AND
URGH
AL.
28.

# THE

# QUEENSLAND AGRICULTURAL JOURNAL,

ISSUED BY DIRECTION OF

THE HON. THE SECRETARY FOR AGRICULTURE.

---

EDITED BY A. J. BOYD F.R.G.S.Q.

---

## VOLUME XXVIII.

---

JANUARY TO JUNE, 1912.

---

BRISBANE:
BY AUTHORITY: ANTHONY JAMES CUMMING, GOVERNMENT PRINTER, WILLIAM STREET,

1912.

QUEENSLAND AGRICULTURAL JOURNAL.

VOL. XXVIII., PARTS 1–6.

# GENERAL INDEX.

# INDEX TO ILLUSTRATIONS.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXVIII. JANUARY, 1912. PART 1.

# Agriculture.

## EXPERIMENTS WITH SMUT PREVENTIVES.

BY R. SOUTTER, Manager, Roma State Farm.

In conjunction with other experiments with winter cereals made last season at the Roma State Farm, the testing of several methods recommended for the prevention of smut in crops was carried out. The results obtained may not be in accordance with those obtained elsewhere, and may, in a measure, appear to contradict recommendations previously made, but it must be borne in mind that the finality in experiment work is not arrived at in one or two seasons, but in many. Consequently, the longer a determination is in being arrived at, the more accurate it must be.

Before going into the experiments made, results obtained, &c., it had probably better be explained that there are two kinds of fungoid pests called smut of which wheat is the host plant. One is known by the names of "bunt," "ball," or "stinking smut," and is the one we are contending with in our tests. The other is called "loose or flying smut." The first-named is the worst in its results on grain garnered, as the flour from such can only be used for inferior purposes. It is hard to detect in a field, though an affected plant is of a darker green than those unaffected plants of a similar variety when growing. When ripe, the affected ears are unmistakable even to the inexperienced eye, as the swollen grain (from which, probably, the word "bunt" is derived*) are much too large for their receptacle in the outer glumes, causing them to open out in such a manner as to give the head a very full appearance. A grain from one of these heads, on

* "To bunt" is "to swell out," and the word is derived from the German "Bund."—Ed.

being opened, will be found to contain a greasy, smutty mass which consists of the spores of the fungus, the odour of which has given rise to the name of "stinking smut."

Loose or flying smut is easily discernible in the field, as the whole of the ear becomes enveloped in a dark smutty mass.

It is just the reverse to bunt in its final effects, as it results in the total destruction of the floral organs, so that at harvest time nothing remains but the bare floral axis. For this reason it has not an injurious effect on the grain garnered, and, as the amount of loss sustained is not so appreciable, little trouble is taken to combat it in Queensland ; and in most cases where a remedy is attempted the wrong procedure is adopted, as, although this smut, like the other, germinates at the same time as the grain of wheat, it requires different treatment to destroy it. This fact will probably afford an explanation to many who have treated barley and oats for smut with bluestone, and still have had dirty crops.

The proper treatment for wheat enemies is immersing the grain for 15 minutes in water at a temperature of 130 degrees to 135 degrees Fahr. This is called "Jenner's" hot-water method, and is as efficacious in destroying bunt spores, and, though cumbersome when compared to other methods in vogue, is practised in some places on account of its not injuring the vitality of the grain, of the knowledge that it has been thoroughly done if the water has been kept at the proper temperature, and that any grain not sown can still be utilised for consumption. To get back to the subject of this paper : In making the tests this season, the following eight sowings were made of smutted grain, viz. :—Untreated, grain treated with carbolised wheat protector, formalin, sheep dip, bluestone, bluestone and lime, brine, arsenic.

The variety used in the test was White Essex, an English wheat of a soft white class, which characteristic, in conjunction with the grain being slightly weathered, would, it was thought, make it more susceptible to infestation than some of our harder wheats, and therefore most suitable for the purpose required.

The method of infesting the grain was by breaking the bunt balls over the grains of wheat and thoroughly mixing, so that all were well covered with spores. The selecting of the 1,460,000 grains was carefully done by hand in order that nothing but sound grain would be sown—a very necessary precaution when it is intended to ascertain the effects of certain treatments on the germination.

The treating of each preparatory to sowing was as follows :—

*Carbolised Wheat Protector.*—This is a powder—a preparation put up by D. Clarke, chemist, Woburn, England. It is intended to prevent all fungoid diseases in wheat, barley, oats ; it is an insecticide, and prevents grain sown being destroyed by birds. It is put up in 1-lb. packets, the contents of which are dissolved in 6 quarts of cold water, which is stirred until all is dissolved. With this mixture the grain is well sprinkled, and kept turned until all is thoroughly wetted, and then allowed to stand for an hour, when it is ready for sowing. The grain, after being treated, is only fit for seed purposes. Our experiment with it was not of sufficient extent to ascertain whether the results accruing from its use are as stated.

*Formalin.*—Owing to the stopper in the bottle of formalin having become loose, it was made stronger—a 60 per cent. solution being used—and the seed immersed for 5 minutes.

*Sheep Dip.*—Solution made by mixing sheep dip with water at the rate of 1—80; seed immersed 5 minutes.

*Bluestone.*—Two per cent. solution made by dissolving 2 lb. bluestone in 10 gallons of water; immersion seed, 5 minutes.

*Bluestone and Lime.*—Bluestone, as just mentioned. Lime water made by slaking 1 lb. of fresh lime in 20 gallons of water; seed immersed in this for 2 minutes after coming out of bluestone water.

*Brine.*—A saturated solution of salt and water made by dissolving as much salt as possible in a quantity of water; immersion, 5 minutes.

*Arsenic.*—Seed just dusted with powdered arsenic; sown, 5-6-10.

The condition of the soil at sowing time was wholly suitable for germination of wheat grains and smut spores, as results show. The bulk of the plants were through by the 16th, though those treated with formalin were a day later.

The method of sowing was as follows:—Furrows 2 inches deep were run out with the Planet Jr. hand cultivator, and the grains embedded in the moist soil 1 foot apart, and the drills covered in, leaving the seed about 2½ inches from the surface.

| Treatment. | Number of Grains sown. | Number Germinated. | Per Cent. | Number of Plants Matured. | Number Smutted. | Per Cent. | Number Clean. | Per Cent. |
|---|---|---|---|---|---|---|---|---|
| 1. Untreated Control ... ... | 183 | 172 | 94 | 165 | 95 | 57.5 | 70 | 42 |
| 2. Carbolised Wheat Protector | 183 | 168 | 91.8 | 160 | ... | ... | 160 | 100 |
| 3. Formalin ... ... ... | 183 | 147 | 84 | 124 | ... | ... | 124 | 100 |
| 4. Sheep Dip ... ... ... | 183 | 172 | 94 | 167 | 74 | 44.3 | 93 | 55 7 |
| 5. Bluestone ... ... ... | 183 | 162 | 88 5 | 148 | 5 | 3.3 | 143 | 96 7 |
| 6. Bluestone and Lime ... ... | 183 | 168 | 91.8 | 166 | 10 | 6 | 156 | 93.9 |
| 7. Brine ... ... ... ... | 183 | 161 | 88 | 151 | 56 | 37 | 95 | 63 |
| 8. Arsenic ... ... ... ... | 183 | 166 | 90.7 | 156 | ... | ... | 156 | 100 |

REMARKS.

*Untreated (Control).*—The growth of these plants was poor when compared to most of the others, showing that some of the treatments confer slight benefits in directions other than that for which they were applied.

*Carbolised Wheat Protector.*—This contained the most forward and best grown plants, heading a week earlier than the others, and being 6 inches higher.

*Formalin.*—The solution made was evidently too strong, as germination was low and tardy; growth made was on a par with untreated plants.

*Sheep Dip.*—The plants grew better than in the control section, but as a smut preventive the results are not at all encouraging, being the reverse to those of last season, and not in accordance with those obtained by others. Probably the strength as advised is not sufficient, and it is intended to increase it next season. Apparently such can be done without undue interference with the germination percentage, as the present formula gives the same percentage as in the untreated block.

*Bluestone.*—This held up its reputation as a smut preventive, though it did not destroy the vitality of the grain to such an extent as it is generally credited with, due in all probability to the fact that there was a good deal of moisture in the soil, which would reduce its caustic action, and that germination was delayed, the plants not appearing for 11 days, which would also mean that it would be much weaker—therefore less injurious to the germination than had the plants appeared, as they do in the early part of the season, in four days.

*Bluestone and Lime.*—Germination here was better than with the bluestone alone, but the greater number of smutted plants more than counterbalanced this benefit.

*Brine.*—This treatment, which at one time was a good deal practised, has proved to be most unsuitable as a smut preventive, as the results show. In addition to this, the germination percentage is low, for some reason.

*Arsenic.*—This was applied more with the idea of ascertaining its value as an insecticide than a fungicide, but results in both directions have been good.

In order to show how the decrease in the germination percentage is due to the different treatments, the following figures are given; the number of plants (172) germinating from the untreated seed being considered 100 per cent.:—

| Treatment. | Number of Plants. | Percentage Loss due to Treatment. |
|---|---|---|
| 1. Control | 172 | .. |
| 2. Carbolised Wheat Protector | 168 | 2.4 |
| 3. Formalin | 147 | 14.6 |
| 4. Sheep Dip | 172 | Nil |
| 5. Bluestone | 162 | 5.9 |
| 6. Bluestone and Lime | 168 | 2.4 |
| 7. Brine | 161 | 6.4 |
| 8. Arsenic | 166 | 3.5 |

As insects and other causes result in the destruction of a number of plants after they have appeared above the ground, and apparently some of the treatments appear to have a beneficial effect in this direction, the losses between the time of appearing and maturity will be given.

| Treatment. | Number of Plants. | Number Matured. | Percentage of Loss between Germination and Maturity. | Percentage of Matured Plants from Grain Sown. |
|---|---|---|---|---|
| 1. Untreated | 172 | 165 | 4.1 | 90.2 |
| 2. Carbolised Wheat Protector | 168 | 160 | 4.8 | 87.4 |
| 3. Formalin | 147 | 124 | 15.7 | 67.7 |
| 4. Sheep Dip | 172 | 167 | 3.0 | 91.2 |
| 5. Bluestone | 162 | 148 | 8.7 | 80.8 |
| 6. Bluestone and Lime | 168 | 166 | 1.2 | 90.77 |
| 7. Brine | 161 | 151 | 6.3 | 82.5 |
| 8. Arsenic | 166 | 156 | 6.7 | 85.2 |

These results, with the exception of the bluestone, bluestone and lime, and brine experiments, are of very little value, excepting for future reference in connection with this work. As before stated, our experience is that the results of one season may be altogether upset in the next, and that only data secured over a number of years of varied character are capable of permitting the value of an experiment to be ascertained.

---

## WATER SUPPLY TO FARMS.

By ARTHUR MORRY, Surveyor, Department of Agriculture and Stock.

The "conservation of water" is equally as important to the farmer or dairyman as the "conservation of fodder," for, without this life-giving and life-sustaining element, his work would at once cease.

Nature, though bounteous, is yet somewhat erratic in her supplies, and it behoves the man on the land to study well the means whereby he may store and distribute her blessings, and thus aid in the general welfare of man and beast.

A plentiful supply of good, pure water is a universal requirement for all animal and vegetable life, and the deprivation or even the excessive limitation of this precious fluid is the most terrible privation which can possibly be endured. It is, therefore, with a full sense of the importance of the subject that attention is directed to it in the following series of short articles, which are intended to be thoroughly practical, and as free as possible from technical terms or phrases which would not be readily understood by the uninitiated.

Very few farmers are favoured with natural fresh-water streams running through their lands. In the large majority of cases, the problem of water supply has to be early grappled with, and often failure and disappointment follow on a considerable expenditure of labour and money in the pursuit of that object. In other cases strenuous efforts are made to impound the rainfall, by the construction of dams or the excavation of holes, which often are ineffective through a lack of technical knowledge.

As far as possible, it will be our endeavour to deal practically with these problems, and to impart such information as will enable our readers to avoid loss and inconvenience, and to secure their object at the minimum of expense.

Questions on any phase of the subject will be considered, and, where possible, dealt with in a simple and practical manner.

Irrigation is too large a matter to be considered in this connection, and may possibly demand a series of articles to itself; but where the farmer can provide himself with a good supply by storage or by tapping subterranean sources, the irrigation of garden plots or of fruit trees may be profitably undertaken without undue expense.

To make the subject as interesting as possible, it is intended to treat it under the following heads:—

I.—"*The Collection and Storage of Rainfall,*" which will be further subdivided into "General Observations on Rainfall"; Percolation; Reservoirs; Dams; Underground Tanks; "Estimation, Collection, and Storage from Roofs."

II.—"*Springs and Subterranean Supplies,*" with Observations on Underground Streams, Tube Wells, Dug Wells, Sub-artesian Bores.

III.—"*The Distribution of Water,*" by Gravitation, Pumps, Hydraulic Rams, Wind Mills, Hot Air, and other Engines.

IV.—"*The Purification of Water*" for Domestic Purposes; for Stock; for the Dairy and Factory.

Specifications for the different classes of work and, where possible, estimates of cost with illustrations will be supplied.

## I.—THE COLLECTION AND STORAGE OF RAINFALL.

The collection and storage of surplus rain water now lost are questions demanding serious attention. However loud our complaints in dry seasons, it is well known that, even in the driest years, if properly conserved, sufficient precipitation occurs to supply our needs apart from irrigation.

Our rainfall under existing circumstances is rendered either positively mischievous or powerless. In one district it runs to waste; in another it inundates the land. At one period we complain of scarcity; at another of extreme abundance. Why, then, should we not husband the surplus and equalise the bountiful supply given to us, as substantiated by facts and figures? Take any small farm of 160 acres, with an annual rainfall of, say, 32 inches, and it is found that during the year—probably during only a short period of the year—not less than 517,074 tons or 115,624,840 gallons of water have fallen on that farm, as every inch of rainfall is equal to 22,622 gallons per acre—no small item. When calculated for only 1,000 acres, the figures are somewhat appalling and make us wonder why there should be a shortage at any time. These figures indeed startle us, yet how unproductive comparatively is this prolific rainfall. It is calculated that only 1 inch per acre would guarantee a sufficient supply for 2½ persons for a whole year; 6 inches of rainfall over an ordinary cottage roof will afford a supply for 4 or 5 persons for a third of the year.

[TO BE CONTINUED.]

---

## THE SOJA BEAN IN NEW ZEALAND.

From the "Journal of the Department of Agriculture," New Zealand, we learn that attention is being directed towards the cultivation of the Soja Bean, and the department obtained some seed for experimental purposes. At Tauranga, seed sown on the 17th December was harvested in May. The plants were then from 2 ft. to 2 ft. 6 in. high. Some yielded from 30 to 80 pods, and amongst them were some which yielded 100. The general yield of beans was estimated at 960 lb. per acre. On a part of the land which was rich, the yield was estimated to be 1,450 lb. per acre. There is every reason to believe that the crop would have been far heavier if the seed had been available for sowing in October. It is recommended that the cultivation, in the first instance, should be similar to that extended to French beans. Later, when the bean may be used for farm purposes, the cultivation as for the field pea may be adopted. It is also suggested that the beans be steeped in warm water to encourage growth.

Soja beans are worth from £7 5s. to £7 10s. per ton in the British market, and the oil about £1 10s. per cwt.

# Dairying.

## THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF NOVEMBER, 1911.

| Cow. | Date of Calving. | Milk. | Test. | Butter. | At per lb. | Value. |
|---|---|---|---|---|---|---|
| | | Lb. | Per Cent. | Lb. | | £ s. d. |
| AYRSHIRES. | | | | | | |
| Auntie ... ... | 31-7-1911 | 1,251 | 3·9 | 54·43 | 10d. | 2 5 4 |
| Queen Kate ... | 10-12-1910 | 572 | 4·8 | 30·93 | ,, | 1 5 9 |
| Lady Margaret ... | 4-2-1911 | 564 | 4·7 | 29·85 | ,, | 1 4 11 |
| Lydia ... ... | 9-9-1911 | 667 | 3·8 | 28·25 | ,, | 1 3 7 |
| Rosebud ... ... | 24-6-1911 | 563 | 3·9 | 24·50 | ,, | 1 0 4 |
| Five cows ... | ... | 3,617 | 21·1 | 167·96 | ,, | 6 19 11 |
| Average ... | ... | 723 | 4·2 | 33·59 | ,, | 1 8 0 |
| SHORTHORNS. | | | | | | |
| Honeycombe ... | 29-8-1911 | 1,215 | 3·8 | 42·98 | 10d. | 1 15 10 |
| Glen ... ... | 30-9-1911 | 908 | 4 | 40·58 | ,, | 1 13 10 |
| Duchess Fanny 27th | 24-8-1911 | 707 | 3·6 | 28·28 | ,, | 1 3 7 |
| Norma ... ... | 12-8-1911 | 599 | 4 | 26·78 | ,, | 1 2 3 |
| Bangle ... ... | 14-8-1911 | 597 | 4 | 26·69 | ,, | 1 2 3 |
| Rusty ... ... | 4-9-1911 | 599 | 3·8 | 25·37 | ,, | 1 1 2 |
| Dora ... ... | 11-6-1911 | 514 | 3·7 | 21·15 | ,, | 0 17 7 |
| Seven cows ... | ... | 5,139 | 26·9 | 211·83 | ,, | 8 16 7 |
| Average ... | ... | 734 | 3·8 | 30·26 | ,, | 1 5 3 |
| HOLSTEIN. | | | | | | |
| Daisy ... ... | 2-2-1911 | 552 | 3·8 | 23·36 | 10d. | 1 7 9 |
| JERSEYS. | | | | | | |
| Cocoa ... ... | 1-5-1911 | 517 | 4·3 | 24·93 | 10d. | 1 0 9 |
| Bliss ... ... | 5-9-1911 | 519 | 4·1 | 23·81 | ,, | 0 19 11 |
| Careless ... ... | 16-12-1910 | 428 | 4·7 | 22·65 | ,, | 0 18 10 |
| Bluebelle ... ... | 20-4-1911 | 396 | 4·7 | 20·96 | ,, | 0 17 5 |
| Four cows ... | ... | 1,860 | 17·8 | 92·35 | ,, | 3 16 11 |
| Average ... | ... | 465 | 4·4 | 23·09 | ,, | 0 19 3 |

GRADES.

| Cow. | Breed. | Date of Calving. | Milk | Test. | Butter. | At per lb. | Value. |
|---|---|---|---|---|---|---|---|
| | | | Lb. | % | Lb. | | £ s. d. |
| Night ... ... | Holstein-Shorthorn | 27-9-1911 | 609 | 4 | 27·22 | 10d. | 1 2 8 |
| Lalla ... ... | Holstein-Ayrshire | 24-9-1911 | 626 | 3·7 | 25·76 | ,, | 1 1 5 |
| Nancy ... ... | Guernsey-Shorthorn | 9-8-1911 | 512 | 4 | 22·87 | ,, | 0 19 1 |
| Three cows ... | ... | ... | 1,747 | 11·7 | 75·85 | ,, | 3 3 2 |
| Average ... | ... | ... | 582 | 3·9 | 25·28 | ,, | 1 1 1 |

AVERAGE FOR NOVEMBER, 1911.

| No. | Breed. | Milk (lb.) | Test. | Butter (lb.) | At per lb. | Value. |
|---|---|---|---|---|---|---|
| | | | Per Cent. | | | £ s. d. |
| 5 | Ayrshires ... ... | 3,617 | 21·1 | 167·96 | 10d. | 6 19 11 |
| 4 | Jerseys ... ... | 1,860 | 17·8 | 92·35 | ,, | 3 16 11 |
| 7 | Shorthorns ... ... | 5,139 | 26·9 | 211·83 | ,, | 8 16 7 |
| 3 | Grades ... ... | 1,747 | 11·7 | 75·85 | ,, | 3 3 2 |
| 1 | Holstein ... ... | 552 | 3·8 | 23·36 | ,, | 1 7 9 |
| 20 | ... | 12,915 | 81·3 | 571·35 | | 24 4 4 |
| | Average ... ... | 646 | 4·6 | 28·67 | ,, | 1 4 2 |

Average return of each cow for November = £1 4s. 2d.

Auntie received the following daily ration from 1st to 21st November:—20 lb. lucerne hay; and from 22nd to 30th November was fed daily as follows:—10 lb. lucerne chaff, 4 lb. crushed oats, 4 lb. bran, 3 lb. oilcake, and grazed on natural pasture. This cow competed at the Noosa Agricultural and Pastoral Society's Show early in November, where she won two first prizes in butter-fat tests, and second prize for "cow giving largest quantity of milk in twenty-four hours." Auntie was judged Champion Dairy Cow of the Show. Her butter returns for November amount to 54·53 lb., which at 10d. per lb. equals £2 5s. 4d., while the cost of feeding is as follows:—

| | | | | | | £ s. d. |
|---|---|---|---|---|---|---|
| 1st to 21st November— | 20 lb. | Lucerne hay daily | = 420 lb. | at £4 per ton ... | = | 0 15 0 |
| 22nd to 30th ,, | 10 ,, | Lucerne chaff ,, | = 90 ,, | at £4 10s. per ton | = | 0 3 7 |
| | 4 ,, | Crushed oats ,, | = 36 ,, | at 3s. per bushel | = | 0 2 8 |
| | 4 ,, | Bran ,, | = 36 ,, | at £4 10s. per ton | = | 0 1 7 |
| | 3 ,, | Oilcake ,, | = 27 ,, | at 8s. 3d. per cwt. | = | 0 2 0 |
| | | Total cost ... ... ... | | | = | 1 4 10 |

Which leaves a profit of £1 0s. 6d.

The following cows, namely, Queen Kate, Lady Margaret, Honeycombe, and Rosebud, each received the following daily ration:—20 lb. lucerne hay, and grazed on natural pasture.

Cost of feedin four cows from 1st to 30th November:—2,400 lb. lucerne hay, at £4 per ton = £4 5s. 9d. The butter returns from these four cows equal £5 6s. 10d., leaving a profit of £1 1s. 1d.

The remaining fifteen cows were grazed on lucerne stubble from 1st to 12th November for one and a-half hour daily, and from 13th to 30th November on natural pasture only.

| | | |
|---|---|---|
| The total cost of feeding twenty cows ... ... ... ... | = | £6 11 8 |
| Total butter returns ... ... ... ... ... ... | = | 24 4 4 |
| Profit ... .. .. ... ... ... | = | £17 12 8 |

## THE DETERMINATION OF MOISTURE IN BUTTER.

By J. C. BRÜNNICH AND F. SMITH.

The fact that samples of butter are from time to time received in the departmental laboratory and found to exceed the legal limit for moisture in export butter indicates the necessity of strict supervision of the product at the factory as it leaves the worker. In view of the various excellent outfits procurable for the speedy determination of the water-content of butter, omission in this direction is hardly justifiable. While failure to fall below the prescribed standard entails retention at the port of shipment, the carrying of percentages considerably below 15 per cent. will in the course of a season mean certain monetary sacrifice to manufacturers—an additional reason for the checking of the composition of the output at the factory.

For the purpose of testing the limits of accuracy of the rapid factory method of drying in a metal dish over an alcohol flame, a series of determinations were made by this method for comparison with the widely employed laboratory procedure of drying on pumice-stone at the temperature of the steam oven :—

| Sample. | Drying in Steam Oven on Pumice Stone. Duplicate Determinations. | | Rapid Drying over Spirit Lamp. Duplicate Determinations. | |
|---|---|---|---|---|
| 1 | 14.55 | 14.40 | 14.37 | 14.20 |
| 2 | 13.98 | 13.95 | 13.62 | 13.45 |
| 3 | 13.68 | .. | 13.25 | .. |
| 4 | 17.95 | 17.90 | 17.80 | .. |
| 5 | 15.05 | 15.05 | 15.07 | 15.02 |
| 6 | 14.75 | 14.90 | 14.85 | 14.90 |
| 7 | 16.45 | 16.52 | 16.15 | 16.20 |
| 8 | 15.00 | 14.92 | 14.96 | 15.15 |

The sample, consisting of approximately 5 grammes, is placed in a shallow metal dish with a glass rod, and heated on a wire gauze over the flame of a spirit lamp. During heating the sample is constantly stirred, and the dish is removed from the flame after active frothing has ceased, and immediately the curd becomes a rich brown colour.

The obvious sources of error are mechanical losses by sputtering, or either insufficient heating, when the contained water will not be all expelled, or overheating, with consequent decomposition of fat or curd.

The concordance of duplicate results, however, and their agreement with the laboratory method show that in careful hands the method gives accurate results, and it is to be recommended in factory control, where analyses of samples representative of separate churnings are desirable.

Owing to the recognised volatility of boracic acid with steam, it was deemed advisable to investigate the effect of the presence of this preservative on the accuracy of moisture determination in butter by usual laboratory methods. The moisture was determined in samples of butter by two methods —(*a*) drying on pumice in the steam oven ; (*b*) drying in the steam oven after addition of alcohol—before and after addition of boric acid. The results, which it is thought will be of interest to factory managers and butter-makers, are summarised below :—

| | | Drying on Pumice. Per cent. | | Drying with Alcohol. Per cent. |
|---|---|---|---|---|
| I.—(*a*) | Boric free .. .. .. .. | 12.90 | .. | 12.80 |
| (*b*) | Containing .5 per cent. boric acid .. | 13.00 | .. | 13.31 |
| (*c*) | Containing 3 per cent. boric acid .. | 13.00 | .. | 13.13 |
| II.—(*a*) | Boric free .. .. .. .. | 13.12 | .. | 13.07 |
| (*b*) | Containing .75 per cent. boric acid .. | 12.91 | .. | 13.69 |

To further test the question, a known weight of pure dry butter fat was taken, and an addition made of a small accurately weighed amount of boric acid dissolved in water. The dishes were placed in the steam oven till their weights became constant :—

| | Drying on Pumice-Stone. (1.) Grms. | | (2.) Grms. | | Drying with Alcohol. (1.) Grms. | | (2.) Grms. |
|---|---|---|---|---|---|---|---|
| Wt. of fat taken .. .. | 4.604 | .. | 6.765 | .. | 4.698 | .. | 4.508 |
| Wt. of boric acid taken .. | .030 | .. | .040 | .. | .030 | .. | .030 |
| Total wt. taken .. .. | 4.634 | .. | 6.805 | .. | 4.728 | .. | 4.538 |
| Total wt. recovered .. | 4.625 | .. | 6.804 | .. | 4.702 | .. | 4.510 |
| Loss of boric acid .. .. | .009 | .. | .001 | .. | .026 | .. | .028 |

The conclusion is that the percentages of water found by drying on pumice in the steam bath are but inappreciably affected by the presence of boric acid ; whereas, where the volatilisation of water is assisted by the addition of alcohol (a rapid method occasionally recommended), boric acid is largely expelled and is calculated as moisture.

---

## FARMERS' COWS.

When, in April, 1911, the cash value and net profit of the produce of the dairy cows at the Queensland Agricultural College were published, we suggested that it would be interesting and instructive to have similar returns from a few of the best private dairy farms for the purpose of comparing the results with those of the College. It was only at the latter end of November that we received a response from one dairy farmer—Mr. J. Wiggins, of Harrisville—who was milking six cows in September (one, a two-year-old) and five in October, the latter receiving as much feed as was previously divided amongst six. The cost and class of fodder are not given, but Mr. Wiggins supplied the credit notes of the Queensland Farmers' Co-operative Company's Factory at Booval, which show that he received for the month of September £7 10s. 5d. (less railage 2s. 9d., £7 7s. 8d.), and for October £7 9s. 5d. (less railage 2s. 9d., £7 6s. 8d.), for 157 lb. and 163 lb. of butter, at 11½d. per lb. in September and 11d. per lb. in October.

For the same months, the return from five Shorthorns of the College herd for September was £8 13s. 8d., an average cow value of £1 14s. 9d. (butter at 1s. 1d. per lb.), and for October seven Shorthorns returned £10 3s., an average cow value of £1 9s. The average cow value of the whole herd for September was £1 15s. 5d., and for October £1 7s. 5d. The cost of feeding 20 cows at the College in September was £22 12s. 10d., or about £1 2s. 7½d.

per cow; commercial butter returns, £35 7s. 9d.; total profit, £12 14s. 11d.; profit per cow, 12s. 9d.

One Ayrshire (Auntie), though costing £1 13s. 7d. to feed for the month, returned £3 18s. 6d., showing a profit of £2 14s. 11d.; and one Shorthorn (Honeycomb) returned a profit of £1 3s. 9d., showing that a high ration results in a high profit.

The cost of feeding in October was considerably less, as only five cows cost 16s. 1d. each, and the remaining fifteen were grazed mainly on lucerne stubble, receiving on the last five days of the month 25 lb. of lucerne silage daily.

The five cows showed a profit of £4 14s. 8d., and the fifteen a profit of £17 7s. 6d.

The total cost of feeding the twenty cows was £4 5s. 5d.; commercial butter return, £27 7s. 7d.; total profit, £22 2s. 2d.

As Mr. Wiggins has not stated the cost of feeding his cows, consequently the actual profit per cow cannot be stated, and no comparison can be made between his results and those of the College.

---

## WINTER FEED FOR DAIRY STOCK.

By G. B. BROOKS, Instructor in Agriculture.

There is probably no branch of agricultural practice more neglected in our State than that of providing winter feed for our dairy stock.

This neglect is no doubt due to the belief prevalent amongst dairymen that the natural grasses are sufficient to support their herds throughout the winter. To be able to do so no doubt speaks well for the value of our grasses, still the cream cheque would be considerably increased were that idea knocked on the head, and the question of supplementary feeding considered an absolute necessity.

Even although the dairyman should be the fortunate possessor of a well-filled silo, he should also have an area of land set apart to grow sufficient winter feed for the needs of his herd. In the event of climatic conditions proving adverse for the raising of such, the stored material in the silo could then be brought into requisition.

### PREPARATION OF THE LAND.

Although the successful raising of winter crops depends to a very large extent upon the rainfall during growth, yet the preparation of the land and the time and method of planting are equally important.

The common practice of waiting until the commencement of the planting season before breaking up the land cannot be too strongly condemned, for not only is the turned-up soil in a very raw and unsuitable condition for the reception and germination of the seed, but its powers of absorbing and retaining moisture are very considerably reduced. This truth was amply demonstrated last season. When the land was ploughed late and planting followed up immediately after, the resulting crop was in almost every instance a complete failure. It follows, therefore, that the early preparation of the land on the dry-farming system should be closely adhered to.

In connection with the study of climatic conditions, it will be observed that early sowing is generally the most successful. An effort should, therefore, be made to get the crop in as close to the end of the wet season as possible.

## CROPS TO GROW.

The keeping up of a supply of succulent material can either be accomplished by successive plantings of the one crop or by the growing of a variety of crops, which mature at widely different periods.

The latter method is to be preferred, for, under favourable conditions, these crops can be sown at the same time, whereas, in the case of a single crop, successive plantings have to be made, and these when conditions for germination are very often unfavourable.

The farmer who has no summer-grown crop to fall back upon will, of necessity, have to put in a crop that will come in fairly early. For this purpose, Cape Barley is most suitable, as it can be planted somewhat earlier than the main crop—say about the end of February. The skinless variety of barley is a very quick grower, but, if planted early and in a humid situation, is liable to rust. About 1½ bushel of either sort is sufficient to broadcast an acre.

Should weather conditions be favourable, further sowings of cape and skinless barleys, together with wheat, rye, and oats, should be made. These would mature at different periods, and thus keep up a supply of green stuff right through the winter. The largest area should be under oats. This crop will mature last, and, in the event of the whole patch not being required for green feed, the balance could be converted into hay.

It will be found of considerable advantage to plant field peas with any of the cereals just mentioned. These can be mixed in almost any proportion up to half quantities of each. A greater quantity of peas will invariably cause the crop to lodge, making it difficult to harvest. A mixture to be recommended is ½ bushel peas to 1½ bushel oats, or 1¼ bushel of either barley or wheat.

In growing field peas for seed purposes, it is always advisable to plant with them some supporting crop to facilitate harvesting. A sprinkling of horse or field beans is generally used for this purpose.

There are several varieties of field pea to choose from. The grey or green sorts, as a rule, give best results. It may be mentiond that the feeding value of a cereal crop is increased to a very large extent by the addition of legumes such as peas or vetches. These legumes also add considerably to the total yield of crop, owing to the fact of their being deep-rooters deriving the greater portion of their nourishment from a lower depth than that drawn upon by most of the cereals.

In sowing, the mixture can be broadcasted in the usual way, although better results can be secured by planting the peas in the rough ground as left by the plough, and the cereals after a single strip of the harrow or, better still, put in with the drill.

Should it be necessary to cross-plough the land immediately prior to planting, the ploughing-in of both peas and cereals is recommended, care being taken not to cover too deep. Excellent results have been secured from this method, more especially in a dry season.

Another useful crop, and one that has the advantage of being easily raised, is dwarf Essex rape. Planting can be carried out from the end of February to June, and, under favourable conditions, a cutting will be secured in about six weeks. It can be either broadcasted or sown in rows; the latter method for preference.

In broadcasting, about 8 lb. of seed is required per acre; with rows 2 ft. 6 in. apart, 2 lb. of seed is sufficient.

The soil should be brought into good tilth, and scuffling between the rows will add materially to the yield.

The growing of cattle cabbages for the dairy herd is also worthy of consideration. Where conditions of soil and moisture are suitable, enormous crops can be raised.

The cabbage plant is an extremely gross feeder, and rich or well-manured soil is required to produce the best results.

When caterpillars are likely to be troublesome, planting the seed direct in the field, which will only mean a few rows, is recommended. Very sturdy plants will result, and the transplanting of these should only be carried out during moist weather.

The sowing of cabbage rape, turnip, or even larger seeds such as sorghums, can be carried out very expeditiously, where a machine is not available, by opening up with a scuffler or hoe and using a coffee-tin tied to a walking-stick as a planter. The tin should have three holes punched in the bottom, from inside; each hole just large enough to let a single seed through when shaken.

Most makes of maize-planters can be easily fitted to sow almost any class of crop; all that is required being a few extra discs bored to suit the various-sized seed.

The growing of cereals between rows of a late crop of corn, if planted during the last scuffling, will often give a large amount of green stuff for grazing off.

To carry this out successfully, it is advisable to have the maize rows well apart—say, 4 ft. 6 in. to 5 ft. The planting of cowpeas for pig-feeding purposes on the same lines is also to be recommended, of course allowing the pigs to do the harvesting.

---

## THE ANGORA GOAT.

By W. G. BROWN, Sheep and Wool Expert, Department of Agriculture and Stock.

In the production of mohair, the South Africans have an industry which returns over £700,000 per annum. Naturally they think a great deal of it, for the limits of expansion are still very wide. They think so much of it, indeed, as to impose an export tax of £100 on every Angora ram or ewe leaving the country. This tax, plus the initial cost, makes it prohibitive for Australians to pay that price, in the present state of the business here. At Graf Reinet sales recently, two of the best Angoras brought £450 and £400, and for seventeen others an average of £191 15s. 3d. was obtained; three ewes averaged £76 13s. 4d.

Recently the South Africans came to the conclusion that merinoes would do equally well, and to that end they have imported numbers of the highest-priced and best of our flocks, money no object; and with them they have first-class Australian sheep men to teach the pastoralist in South Africa our methods of breeding and management. To the ordinary mind Australian breeders seem to be acting very unwisely, when it is considered that Africans will not let us have Angoras without an extreme penalty.

Fortunately, there are enough high-class Angoras in Australia, with America to draw upon, to hit back successfully at the attack on our fine-wool industry with an attempt on the mohair business. We have enormous areas of scrubby lands extremely well suited to the Angora; skill in breeding and handling stock of all kinds; a climate in which all animals thrive; and a very much shorter list of diseases in stock than our African rivals. A good sheepmaster will make a first-rate Angora man, as the animal is very much easier to handle than sheep. It is the object of this article to give some particulars as to management, with prices, &c.

The Angora is a native of Angora, a vilayet in Asia Minor, and the Turks claim an ancestry of 2,400 years for the animal. The country they occupy there is about 2,000 feet above the sea, and is drier in climate than almost any part of Australia, excepting the centre of our island. The Angora can stand any climate from the Arctic regions to the equator, provided it is not wet or humid. Goats have to keep dry under foot or overhead.

They cut a fleece which is valuable according to the purity of their breeding. The quickest way to start a flock is to get common white nannies which should be fine-haired and as smooth-skinned as possible, and cross with a pure Angora buck. The weight of fleece and value per lb. are as follow:—

1st cross will not pay to shear.

2nd cross, 1 to 2 lb.; value, 8d. per lb.

3rd cross, 2 to 3 lb.; value, 10d. per lb.

4th cross, 3½ to 4 lb.; value, 12d. per lb.

After the fourth cross the animals are "grade," but the bucks should not be used. Select the very best bucks from the start. It will shorten the process of forming a flock. Use 2 per cent. of bucks. Do not use animals with big, coarse heads, rough hairy coats, and long hair on breech or shoulder. The dentition of goats is the same as sheep, *i.e.*:—

| | |
|---|---|
| 2 teeth .. .. .. .. .. | 12 months old. |
| 4 teeth .. .. .. .. .. | 24 months old. |
| 6 teeth .. .. .. .. .. | 36 months old. |
| 8 teeth .. .. .. .. .. | 48 months and over. |

Goats are comparatively long lived, 15 years being a common productive age to which they live. They require a strong fence, but not necessarily a high one. A good specification is a 6-wire fence, posts 25 ft. apart, with three droppers, which will cost approximately £26 per mile; or netting may be used, 4-inch mesh and 25 gauge, with one wire 10 in. above the top of the netting. Logs, stumps, and leaning trees should be removed from the line for obvious reasons. Wires should be 3 in. from the ground and 6 in. after in the case of a wire fence.

Angoras are strictly browsers, and improve scrubby country better than any other agency whatever, for they pay for their board and earn money for the owner besides. They exterminate seedlings and suckers. They are cleanly animals, and practically immune from tuberculosis and kindred diseases.

As they shed their coats on the approach of spring, it is necessary to shear them at that time. Machines should be used. They should be furnished with a shed or sheds in case of rain and clean water, as they are most fastidious animals. Castrate not later than at three weeks old. It is necessary to shepherd them when they reach new country for a week or two, and then they will learn to come home regularly at night.

It is necessary to keep the "wet" goats apart from the "dry" especially at the time when the kids are about to drop. The period of gestation is about 21 weeks; and when the time comes, it is very necessary that the kid be watched and kept separate from other kids. If two young kids be rubbed together, it is very probable that the mothers will repudiate them. They are not what sheep-men call "good mothers" for, if they lose sight of their young soon after kidding, they forget them easily. At three weeks and later, however, the mothers are as good as any sheep. According to Professor Thompson, of the American Agricultural Bureau, the best plan is to keep the kids at home for a week or two, and it is done easily by putting a board 18 in. high and 2 in. thick at the gate of the yard. When the mothers go to feed, the kids cannot jump that height. When they can jump the obstacle, they are fit to accompany their mothers to the range. In Mexico each kid is tethered so that it shall not touch another in the yard. As to profit, here is an Australian instance:—Mr. E. C. Kempe, of Warrina, Adelaide, owner of the "Central Australia Flock of Pure Angoras" running north of Lake Eyre (120 miles south of Birdsville, Queensland), says that his mohair, somewhat affected by drought, sold in London at 1s. 2d. per lb. for fleece, unclassed; locks, 7½d. On another occasion, best fleece mohair brought 2s. per lb. Half-bred skins sold in Adelaide at 4s. 3d. each. Dressed skins with fairly long hair brought 12s. 6d. each, and generally the price of skins in the the flocks varied from 5s. to 20s. apiece. The above price was the lowest Mr. Kempe ever received for his clip of mohair.

There is a standing advertisement in the "American Sheep Breeder" whereby Mr. Lekussore, of New York, offers 4s. 2d. (1 dollar) per lb. for hair of 12 in. or over in length. His address is 152, Third Avenue, New York, U.S.A. Messrs. Blaxland and Knox, of Wyalong, N.S.W., sold the fleece of a stud buck to Mr. Lekussore at 4s. 2d. per lb.

According to Bowman, "Structure of the Wool Fibre," page 126, "Mohair is a true wool possessing curly structure, fine development of epidermal scales, and bright, metallic lustre." Consequently, as wools, all wools, improve in Australia, it is probable that the Angora will, here, given the same care and skill which is lavished on the merino, do at least as well as in other lands.

Professor Thompson asserts that these animals cleared one of the Antilles Islands of lantana, one of our imported vegetable pests. Scrub is dessert for goats, and also the main part of the "menu."

They require plenty of salt—as much as or more than sheep.

Do not breed before the animals are from 16 to 18 months old. They will breed at from 5 to 6 months if allowed.

The percentage of kids to nannies with 2 per cent. of rams is from 75 to 100 per cent.

Kill all "rigs." They are only a nuisance, and their skins are worth 5s. to 20s. according to quality; 4 in. is short for a mohair staple.

A fairly well-bred Angora on reasonably good country will average about 6 lb. On very good country where there are plenty of weeds, small trees, scrub, or thick undergrowth, about five goats to the acre will find a good living until the country is cleared. They must not be kept too long, however, on the one range for obvious reasons.

It is necessary at first to milk the deep-milking goats, until their kids are big enough to take all their mothers' milk.

March and April are the best months to join the bucks.

Angora goat flesh is quite equal to the best mutton, and requires a longer cooking.

Bucks may be obtained from Messrs. Blaxland and Knox, Wyalong, N.S.W.; Blaxland and Son, Murinbin, Patrick's Plains, N.S.W.; Mr. E. C. Kempe, Warrina, South Australia; and many others. Mr. W. R. Robinson, of Toowoomba, Queensland, can also obtain good bucks from several Queensland growers. Prices run, for bucks, from £3 3s. upwards. Nannies are not sold locally, only for export or to go to another State. The cost of obtaining a buck through the Department of Agriculture would depend upon the selling price and the distance by rail or by sea.

The above is a short description of the Angora, and full particulars may be obtained by correspondence through the Editor of the "Queensland Agricultural Journal" concerning any points which may have been missed by the writer.

The writer has to acknowledge as sources of information Messrs. W. R. Robinson and Major A. J. Boyd's pamphlets; Professor Thompson, of the U.S. "Bureau of Agriculture"; and Messrs. Blaxland and Knox's article in "Dalgety's Review" for October.

# Poultry.

## REPORT ON EGG-LAYING COMPETITION, Q.A. COLLEGE, NOVEMBER, 1911.

Three thousand and five eggs were laid during the month, an average of 125.2 per pen. Broodies have again been troublesome, 39 hens having been out during November. J. Gosley wins the monthly prize with 151 eggs. The following are the individual records:—

| Competitors. | Breed. | November. | Total. |
|---|---|---|---|
| J. F. Dalrymple, N.S.W. ... ... ... | White Leghorns ... ... | 135 | 950 |
| E. A. Smith ... ... ... ... | Do. ... ... | 131 | 910 |
| Range Poultry Farm ... ... | Do. ... ... | 108 | 903 |
| Yangarella Poultry Farm ... ... | Do. ... ... | 126 | 900 |
| J. Holmes ... ... ... ... | Do. ... ... | 125 | 890 |
| Alex. Smith ... ... ... ... | Do. ... ... | 131 | 879 |
| Cowan Bros., N.S.W. ... ... | Do. ... ... | 136 | 860 |
| Jas. McKay ... ... ... ... | Do. ... ... | 137 | 847 |
| J. Gosley ... ... ... ... | Do. ... ... | 151 | 847 |
| Mrs. Kinnear, S.A. ... ... | Do. ... .. | 119 | 842 |
| A. Hollings, N.S.W. ... ... | Do. ... ... | 126 | 840 |
| A. J. Cosh, S.A. ... ... ... | Do. ... ... | 131 | 829 |
| S. Chapman ... ... ... ... | Brown Leghorns ... ... | 130 | 816 |
| R. Burns ... ... ... ... | White Leghorns ... ... | 135 | 815 |
| A. H. Padman, S.A. ... ... | Do. ... ... | 138 | 785 |
| H. Hammill, N.S.W. ... ... | Do. ... ... | 136 | 771 |
| J. Zahl ... ... ... ... | Do. ... ... | 139 | 758 |
| R. Burns ... ... ... ... | S.L. Wyandottes ... ... | 124 | 737 |
| A. Astill ... ... ... ... | White Leghorns ... .. | 112 | 628 |
| R. W. Goldsbury ... ... ... | Do. ... ... | 121 | 615 |
| Mrs. A. A. Carmichael ... ... | Brown Leghorns ... ... | 108 | 614 |
| J. K. Stewart ... ... ... | White Plymouth Rocks (1) | 104 | 470 |
| J. K. Stewart ... ... ... | Do. do. (3) | 102 | 444 |
| J. K. Stewart ... ... ... | Do. do. (2) | 100 | 384 |
| Totals ... ... ... | ... | 3,005 | 18,334 |

## POULTRY-KEEPING.

On this subject, the late Mr. John Mahon, Principal of the Queensland Agricultural College, wrote :—

Although our Queensland climate is one of the best in the world for poultry-raising, we find comparatively few people who give any consideration to the industry in question. If our farmers kept a few head of good poultry, instead of a large number of nondescripts, they would find that they paid better than almost anything on the farm. In the wheat districts, if movable houses were used, thousands of fowls could be kept on the stubble for two or three months after the harvest with practically no expense. Movable houses could also be used with advantage on any large farm, and, if they were shifted every fortnight on to fresh ground, the birds would almost find their own living. I would like to see this system adopted by our farmers during six or seven months of the year, and I am sure it would prove a paying concern. Poultry would also be of great benefit to our orchardists, for, besides returning a handsome profit, they would greatly assist in keeping down scale and other insect pests; moreover, the manure which would be

PLATE 1.—OPEN FRONT COLONY HOUSES WITH HINGED SHADE IN FRONT.

PLATE 2.—COLONY HOUSES AT LITTLE COMPTON, R. I., SHOWING THE CART FOR FOOD AND WATER.

PLATE 3.—COLONY HOUSES FOR LAYING STOCK, LAKEWOOD FARM. SHOWING NEST BOXES.

distributed is one of the best-known fertilisers. Poultry-keeping would also go well with dairying, and, if run with movable houses, would entail very little extra labour; moreover, surplus milk could not be put to a better use than feeding it to poultry, as it is especially good both for fattening table birds and also for egg production. Farmers and others with plenty of room have an advantage over the ordinary householder; their birds can find a large amount of natural food when running at large, and they can also grow on the farm a great deal of the food required. Another good plan for the farmer is to divide his cultivation into two parts—crop one, and run the poultry on the other; then, when the crops have been harvested, move the birds and put under crop the portion on which they had been running. Many American farmers work on this plan, which has been found to give excellent results both in the way of increased crops and in good returns from the poultry. Movable houses may be used for this system, and these can either be built on wheels or fitted with slides. The above is usually called the "colony house" plan, and it will be found to be the least expensive of any known system.

NOTE.—The three cuts forwarded show how the Americans work the system.

---

# Statistics.

## COMMONWEALTH METEOROLOGY.

### RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

| STATIONS. | 1910. | | 1911. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Nov. | Dec. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. |
| *North.* | | | | | | | | | | | | | |
| Bowen ... ... ... | 3·89 | 5·36 | 23·72 | 7·57 | 10·66 | 1·64 | 0·12 | 0·2 | Nil | 0·15 | Nil | 1·5 | 0·19 |
| Cairns ... ... .. | 7·27 | 11·59 | 34·49 | 27·43 | 35·35 | 52·31 | 2·08 | 1 44 | 1·48 | 0·27 | 0 6 | 0·88 | 1·95 |
| Geraldton (Innisfail) ... | 7·30 | 4·77 | 36·96 | 35·51 | 28·39 | 50·53 | 3·58 | 5·10 | 6·20 | 0 79 | 0·30 | 0·73 | 1·61 |
| Gindie State Farm ... | ... | 3·87 | 11·69 | 4·15 | 2·29 | 0·29 | 0·29 | Nil | Nil | 0·49 | ... | 0·81 | ... |
| Herberton ... ... | 4·93 | 9·71 | 11·43 | 13·16 | 15·35 | 14·17 | 0·58 | 0·36 | 0·40 | 0·5 | Nil | 0·9 | 0·62 |
| Hughenden ... .. | 3·41 | 1·13 | 9·15 | 3·76 | 0·17 | 6·29 | 0·4 | 0·2 | 0·2 | Nil | Nil | Nil | 1·37 |
| Kamerunga State Nurs. | ... | ... | ... | 23·08 | ... | 52·28 | 1·51 | ... | ... | ... | ... | ... | ... |
| Mackay ... ... | 2·67 | 2·15 | 30·52 | 13·04 | 14 41 | 3·14 | 0·77 | 0·22 | 0·43 | 0·18 | 0·3 | 0·93 | 0·17 |
| Mossman ... ... | 10 36 | 19 91 | 32·76 | 21·95 | 71·64 | 37·10 | 1·44 | 0 33 | 1·28 | 0·39 | 0·09 | 0 55 | 0·86 |
| Rockhampton ... ... | 4·17 | 2·46 | 9·64 | 21·07 | 6 39 | 1·44 | 0·56 | Nil | 0·24 | 1·17 | Nil | 0·40 | 0·6 |
| Townsville ... ... | 2·53 | 6·77 | 25·40 | 19·24 | 4·24 | 3·02 | 0·7 | 0·11 | Nil | Nil | Nil | 0·39 | 0·31 |
| *South.* | | | | | | | | | | | | | |
| Biggenden State Farm | 4·59 | 5·96 | 10·37 | 7·34 | 6·25 | ... | ... | ... | ... | ... | 0·79 | ... | ... |
| Brisbane ... ... | 2 49 | 13·99 | 10·30 | 5·84 | 4·69 | 0·88 | 0·90 | 0·9 | 1·70 | 2·22 | 0·84 | 4·95 | 0·84 |
| Bundaberg ... ... | 8·39 | 1·58 | 21·05 | 9·75 | 4·31 | 1·46 | 0·56 | Nil | 0·37 | 1·15 | Nil | 2·36 | 1·30 |
| Crohamhurst ... ... | 3·31 | 6·20 | 28·85 | 19·20 | 16·67 | 2·94 | 1·21 | 0·13 | 3·58 | 2·62 | 0·51 | 6·27 | 1·74 |
| Dalby ... ... ... | 4·09 | 3·29 | 8·08 | 2·24 | 3 20 | 0·76 | 0·91 | Nil | 0·68 | 0·43 | 0·42 | 3·45 | 1·99 |
| Esk ... ... ... | 3 84 | 7·53 | 11·90 | 6·04 | 3 54 | 0·99 | 1·90 | Nil | ... | 1·51 | 2·04 | 4·17 | 0 47 |
| Gatton Agric. College | 2·85 | 6·84 | 12 03 | 3·98 | 2·80 | 1·38 | 0·58 | Nil | 0 72 | 0 90 | 0·96 | 3 77 | 0·49 |
| Gympie ... ... | 3·16 | 1·96 | 9·13 | 5·33 | 6 02 | 1·88 | 0·32 | Nil | 0·97 | 0·48 | 0·26 | 2·42 | 0 50 |
| Ipswich ... ... | 1·96 | 5·04 | 8·15 | 4·19 | 2·51 | 1·38 | 0·42 | Nil | 0·59 | 1·12 | 0·34 | 4·71 | 0·25 |
| Maryborough ... ... | 4·19 | 3·19 | 16·93 | 6·58 | 7·20 | 2·61 | 0·16 | 0·11 | 0·62 | 1·47 | 0·9 | 2·81 | 0·90 |
| Roma ... ... .. | 4·39 | 0·96 | 11·52 | 5·94 | 1·25 | 0·14 | 1·13 | Nil | 0·67 | 1·55 | 0·87 | 1·9 | 1·55 |
| Roma State Farm ... | 3·50 | 7·97 | 9·72 | ... | 5·39 | 0·04 | ·02 | ... | ... | 1·39 | 0·74 | 1·31 | 1·29 |
| Tewantin ... ... | 7·71 | 8·25 | 20·84 | 8·50 | 18·11 | 1·78 | 0·57 | 0·22 | 2·53 | 1·07 | 0·4 | 7·48 | 1·14 |
| Warren State Farm ... | ... | ... | ... | 11 75 | 3·17 | ... | ... | Nil | 0·6 | 1·01 | ... | 0·64 | ... |
| Warwick ... | 3·86 | 3·46 | 7·13 | 2 01 | 3·12 | 0·74 | 1·04 | Nil | 1·20 | 1·50 | 0·80 | 1·78 | 2·26 |
| " Hermitage State Farm | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 0·60 | ... |
| Westbrook State Farm | ... | 4·44 | 5·26 | 3·90 | 1·76 | 5·50 | 0·79 | 0·1 | 1·1 | 0·54 | 0·82 | 1·77 | 2·68 |
| Yandina ... ... | 5·16 | 16·05 | 12·04 | 10·73 | 12·02 | 2·68 | 0· | Nil | 2·43 | Nil | 0·30 | 2·90 | 1·36 |

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as pproximate only.

GEORGE G. BOND, Divisional Officer.

# State Farms.

## SELECTION OF SEED MAIZE.

By T. JONES, Manager State Farm, Warren.

I shall offer a few suggestions as to how I think a farmer should select his maize seed.

Maize seed should be selected while on the stalks in the field, because it is here that the habits of the corn are displayed. The size and length of shanks, the height of the cob on the stalk, the healthy condition of the stalk, as well as the healthy condition of growth—viz., foliage and cobs free from grubs—can all be observed.

It is not always wise to select the largest cob for seed, because very large cobs mostly owe their size to exceptional conditions during growth; neither is it wise to select cobs that stand too upright on the stalks, because such cobs readily take in rain, thus making shoots grow out from the ends of the cobs.

The cob on a shank that will slightly bend is the cob to select.

It is essential that the stalks should be strong and healthy at the early stage of growth, in order to support the cobs; otherwise the crop may be knocked down by the rain and destroyed.

Another point in field selection of maize is to see that the husks extend well over the points of the cobs. This protects the cob from the cotton-boll worm, and also from the weather.

Select cobs that are not too high on the stalks, from stalks that have grown under difficult conditions, not forgetting that the shank should be slightly bent.

The time to select the seed is when some of the cobs are ripe, some ripening, and some green. At such stages it is easy to determine the early, medium, and late maturing varieties. Careful selection on these lines will enable a maize-grower to establish a plant suitable for his requirements.

Great care should be taken in the thrashing of the seed, and, as it requires such a small quantity per acre, I would advocate hand thrashing so as to prevent any possible cracking of the grain. The ends of the cobs should be discarded, the grains being smaller. It is essential to have maize seed of uniform strength, and, to ensure this, the seeds must be selected from the centre of the cobs. Uniform strength in seed means a uniform crop.

---

## NOTES ON STATE FARM, WESTBROOK.

The weather has been most adverse to agriculture in this district during the first half of December. On date of writing, 15th December, the temperature in the shade registered 99 degrees, with a hot scorching wind, curling up the leaves of maize, potatoes, grape-vines, and all tender vegetable growths. If the present weather conditions continue much longer, the outlook is not promising for a good winter to the farmer on this portion of the Downs. The hundreds of stacks of hay, oats, &c., which were dotted round the homesteads during 1910, and collecting for the previous few years, have nearly all disappeared. Many of the farmers have sold out, while the market was good, running themselves short for their own stock, not expecting the present unfavourable conditions after the severe winter. The fine showers of rain during November encouraged all the farmers in this district to plant maize, and in many cases to a very large extent, with a result that thousands of acres are showing total failure, which is unfortunate and discouraging, especially to new settlers and those who have not experienced our occasional dry seasons. Still, they may feel a little comforted by knowing that their soil has gained considerably in fertility, although a great portion of our land on the Downs is extraordinarily fertile. If no intermission in seasons were to occur, our land would become more sterile, unless the utmost limit in culture by working and the use of fertilisers applied under the most practical skill be resorted to. Even then I doubt if the best land would not become practically unfertile, if we were not to have our occasional dry spells.

FRUITS.—The season is too dry for all classes of fruit. Stone fruits especially are suffering, ripening before they are matured. Good fruit is bringing a fair price in the market, which should encourage the orchardists to give the best attention to his trees, by keeping the soil open to admit air, which encourages humus, and planting the best and most suitable varieties for his district or soil. Strict attention is required in winter and summer pruning, also cleanliness from all insect pests and fungoids. Lucerne has gone off considerably the last fortnight. We have had two cuttings this season on a piece of land near the creek, and the yield on both cuttings was about 2 tons to the acre. The field is very dry looking. At present we are giving it a good harrowing to split up the crowns and break the crust that has formed on the soil. Potatoes are looking fairly well. There is a general complaint in the district that the field appearances are good, but the crop of tubers is not showing up to the standard. The present dry spell may help to force tubers by checking top growth.

## STATE FARM, HERMITAGE.

The past season has not been satisfactory for wheat-growing on the heavy black soil of the Downs. The greater portion of the area of land intended for wheat at this farm was on this class of soil. The seeding time was a very precarious one. Early in the month of May some 14 acres of Manitoba and other late-maturing varieties were seeded. Owing to the weather conditions, no other seeding was made until the end of July. The whole of the late-sown varieties yielded a very poor crop, the straw being short and thin on the ground. Of the 20 varieties sown, there are few that will exceed 10 bushels per acre. The worst of these are John Brown, Federation, Bobs, Plover, and Yandilla King. Of the early-sown varieties, there are two wheats which stand out very prominently above all others—

viz., Warden's Hay (a wheat received under that name from the Department of Agriculture, Victoria, some four years ago). This has proved to be a good drought-resister, and could be recommended to be grown as a hay wheat in the drier districts of the West. It is a fair yielder of good-quality milling grain, and should compare well, from the miller's point of view, with Manitoba. It grows quickly, has a good, sound, firm, erect straw, but is somewhat slow from the time of coming into ear to time of maturity. Under showery conditions it is susceptible to rust, but for hay purposes in the Central and Western districts it should prove one of the best; 3 acres of this wheat were cut for grain this season, and should yield about 20 bushels per acre.

The next to show good drought-resisting qualities is No. 1 Kharkof, a wheat introduced from America by Senator McColl. The wheat proved to be a nice even crop throughout the plot, yielding a fair-quality grain crop of the Manitoba type of 21 bushels per acre. This is a bearded variety, and does not appear to be a robust grower. It has good, firm, fine straw of a wiry nature, and, from last season's experience, should prove a suitable wheat to grow in the drier districts.

At the present time, on a heavily stocked farm such as this, it is needless to say that we are feeling the effect of the continued dry weather. Three acres of mangels were seeded on 31st March, with Long Red and Yellow Globe. Notwithstanding the dry and cold winter, this crop continued to look remarkably well, and is at present proving its value for cattle and pig feed. The seeding did not prove a good one, owing to the dry conditions, as they came up very thin, giving a patchy crop. From the time of seeding to the present, a period of eight months, 834 points of rain have fallen. At present we are harvesting mangels over 40 lb. in weight. From my experience, this is a purely fodder crop, and has always been a good stand-by, for which reason it should receive more attention, particularly from the dairy farmers.

## COWPEA.

By R. JARROTT, Manager State Farm, Gindie.

The value of this crop, I think, is not fully recognised, otherwise it would be grown more extensively, especially in districts where lucerne cannot be grown successfully.

Made into hay, it makes splendid horse feed. When chaffed, no doubt it looks rough and unsightly in comparison with either oats or wheat, but the feed value is there.

I have never seen horses look or work better than when a good part of their feed consisted of cowpea chaff.

The only drawback in connection with it is the amount of handling it requires to convert it into good hay.

As soon as it is cut we have found it best to put it up in small heaps—say a good armful. The next day every alternate heap is turned over by putting the fork under it. When the amount being handled has been treated in this way, go back to the starting point, pick up the remaining bundles with the fork, and invert them on to the heaps previously turned. The next move will depend on the weather. If it is bright and hot, the heaps should be treated in the same manner on the following day.

The cocks may be doubled in this way three or four times if necessary. The object is to get rid of the moisture contained in the hay without exposing the leaves to too much sun. If left too long in one position, the loss of leaf in carting and stacking would be great. If not thoroughly cured, this hay is liable to get very hot; but this can be overcome to a great extent, by using plenty of ventilation when stacking.

The best means that I know of to obtain this result is by making ventilators with 3 x 1 battens. This applies to any kind of hay.

Sometimes we are forced by weather conditions to cart in hay before it is quite fit, but if plenty of ventilation is given it will take no hurt.

In making these wooden ventilators, it is well not to make then in too long lengths, or it will be difficult to keep them plumb at first; about 6 ft, is a handy length. Lay the battens down, edge up; cut a piece 4 in. long, and another 6¼ in. Measure 6 in. up from the bottom of the batten, and nail the short piece on, flush with the outside of the batten. Nail the 6¼-in. piece on the top ends of the batten, letting it be flush with the sides and top. Put another piece in the middle, turn the battens over, and repeat. Made in this way, they will telescope into each other, and as the stack rises other lengths can be inserted.

These ventilators are very effective, cost little, and will last for years if taken care of when not in use. Of course it will be necessary for the bottom of the ventilators to stand on a couple of saplings, so that there will be a free current of air from the ground up through the ventilators.

---

## VANILLA.

One of the most interesting exhibits at the August show of the Queensland National Agricultural and Industrial Association, in 1911, was that of the Kamerunga State Nursery, Cairns. Mr. H. Newport, Instructor in Tropical Agriculture, naturally has always made a specialty of tropical products, and when we consider the agricultural products of the State, apart from the pastoral and mining industries, which are carried on successfully in all parts of Queensland—tropical, sub-tropical, and temperate—it becomes obvious that, since tropical Queensland embraces the enormous extent of country from the tropic of Capricorn (Rockhampton) to Cape York, a distance of over 13 degrees of latitude (about 1,000 miles in a direct line), whilst the temperate coast line extends for about 4½ degrees (about 300 miles) from the New South Wales border, it must be admitted that tropical agriculture occupies a position of much importance to the community, and this supplies the answer to some of our correspondents, who have suggested that we give too much prominence to the cultivation of tropical products. Our object in doing this is to draw attention to the illimitable resources of Northern Queensland, which could be enormously developed in the direction of the cultivation of such products as Coconuts, Rubber, Cacao, Vanilla, Tobacco, Cotton, Coffee, Spices, Drugs, Dyes, &c., not to speak of Sugar, Bananas, Cassava, and Arrowroot, all of which have been proved to thrive and produce as well in North Queensland as in any of the purely tropical islands of the world, such as the West Indies, the Dutch East Indies, New Guinea, the Solomons, &c.

Take vanilla, for instance. At the Kamerunga Nursery, Mr. Newport produces the marketable product, which is quite equal to that which is grown and manufactured in the hot, humid forests of Central and South America, as in Brazil, and in Mexico, Honduras, Mauritius, the Seychelles, Guadeloupe, Java, and Tahiti. In Guadeloupe, Reunion and Mauritius the vanilla plant is cultivated by small proprietors, and many of the householders of these islands make money by selling the pods on vines cultivated in their gardens, and on the walls of their houses.

This suggests that since the study of agriculture, tropical and temperate, practical and theoretical, has been adopted as part of the curriculum of our State schools, the cultivation of vanilla in suitable Northern localities would be a most interesting and at the same time profitable business for the pupils of the State schools. They have the advantage of climate and of the assistance of the Instructor in Tropical Agriculture. The work is easy, and the method of fertilisation is simple once the system is properly understood.

## THE SOIL.

It must be understood that it is not every soil which is suitable for the cultivation of vanilla. A rich, vegetable soil, such as is found in the scrubs of the Johnstone and other tropical Northern rivers, is the best. Sandy soils are too light, clay soils are either too dry in hot weather, or too wet in the rainy season. Any undrained, water-logged soil will cause the roots to rot, and it is therefore quite unsuited to the cultivation of this " Orchid."

## CLIMATE.

The climate must be hot and moist, and are not these characteristics of most of the tropical coast lands of Queensland ? Sheltered situations are indispensable, but too much shade is detrimental, because it prevents the pods from ripening. It was in such a climate and situation as this that we saw, in New Guinea, a neglected plantation, where the vanilla vines, being untrained, had climbed to a height of 40 feet over a number of bread fruit trees. This luxuriance of growth is, as we shall see, when we come to discuss cultivation, very detrimental to the production of fruit.

## PROPAGATION.

The plants are raised from cuttings, and it is not absolutely necessary to set them in nursery beds to strike root. These cuttings are about 4 or 5 feet long, and are planted either at the foot of trees, or posts, or walls, or some kind of support for the future vine to cling to. The cuttings may be taken from any part of the vine, and it is not absolutely necessary that they should be 5 feet long. If vines are scarce, cuttings may be shorter, but the plants will come sooner into bearing if the cuttings are of the proper length.

## CULTIVATION.

As above stated, the vanilla vine requires a support to grow on just as in the case of granadillas or passion fruit. These supports, if the plants are grown in gardens, may be posts, trees, or trellis work; but if grown on a larger scale, either trees must be planted or posts set up at regular intervals of about 6 feet must be supplied. The best tree for the purpose is the physic nut (*Jatropha Curcas*) which may be raised from seed or grown from live trunks, which, if put in the ground in rainy weather, will, in most instances, take root.

When planting the vines, remove the three lower leaves of the cuttings, and plant that portion of the stem 3 or 4 inches below the surface; the remainder of the stem is then tied to the post or tree by a flat band of banana fibre or by a cocoanut leaflet. Round cord must not be used, as it is liable to cut into and injure the green succulent stem of the vanilla. The ground over the buried part of the cutting is then mulched with leaves or light brushwood. If dry weather come on, frequent waterings will be necessary until the vine has taken root.

The ground must be kept free from weeds, and unless it be lightly shaded by the growing physic nut trees, it will be advisable in dry weather to keep the roots constantly mulched. The trees must be kept down low, so that the vines do not get out of reach, and the branches must be judiciously lopped in order to prevent too much shade. When the vines have reached the tops of the trees or other support, a trellis of bamboo or other material may be fixed from tree to tree, or post to post, and the vines trained along them. No animal or artificial manures should be used, but rotten leaves and vegetable soil may be applied to the roots after each crop is gathered.

## FERTILISATION OF THE FLOWERS.

The plants will commence to flower in the second year after planting, and full crops may be expected in four years. In Central and South America, where the orchid grows wild, fertilisation of the flowers is effected by means of insects or other agency. The parts of the flowers are so arranged that self-pollination is impossible, and it must, therefore, be effected by some foreign agency. It is usually said that this agency is an insect one, but none of the writers on vanilla give any description of the insect, or any particulars regarding it. The author of "A Text-book on Tropical Agriculture," H. A. Alford Nicholls, M.D., &c., from which the present article is extracted, says that he once gathered a few vanilla pods in his garden in Dominica, and as none of the flowers were artificially fertilised that year, it is probable that pollination was effected by humming birds, which were frequently seen to insert their long beaks into the flowers for the purpose of extracting the nectar. It is likely, therefore, that birds may have as much to do with fertilisation of the vanilla orchid as insects. In the cultivation of the plant, however, it will not do to depend on such precarious agencies, and the planter, in order to ensure crops, must fertilise the plants himself.

The flower of the vanilla orchid is very different from the usual type of flower of other plants; but, on examining it carefully, the outer floral envelope, consisting of three sepals, and the inner one, consisting of three petals, may be made out. The lowest of the petals is very different from the others; it is called the *labellum,* or lip, and it envelopes the columnar continuation of the axis of the plant, on which are set the curious anther and stigma. The continuation is called the *column.* At the top of the column is a *hood* which covers up the anther and pollen masses, and below this is the viscid stigmatic surface, protected and hidden by a projecting lip, sometimes called the *lamellum.*

Thus we see that the pollen is shut in by the hood, and the stigma is shut in by the lamellum, so that two obstacles prevent self-pollination.

The object of artificial fertilisation is to remove these obstacles, and to permit the pollen masses to approach the stigma. This is easily effected, firstly, by detaching the hood by touching it lightly with a piece of sharpened wood; secondly, by slipping the lamellum under the anther; and, thirdly, by ensuring contact of the pollen and stigma by gentle pressure between the thumb and forefinger. The operation is performed in a few seconds after a little practice, and it may be facilitated by holding the column between the thumb and middle finger of the left hand, whilst it is supported at the back by the forefinger. The right hand is then free to use the fertilising implement, which should be rather blunt and flattened at the end. A tooth broken from an old comb, and fixed into a piece of thin bamboo a few inches in length, has been used by the author in fertilising many vanilla flowers.

## CROPS.

If the fertilising operation prove successful, the flower will gradually wither, whilst the pod will grow rapidly. If unsuccessful, the flower will fall off before the second day, and the ovary will remain undeveloped, turn yellow, shrivel up, and drop off the stalk.

The flowers come out in February and March in Dominica (which lies in about the same latitude north of the Equator as Port Douglas in Queensland, south of the line), in clusters of from ten to twenty, but not more than half-a-dozen of the cluster should be fertilised; and, in this way, five large pods will be secured. Fertilisation should be commenced about 9 or 10 o'clock in the morning, for if it be left too late, pollination may be incomplete, or fail altogether. The fruit goes on growing for a month, but it will take at least five months longer to ripen sufficiently for harvesting. The pods are to be gathered when they begin to turn yellow at their ends, or when they produce a crackling sensation on being pressed lightly between the fingers. Each pod should be gathered separately by being bent to one side, when it will snap off the stem. It is very important to gather the pods at the right time, for if they be too ripe they will split open in curing, and if too green they are dried with difficulty, and they will have little or no perfume.

## CURING.

After the beans are gathered they are plunged for half a minute into hot water that is almost boiling. They are then put on mats to drain dry, and afterwards they are spread out on blankets and exposed to the sun. Every evening they are rolled up in the blankets, and shut up in tight boxes to ferment. The sunning process is continued for a week, or until the pods become brown and pliable, when they are squeezed between the fingers to straighten them, and to cause the seeds and oily substance inside to be evenly distributed. Should any of the pods split, they should be closed up and bound round tightly with silk thread or narrow tape. As they dry and shrivel the thread should be unwound, and the pods tied up again. When the pods are brown, the drying process should be continued in the shade, which may take many weeks. Sometimes the beans are slightly anointed with castor or olive oil, but this cannot be recommended as the oil may become rancid, and thus spoil the product.

## PACKING.

The dried beans are to be sorted according to their length, the long thin ones being the most valuable. Beans of the same length are to be tied in bundles of twenty-five or fifty, the ligatures usually being applied close to each end of the bundle. The bundles are then packed in closely-fitting tin boxes, which are enclosed in rough wooden cases. In Guadeloupe the bundles are put into clean kerosene oil tins, which are soldered up so as to exclude all air and moisture.

---

## BANANAS.

By C. E. WOOD, Manager, Kamerunga State Nursery, Cairns.

It having become necessary to start a new plot of bananas at the Kamerunga State Nursery, it was decided to plant up a few rows between the young Pará rubber trees growing on the banks of the Barron River. The soil is of a very sandy nature, very porous, and, judging by one or two banana plants growing within a short distance, poor. The ground had been well cultivated for the rubber. Thirty pits have been made, two rows were planted on 14th January, 1911; one row contained Chinese Sugar, and the other Cavendish. On 25th January a row each of New Guinea Sugar and Gros Michel were planted; and on 6th February two more rows, containing two or three varieties.

None of the plants received any treatment for a start, but on 24th February the ground received a dressing of slaked lime, 2 lb. being sprinkled within a radius of 6 ft. of each plant, and was mixed with the soil by the scarifier being run over it. After this, very heavy rains were experienced, also two cyclones, but the plants, being young, did not appear to suffer damage. On 23rd June, the plants having made very little headway, a dressing of manure, as recommended by Mr. Brünnich, Agricultural Chemist, was administered—viz., 1 lb. sulphate of potash, 1 1/10 lb. blood, and 1½ lb. Thomas' phosphate. This amount was applied on the surface within a radius of 4 ft. of each plant, and simply mixed with the soil by means of a scarifier. Showers fell on the last four days of the month and during the first three days of July, totalling 2¾ in. After this, the ground was again scarified to prevent evaporation. From that date until the end of November dry weather was experienced, but, in spite of the long dry season, the plants have made splendid growth, which confirms my opinion that the method of applying manures to bananas, as recommended by the Agricultural Chemist, is good.

I should also mention that grass which had grown during the wet weather, after being hoed up, was either buried round the bananas or used as a mulch.

The Gros Michel bananas are some of the original ones imported by the Department of Agriculture, and had to be transplanted from where they were originally set. Now, as a new consignment of Gros Michel plants has just arrived, it may be of interest to know that of the 75 corms planted in August, 1910, most of which were more or less decayed, 24 plants were successfully raised, and it took a month before the first little shoot appeared above ground, others taking as long as two months. The accompanying photograph shows one of these plants, at the age of five

PLATE 4.—GROS MICHEL BANANAS AT KAMERUNGA STATE NURSERY.

months from breaking ground. The corm, a large one, with all the centre rotten, was planted in my garden on 8th August, 1910, near the Barron River, for special treatment, in a well-prepared hole. It was taken out of the ground two weeks later; all the rotten portion was scraped out, and the hollow filled up with powdered charcoal; then replanted. On 10th September, a small weak shoot showed above ground; after this, it received a light dressing of meatworks manure, and was kept watered and mulched. Applications of weak liquid manure were also given, and in February, 1911, when the photograph was taken, the plant was twice the size of those otherwise treated. Unfortunately this plant, with many others, was lost during the big flood in April last, when the bank of the river was swept away. A photograph, showing the row of imported Gros Michel bananas mentioned above, will be seen ilustrated in Mr. Newport's article in this journal.

# The Orchard.

## OBSERVATIONS AND CULTURAL NOTES ON GRAPES.

BY C. ROSS, Instructor in Fruit Culture.

Advice is continually being requisitioned for the best varieties of table grapes to grow in different localities. I, therefore, purpose giving the leading particulars only of some of the more uncommon varieties, and such cultural notes as may be useful and interesting. All the varieties commented upon have been grown and their characteristics observed by the writer for a period of nine years at the State Farm, Westbrook. Some of the varieties have been grown at Roma and Biggenden. There are also isolated instances where some of the varieties have been successfully grown in various parts of the State.

1. *Alicante.*—A large, oval, black, vinous grape, covered with a dense blue bloom. The bunches are large, sometimes regularly tapering, and of very handsome form, but more frequently divided and heavily shouldered. As the berries are closely set, the fruit would be much improved if the berries were thinned out early. Skin tough and thick, which constitutes good packing qualities. The flesh is rather squashy, but when well ripened, and after hanging a long time, the flavour is brisk and pleasant. Its chief merits are long-keeping and free-fruiting properties, its splendid appearance, and fine constitution. The growth is strong and vigorous, the young shoots are coated with down, the buds are prominent, and the wood ripens well. The leaves are very large, of a deep colour, thick and soft, covered with down on the under side. The origin of this grape is supposed to be Spanish, as its name indicates. Its synonyms are numerous, being called Black Lisbon, Black Portugal, Black St. Peter, Black Tokay, &c. The vine is of strong constitution and easily cultivated; hot weather is conducive to an improved flavour; it is generally very fruitful and sets well. After ripening, if the fruit is required to be kept long, the vine should be covered and kept cool and dry; otherwise the close-set bunches that have not been thinned are apt to rot.

2. *Aramon or Burchardt's Prince.*—A medium-sized, round, black, vinous grape; large, long, cylindrical bunches with a long stalk so brittle that a knife is not necessary to detach it from the vine. The berries are regularly set, and possess a tender, juicy flesh with a very brisk strong vinous flavour when well ripened. The vine is a very rampant grower, and requires more than average attention to stopping and trimming than most other vines. Intelligent winter pruning is very important, as the spurs soon become very large and coarse. A remarkable free-fruiting grape in almost any situation as regards soil or climate.

3. *Almeria.*—A thick-skinned grape of no special flavour, but is sweet and pleasant when well ripened. It is used for raisin-making, and its excellent packing and carrying properties are the best for marketing at long distances. The berries are yellowish-green in colour, set loosely on the bunches, and keep for a long time. The variety originated in

Spain, and large quantities packed in cork dust are sent annually from that country to England. The vine is a strong grower, and requires age to bear well. The bearing qualities are improved when pruned on the long and short spur system—*i.e.*, pruning one spur to eight or nine eyes, and leaving a short spur of one or two eyes at the base of the old node.

4. *Bicane.*—An excellent medium-sized, tender, and juicy grape of the sweet-water type with a sweet, pleasant flavour and thin, white, almost transparent skin. The vine is a moderately strong grower, the canes are short-jointed, light-coloured, with full buds. Its bearing qualities are fair. Short winter pruning is most applicable for this variety.

[TO BE CONTINUED.]

---

## CULTURAL DIRECTIONS FOR PAPAYA (PAPAW).

BY P. J. WESTER, Horticulturist, Bureau of Agriculture, Manila.

The Philippines Bureau of Agriculture has issued the following directions for growing papaws, which should prove of interest and be useful to growers of this delicious fruit in Queensland:—

SEED BED.—The seed bed should be prepared by thoroughly pulverising the soil by spading or hoeing the ground well, and the clearing away of all weeds and trash. Sow the seed thinly, about 1 to 2 centimeters apart, and cover the seed not more than 1 centimeter with soil, then water the bed thoroughly. In the dry season it is well to make the seed bed where it is shaded from the hot midday rays of the sun, under a tree; or it may be shaded by the erection of a small bamboo frame on the top of which are placed grass or palm leaves. If the seed is planted during the rainy season, a shed of palm leaves should always be put up over the seed bed to protect the seed from being washed out and the plants from being beaten down by the heavy rains.

TRANSPLANTING.—When the plants have attained a height of about 7 to 10 centimeters, they are ready to be transplanted to the place where they are intended to grow.

Unless the transplanting has been preceded by a good rain, the plants should be thoroughly watered before they are removed from the seed bed. In order to reduce the evaporation of water from the plants until they are well established in their new quarters, about three-fourths of the leaf-blades should be trimmed off.

In transplanting, take up the plants with so large a ball of earth that as few roots are cut or disturbed as possible. Do not set out the young plant deeper in the new place than it grew in the nursery; firm the soil well around the roots, making a slight depression around the plant; and water it thoroughly.

In order to protect the tender plant from the sun until it is established, it is well to place around it a few leafy twigs at the time of planting. It is well to set out three plants to each hill, and, as the plants grow up and fruit, to dig out the males or the two poorest fruiting plants.

If the plants cannot be set out in the field at the time indicated, transplant them from the seed bed to a nursery, setting out the plants about 20 to 30 centimeters apart in rows a meter apart, or more, to suit the convenience of the planter. While the best plan is to set out the plants in the field before they are more than 30 centimeters (12 in.) tall, the plants may be transplanted to the field from the nursery with safety after they are more than 1.5 meters (59 in., say, 5 ft.) high, *provided that all except young and tender leaf blades are removed, leaving the entire petiole, or leaf stalk, attached to the plant;* if the petiole be cut close to the main stem, decay rapidly enters it. If the entire petiole is left, it withers and drops and a good leaf scar has formed before the fungi have had time to work their way from the petiole into the stem of the plant.

TREATMENT OF OLD PLANTS.—When a plant has grown so tall that it is difficult to gather the fruit, which also at this time grows small, cut off the trunk about 75 centimeters (28 4/5 in.) above the ground. A number of buds will then sprout from the stump, and will form several trunks that will bear fruit like the mother plant in a short time. These sprouts, except two or three, should be cut off, for if all are permitted to grow the fruit produced will be small.

SEED SELECTION.—Seed should be saved from the best fruits only. By this is meant not so much a *large* fruit as one that is sweet and well flavoured, with a small seed cavity and few seeds; oblong fruits should be preferred to roundish ones in saving seed, as they grow on plants having both stamens and pistils in the same flower; and these being, very largely, self-pollinated, the seeds produced from such flowers are more likely to reproduce their kind than the seed from roundish, melon-shaped fruits, which mostly grow on female plants.

All male plants should be destroyed wherever they appear, as not only are they unproductive but by their pollen being carried to the fruiting plants they tend to produce degenerate plants when these are grown from the seed produced on plants growing in the vicinity of the male plants.

There is no need to fear that the other plants will not fruit if the male papayas are destroyed, for the reason that there are always plants about having *perfect* flowers and which provide sufficient pollen for the fructification of the female plants. This applies particularly to the Hawaiian papaya.

GENERAL REMARKS.—The papaya is very impatient of water standing around the roots, and should be planted only on well-drained land; being easily injured by strong winds, it should be planted in sheltered situations.

Keep the land clean of weeds and the plants well mulched.

---

## A PROLIFIC PAPAW TREE.

Our illustration, kindly supplied by Mr. J. C. Harrington, of the Lands Department, affords good evidence of what we have often asserted —that the papaw tree, under good conditions of soil, rainfall, &c., will bear heavily at a very early age. The tree here shown was grown on Mr.

Harrington's property, Nudgee road, Ascot. It was only twelve months old when the photograph was taken, and was then bearing 130 fruits, ranging from 2 lb. to 4 lb. each in weight. Some advocate cutting off the heads of the trees to increase the yield of fruit, but Mr. Harrington does not agree with this. In his experience, the fruit grown from the suckers is

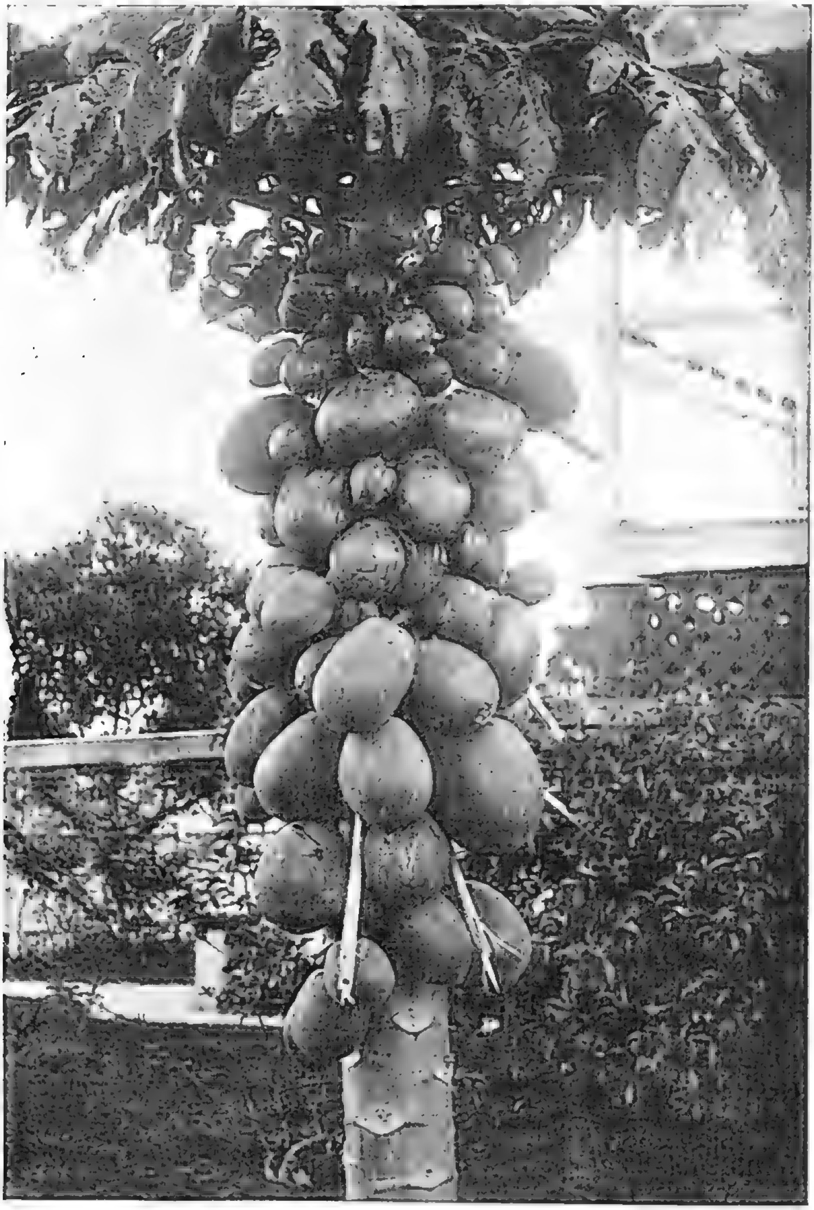


PLATE 5.—PAPAW TREE ON MR. HARRINGTON'S PROPERTY, NUDGEE ROAD, ASCOT.

not equal in flavour to that grown on the parent stem. As papaw trees are only economically good for four years, he thinks that a judicious system of pruning for the fourth and last year would be beneficial in producing a greater yield, somewhat at the expense, however, of the flavour.

## FRUIT BLOSSOMS, BEES, AND WEATHER.

We have received from the author, Mr. Cecil H. Hooper, M.R.A.C., South-eastern Agricultural College, Wye, Kent, the following interesting paper on the above subject, which attracted much attention when it was published in the "Estate Magazine" last June. The information it contains concerning the work of bees in the pollination of fruit blossoms, applies with slight modifications to the work of these busy insects in our Queensland orchards:—

The weather during the blossoming period exerts both a direct and indirect influence on the setting of fruit. Even when not injured by frost, the blossoms are often chilled by the cold to such an extent as to interfere with fecundation. Moderate cold renders the "self-fertile" trees "self-sterile"—that is to say, the seeds and fruit do not mature when pollinated with pollen from the same variety of tree—and severe cold renders them sterile to cross-pollination as well. Warm and sunny weather at blossoming time indirectly aids the fertilisation by favouring and aiding insects in their work of cross-pollination. An excessive degree of humidity favours fungous diseases, which may destroy either the blossoms or the young fruit. Dry winds on the other hand reduce the flow of nectar to almost nothing and probably cut down the stigmatic secretion, and so interfere with the setting of the fruit. Cold, rainy weather during the flowering time may be disastrous, the rains knocking off the pollen or causing to to swell and burst, and washing away the secretion of the stigma, thus preventing pollination by insects.

For these various reasons fruit will not set unless a reasonable amount of warm, sunny weather occurs during flowering time. The vitality of a tree is often injured and young fruit often killed by fungous diseases which destroy the flowers and the foliage. Such diseases often exert sufficient influence to cause crop failures, such as occur in cherry orchards. Again, the amount of fruit a tree bears one year generally determines the yield the following year, and sometimes all possibility of a crop is cut off by the trees failing to bloom.

Turning to other considerations, the number of insect visitors in any orchard determines to a great extent the amount of cross-pollination carried on. The pollen of pear, apple, plum, cherry, and other fruits is not produced in sufficient quantity nor is it of the right consistency to be carried by the wind, and the pollination of these trees is therefore dependent on the activity of insects. Honey bees and other members of the bee family are the best workers in cross-pollination, though some other insects assist; thus, ants will sometimes pollinate strawberries, and Professor F. V. Theobald tells me that black midges do much in the pollination of pears. Some fruits, such as the gooseberry and black and red currants, if protected from bees will set practically no fruit, as by the construction of the flower and the adhesiveness of the pollen mechanical means are necessary to carry the pollen to the stigmas. Many other trees, such as most of the apples and pears and some of the plums and cherries, need, in order to set fruit, that their stigmas be pollinated with pollen from a different variety of the same kind of fruit.

Mr. W. F. Reid says, in reference to fruit-growing in London, that it is not the smoke that prevents trees fruiting, but the lack of insects to cross-pollinate them, and quotes an example of pears growing well at Clapham Common, where bees were kept.

As to the various ways in which different varieties of fruits are fertilised, the following notes may be of interest:—

NUTS.—Cobnuts and filberts are wind fertilised. It is therefore important to have plenty of pollen catkins, and in some plantations a special variety, the Cosford cob, which bears many catkins, is planted here and there to ensure there being plenty of pollen. In the case of a nut-tree in a garden which has very few catkins, hazel boughs with plenty of catkins may be placed in the tree to provide pollen for the little red stigmas of the female nut blossoms. A plentiful supply of pollen is also necessary in walnut growing.

GOOSEBERRIES AND CURRANTS.—As to these fruits Messrs. Little and Avery covered certain bushes of gooseberry and red and black currant with muslin to exclude insects. The experiment demonstrated that it was absolutely necessary to have the help of bees, as these protected bushes had either no fruit whatever, or only a very few tiny fruits, whilst those around had plentiful crops, thus showing the importance of bees. Mr. W. O. Backhouse found that the pollen of gooseberry remains in a compact mass, that there is apparently no mechanism to ensure self-fertilisation, and that bees were consequently absolutely necessary to transfer the pollen; and in the case of one variety, "May Duke," so much nectar was secreted that unless drawn off by bees or other insects the anthers were in danger of being swamped. In gooseberries the pollen is found to be shed slightly before the stigma is ready to receive it, but the stigma is ready before the anthers have shed all their pollen. In the red and black currant, the anthers and pistil appear to come to maturity simultaneously. The flowers of gooseberries and black currants are much visited by bumble bees, as well as by hive bees. The bumble bees work later into the evening and in less attractive weather than ordinary bees.

PLUMS.—So far as plums are concerned, experiments made by Mr. W. O. Backhouse lead him to regard the different kinds of plum as on the whole "self-fertile," notably Victoria, Histon Apricot plum, blue bullace and sloe, whilst Rivers's Early Prolific, the old greengage, and Black Diamond show themselves "self-sterile." These, however, set fruit well when dusted with the pollen of another variety, but should not be planted in large blocks alone. In America a variety called "Tragedy" is found to be brought into greater bearing by the presence of Clyman, while Coe's Golden Drop, which is found to be "self-sterile" in both America and Victoria (Australia), fruits better when planted with Satsuma. It seems advisable in England not to plant more than two rows together of the same variety of plum.

CHERRIES.—Bees are of great importance to cherries. This has been very fully demonstrated on a large scale in California, and I should like to mention one example in Kent, told me by Mr. F. Shrivell of Golden Green, Tonbridge. Close to his house is a large Bigarreau cherry-tree, which for many years bore good crops of fruit whilst there was a hive of bees near; but, on account of the bees getting "foul-brood," the swarms were destroyed, and for two or three years there were hardly any cherries. On his restarting the bees, however, the cherry-tree again cropped well. In 1910 he lost his bees through inattention and omitting to feed them the previous winter, with the result that the cherry-tree's crop was a complete failure—too few to gather. Mr. Shrivell admits the flowering season was very wet, and that it was a bad cherry season, but says if the bees had been on the spot at every sunny interval they would have been in the trees, and he would have had a far better crop. In Victoria the Early Purple Guigne cherry is found to be "self-sterile," and in England the Black Tartarian cherry has been found not to set fruit when planted alone. Experiments are needed in this country to know which varieties of cherry are self-fertile and which self-sterile, and to ascertain whether the setting of cherries is aided by a mixture of varieties enabling cross-pollination.

PEARS.—It would appear from the trials of M. B. Waite in the U.S.A. and F. J. Chittenden in Essex, that two-thirds of our different varieties of pears are "self-sterile." This fact is of great importance, and may account for many trees not bearing, especially where there is no other variety of pear near, nor any bees. The stigma of the pear was found by Waite to ripen before the stamens unless retarded by wet weather, in which case the stigma may remain enclosed by the petals until the stamens have reacher maturity or even discharged their pollen.

As a result of experiments made it seems that the White Doyenné has proved to be a good polleniser for Williams' Bon Chrétien in the United States of America.

A British example may also be given to illustrate the importance of cross-pollination in pears. In a field at Swanley, Kent, I planted forty Pitmaston Duchess pears, away from other pears. For four years, though flowering well, they did not fruit. I took them up and replanted them in another part of the farm in a small orchard of pears of other varieties, and placed a hive of bees amongst them. The following year they commenced to bear, and have, I understand, borne fairly well and regularly since. Mr. H. F. Getting, of Glewstone, Herefordshire, also finds that Pitmaston Duchess requires cross-pollination.

Mr. F. J. Chittenden, out of sixteen varieties of pears, only found two, Durondeau and Conference, to set fruit with their own pollen. In America, Duchesse d'Angoulême, Beurrè Bose, and Flemish Beauty are "self-fertile."

Quince trees set their fruit perfectly with their own pollen.

In APPLES, as in pears, the stigmas usually mature before the anthers. Many practical fruit-growers have observed that certain varieties, if planted in large blocks, do not fruit well. Mr. Charles Martin, of Toddington, finds the best Cox's Orange Pippins are produced in a plantation in which these trees are intermixed with Duchess Favourite, a wonderfully free blooming variety, and apparently a good polleniser, the result being better than where intermixed with Warner's King, or King of the Pippins.

Mr. F. J. Chittenden microscopically examined pollen of over 100 varieties of apple, and found in most varieties 80 per cent. of the pollen perfectly formed. The only well-known variety in which the pollen was not good was Ribston Pippin, in which only about 40 per cent. was well formed. In testing the germination of the pollen a solution of 2½ to 5 per cent. sugar in water was used.

In apples it seems probable that in England quite 90 per cent. of the different varieties of apples are "self-sterile."

Mr. Chittenden found, out of twenty-four varieties, that Gladstone, Stirling Castle, and King of the Pippins were the only kinds that set fruit with their own pollen. Messrs. Lewis and Vincent found in Oregon that Keswick Codlin, Duchess of Oldenburgh, and Washington, were "self-fertile." Hive bees, bumble bees, and other wild bees appear to be the chief pollenisers of the apple.

It appears in colder and more exposed climates the number of varieties that are "self-fertile" is proportionately smaller than in districts specially favourable to the fruit.

STRAWBERRIES AND RASPBERRIES.—With regard to these, Mr. C. W. Richardson finds from experiments that most varieties of strawberry set fruit with their own pollen. Bees, nevertheless, would appear to be valuable to a strawberry field, especially in a dull season, though they are not of the same relative importance as they are to apple, pear, plum and cherry. In strawberries and raspberries the stigmas are receptive before the anthers. Last year I begged three lots of unopened raspberry flower-buds, on two different varieties, and was surprised later in the season to find the blossoms had set fruit nearly as well as in the open. The raspberry is, nevertheless, a very favourite blossom with hive bees, from the nectar of which they produce a pleasant-flavoured, almost colourless, honey.

In conclusion one cannot doubt that greater knowledge of the pollination of our hardy fruits would be advantageous to all commercial fruit-growers. This knowledge can be gained by observations and experiments made by fruit-growers in different parts of the country, together with experiment stations and research laboratories. And all sound demonstrable data should be collected and tabulated by some such body as the National Fruit Growers' Federation.

Whilst it is no doubt right to advise fruit-growers, from a commercial point of view, to limit the number of varieties they shall grow, knowledge of whether the varieties selected are self-fertile or self-sterile is desirable, as is also knowledge as to whether the varieties are early or late bloomers, because, taking an extreme case, Irish Peach apple and Bismarck are almost out of flower by the time Graham's Royal Jubilee commences, and they would therefore be obviously unsuitable for cross fertilising purposes. The remarks given here on the influence of the weather on the setting of fruit, are taken from an article by M. B. Waite, on "The Pollination of Pomaceous Fruits" in the "Year Book" of the Department of Agriculture, United States of America.

# THE BANANA IN QUEENSLAND.

By A. J. BOYD.

From the earliest days of the colonisation of Queensland by free settlers, the Banana has been grown and has flourished—first in the neighbourhood of Brisbane, whence its cultivation spread gradually towards the North, following the trend of settlement, until it became finally established on the Northern rivers in the rich scrub lands surrounding Cairns, Innisfail (Geraldton), the Tully River, and other neighbouring localities, where the wild Banana is indigenous and thrives, although not as a producer of marketable fruit, in all the scrubs of the Northern coast.

Whilst large quantities of fine fruit are produced, and either sold locally or exported, in several districts in East and West Moreton, notably at Buderim Mountain, in the Blackall Range (and generally on the range), and on the Maroochy River, Samford, and Mount Cotton, the centre of the exporting trade is in the Far North at Cairns. There the Banana flourishes in the greatest luxuriance; soil, climate, and rainfall being especially favourable to its development.

In proof of the adaptability of the coast lands of Southern Queensland for the successful cultivation of Bananas, it may be incidentally mentioned here that at Mount Cotton, a short distance from Cleveland, on the coast, although Bananas have been grown for years on the same land, no deterioration, but actually the reverse, has taken place in the quantity, quality, and size of the fruit produced. As an instance:—In April, 1910, Mr. Preston, of Mount Cotton, sent in a consignment of Bananas to an agent in Brisbane. The fruit, as may be seen by the accompanying illustration, was perfect in every way. Every fruit on the bunches was practically of the same size, and well filled. Individual bunches, containing up to 11½ dozen, weighed 67 lb. In a low market, the fruit sold at the exceptional price of 8d. per dozen wholesale. Most of the fruit weighed, singly, nearly ½-lb. Similar fruit has also been grown at Mooloolah by Mr. Court.

## THE BANANA PLANT.

Notwithstanding the belief still held by some—that the banana, the plantain, the fibre-producing banana of the Philippine Islands, and the wild banana, so plentiful in the dense scrubs of North Queensland, are distinct species—botanists are very clear on the point that all are members of one family—the order Musaceæ.

So closely are the banana and plantain related that it is impossible to say where the plantain ceases and the banana begins. These two, while having distinct specific names, are, by the best authorities, regarded as only varieties of the same species. The distinction between them is stated to be that the former have a stem wholly green with persistent male flowers, while the latter have deciduous male flowers, a spotted stem, and shorter and rounder fruit. All varieties known to-day sprang originally from the native wild plants of the Asiatic Islands known as *Musa sapientum,* and *Musa* is the generic name of all.

The fruit of the Queensland wild banana contains scarcely any edible flesh. Its leathery skin encloses a large number of black seeds adhering to a midrib, and covered with a gummy substance something like bird-lime. In no cultivated variety can any seed be detected, although we occasionally notice small black spots in the flesh in regular rows. These are, probably, the faint traces of seed which have not been entirely eliminated by cultivation. Professor Semler says that all cultivated bananas have been derived from *Musa troglodytarum,* which is a native of the Moluccas, probably the grand *Musa uranoscopus,* which, unlike other wild bananas, produces its edible fruit in bunches which stand upright, not hanging down like the cultivated fruit.

It is supposed by some that the wild banana of North Queensland could, by cultivation, be brought to bear edible fruits. No doubt they could, but the experimenter would have to live over 100 years to enjoy the fruits of his labour. His time will be much better occupied in reproducing the cultivated plant.

For grandness of proportion and gracefulness of habit, the *Musæ* are only second to the palms, and they can only be seen in their greatest perfection in the tropics: "The rank luxuriance of the growth of this class of fruits, their handsome foliage, their productiveness, their high economic value as food, and their universal distribution throughout the tropics, all combine to place them in a premier position" (Benson—"*Fruits of Queensland*").

As a food, it is unequalled amongst fruits, as, no matter whether it is used green as a vegetable, ripe as a fruit, dried and ground into flour, dried and preserved like figs, or prepared in any other way, it is one of the most wholesome and nutritious of foods for human consumption. The stem makes excellent food for all kinds of stock. The extent to which the Banana is cultivated, and the vast number of human beings who are more or less dependent upon it for food in warm countries, is wonderful. It is, for an immense portion of mankind, what wheat, rice, and other cereals are for the inhabitants of Europe and Western Asia. The Banana was introduced into Fiji by the great missionary, John Williams, from the Duke of Devonshire's conservatories at Chatsworth, England, whence it spread to the Tongan Group and successively to all the islands of the South Seas. Its low habit of growth in that part of the world, where hurricanes periodically occur, gives it a great advantage over the taller species such as Gros Michel, which are, at such times, levelled with the earth by the resistless fury of the wind. For this reason the low-growing variety is the most commonly grown on those islands. Another reason is that the fruit is considered to be of more exquisite flavour than that of any other variety. Only a short time ago, the banana groves in Fiji were almost totally destroyed by a severe hurricane.

## SELECTION OF SITE AND SOIL.

In Queensland the culture of the Banana is almost confined to the frostless belt of the eastern seaboard, as it is a plant which is extremely sensitive to cold, and is injured by even a light frost. Still, whether it may be due to acclimatisation or to some other cause, Bananas, particularly the low-growing kinds, thrive in parts of the State where frosts are of frequent occurrence. As against the acclimatisation theory, the writer having obtained some of the Gros Michel plants imported last year (1910) by the Department of Agriculture, planted them in a garden in a suburb of Brisbane, where, during the heavy frosts experienced in July, 1911, the plants were exposed to a temperature of 28 degrees Fahr. for three nights in succession, yet, although the expanded leaves were killed, a splendid green shoot soon afterwards sprang from each plant, and the effects of the frost were soon no longer in evidence. As a matter of fact, heavy crops of Cavendish and Sugar Bananas have been grown year after year on the Brisbane River, where potatoes, pumpkins, and sweet potatoes have been killed every year by frost. As a rule, the taller the variety, the warmer and moister must be the climate. On a site near the sea the plant thrives best, as it requires a certain amount of salt from the saline air, which is necessary for its well-being.

Any site exposed to strong westerly winds should be avoided, because, by reason of their frequent violence and their usual three-days' duration, the broadly expanded leaves are torn to pieces, and these leaves are especially necessary to the building up of the plant and the production of heavy bunches of fruit. If the leaves are destroyed, the vitality of the plant is reduced, and, consequently, steady growth is checked to the ultimate loss of the grower.

Bananas in Queensland, therefore, do best where they are sheltered from wind, and the plants thrive better in such situations than when planted in more exposed situations. Bananas are frequently the first crop planted in newly-burnt off scrub land, as on such land no special preparation is required, and the large amount of ash and practically burnt and decomposed vegetable mould provide an ample supply of food for the plant's use. Bananas are rank feeders, so that this abundance of available plant food causes a rapid growth, fine plants, and correspondingly large bunches of fruit.

The best soil for the cultivation of the plant is a warm, well-drained, but rather moist deep loam, with a good proportion of humus. Our scrub soils are ideal in this respect. A writer on the subject of Bananas maintains that the composition of the best soil for Bananas and Plantains is as follows:—

| | |
|---|---|
| Clay .. .. .. .. .. .. | 40 parts. |
| Lime .. .. .. .. .. .. | 3 ,, |
| Humus .. .. .. .. .. | 5 ,, |
| Sand .. .. .. .. .. .. | 52 ,, |

Such a soil may be described as a rich loam with a sufficient lime content.

The composition of our scrub soils is such that not one banana-grower in a thousand has yet had to apply manure to secure a crop. From the ash analyses of the fruit and leaves, potash, next to nitrogen, is shown to be a most important constituent of the soil. The potash content of the Cavendish fruit is 64.250 per cent., and of the leaves 36.64 per cent. Lady's Fingers: Fruit, 62.350, leaves, 33.17. Sugar Bananas: Fruit, 60.625; leaves, 38.33. Some day this constituent will have to be supplied as the banana lands become worked out.

Swampy land is quite unsuitable to the Banana, and pure sandy soil is also to be avoided, seeing that good returns can only be expected on rich country with abundant humus, and then only where there is an abundant rainfall or where irrigation can be resorted to. As stated, the plant delights in the sea air, the salt of which is drawn into the sap of the plant, which contains a good percentage of sodium chloride.

## PREPARATION OF THE LAND.

In the cultivation of all soil crops, the first and most important thing is to thoroughly prepare the land by deep ploughing, cross-ploughing, harrowing, and, where necessary, by sub-soiling. No matter how rich and even loose the soil may be, the previous preparation before planting will prove advantageous and labour-saving in the after cultivation. In the case of newly cleared scrub lands, ploughing is, of course, out of the question owing to the innumerable stumps and the netword of roots. In such cases, all that is needed is to dig holes about 18 in. square and 18 in. to 2 ft. deep.

## PLANTS AND PLANTING.

On the ploughed lands this size of hole will be found ample for the well-being of the young plant, which should be a sucker from 2 to 3 ft. high taken from an older plant. When larger suckers are taken, the custom in older banana-growing centres is to cut them back to within 6 in. of the corm. The best suckers, according to Queensland experience, are between 2 and 3 ft. in height and from 3 to 4 months old. It has not been the practice here to cut them back, although, judging by the experience of those who have planted the Gros Michel banana plants imported by the Department of Agriculture, the cut-back plants have made splendid plants, notwithstanding that the central bud had completely rotted. It is a good practice to trim off the old roots, as is done in the case of pineapple and sisal hemp suckers.

Under the conditions above named, and if the sucker has not been too deeply planted (3 in. of soil above the corm is sufficient), the young plant will soon take root, and grow rapidly under favourable weather conditions, producing its first bunch in from 10 to 12 months after planting. At the same time that it is producing its first bunch, it will send up two or more suckers at the base of the parent plant, and these in turn will bear fruit, each sending up suckers.

After bearing, the stalk which has produced the bunch of fruit, is cut down. If this is not done, it will die down, as its work has been completed, and other suckers take its place. Too many suckers should not be allowed to grow, or the plants will become too crowded, and be consequently stunted, and will produce only small bunches.

Small-growing or dwarf varieties such as the Cavendish, so universally planted in this State, are planted at from 12 to 15 ft. apart each way, which will give 302 plants in the first case, and 193 in the second, per acre.

Large-growing Bananas, such as the Sugar and Lady's Fingers, require from 20 to 25 ft. apart each way, as do the stronger varieties of plantains.

Plantains are not grown to any extent in Queensland, and our principal varieties are those already mentioned, the Cavendish predominating. There will, however, within a short time, be many thousands of the Gros Michel Bananas grown in all parts of the State, as, in addition to those already planted, two more large consignments are expected from Jamacia and will have been distributed and planted before this paper goes to press.

The after cultivation, where the land has been previously well prepared by ploughing and harrowing, consists in keeping the spaces between the young plants clear of weeds, by means of the farm implements usually employed for such work amongst other crops. On unstumped land, the weeds must be kept down with the hand hoe. Once the plants have begun to bear, cultivation of the land usually ceases. One of the reasons given for this is that even very light ploughing or scarifying is injurious to the growing plants, which, in a loose soil, send their roots all over the unplanted spaces. These roots are cut by the plough, and, according to some North Queensland planters, the bearing plants and the crop are injured thereby. I will here quote what was written on this subject in 1904 by Mr. J. E. Higgins, the Horticulturist at the Hawaii Agricultural Experiment Station, in a Bulletin (No. 7) entitled "The Banana in Hawaii," published in October of that year. Mr. Higgins wrote:—

"Tillage is one of the important forces making for fine fruit. It has commenced with the thorough deep ploughing and harrowing of the soil, and must be continued to keep the surface loose and free from grass and weeds, and for the many other benefits which follow in its train."

What are these benefits? Professor L. H. Bailey enumerates them as follows:—

1.—Tillage improves the physical condition of the land—
- (*a*) By fining the soil, and thereby presenting greater feeding surface to the roots;
- (*b*) By increasing the depth of the soil, and thereby giving a greater foraging and root-hold area to the plant;
- (*c*) By warming and drying the soil in spring;
- (*d*) By reducing the extremes of temperature and moisture.

2.—Tillage may save moisture—
- (*e*) By increasing the water-holding capacity of the soil;
- (*f*) By checking evaporation.

3.—Tillage may augment chemical activities—
- (*g*) By aiding in setting free plant food;
- (*h*) By promoting nitrification;
- (*i*) By hastening the decomposition of organic matter;
- (*j*) By extending these agencies (*g, h, i*) to greater depths of soil.

All these statements, except that in relation to the warming of the soil in spring, are as applicable to conditions existing in the tropics as to those of the temperate zones.

The implements of tillage will depend somewhat upon how the plantation has been laid out, it being possible to use quite large machines, such as disc harrows and other forms made for orchard work, where there is a wide space of 10 to 14 ft. between the rows. When the rows are very close together, it will be necessary to use the ordinary cultivator.

Most of the time after planting, tillage of the surface soil only will be best. The subject of ploughing in an established plantation is still in dispute amongst banana-planters. Mr. Higgins says that "many of the roots of the plant are so near the surface that any ploughing deeper than a few inches would cut off a great many of them. This may be an advantage or a disadvantage. The banana roots are not naturally branching, but run out long and cord-like. Cutting off these roots causes them to send out many new ones from the cut surfaces, which spread in several directions, thus increasing the food-gathering capacity of the plant, as is claimed by some. The production of these roots, however, must make very considerable demands upon the stores of food in the corm, and, therefore, ploughing should not be done at a time when all the supplies of stored food are required for the developing of the flower-bud or of the fruit. Basing their practice on this reasoning, many planters in the West Indies do not plough until after the main crop for the American market has been gathered."

Where the stumps are still standing, it is, of course, impossible to do anything but make an approach towards tillage by the use of the only suitable tool—the hoe.

From the foregoing it will be seen that there is, perhaps, no tropical plant easier of cultivation than the Banana.

In dealing with the plants on a newly-formed plantation, attention must be paid to the before-mentioned suckers. Whilst the plant is young, all the suckers except one should be cut away, the best plan being to sever them with a sharp spade or a narrow, sharp-edged grafting tool, such as is used in the final stage of making a pipe drain. Thus all the vigour of the plant is thrown into the fruiting of the first stem and the growth of the one to supplant it, and in this way fine large bunches can be reckoned on. Afterwards, when the stool has matured, from three to even five stems may be allowed to grow, but, as I have previously pointed out, on no consideration should a larger number be permitted to shoot up, if fine bunches are looked for. The second stem usually produces a finer bunch of fruit than the first, but, as time goes on and the land begins to show signs of exhaustion, the bunches decrease in size, and this shows the necessity for manure in some form or other. After the stool has borne a crop or two, the earth should be loosened round the stems, and manure or decayed leaves and banana stems forked in, the whole being moulded up with surface soil from the vicinity. When the stool shows signs of exhaustion, as it probably will after a few years, it should be stumped out and a fresh sucker planted in its place, or, better stiill, in the intervening space between the two former stools, the fertility of the soil being restored by a free application of manure.

In North Queensland, up to very lately, almost the entire banana-growing industry was in the hands of the Chinese, who rented the standing scrubs with their wonderfully rich fertile soils from white owners. These lands they cleared, planted with bananas, took all they could out of the soil, and, to save the expense of manuring, handed back the impoverished lands to the owners (cleared, certainly, but no longer fit for the production of bananas, except at considerable expense for manure), and rented fresh land, where the same ruinous methods of production were adopted. When a stem had fruited, it was cut down, chopped in pieces, and scattered round the base of the clump. This is certainly not a method to be recommended. Banana stalks, even when buried in the soil, will remain for a year buried in soil which is not always damp, and may then be dug up almost intact. Furthermore, the worn-out stems lying on the ground form a splendid breeding-place for countless insect and fungoid pests. At Cairns, where the Chinese plantations are not cultivated, I have seen thousands of these stems lying between the rows; and it is quite possible to believe that the larvæ of the fruit-fly find here a safe refuge, which may account for the propagation of the pest.

[TO BE CONTINUED.]

## TIMES OF SUNRISE AND SUNSET AT BRISBANE, 1912.

| Date. | January. | | February. | | March. | | April. | |
|---|---|---|---|---|---|---|---|---|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. |
| 1 | 4·57 | 6·45 | 5·21 | 6·42 | 5·42 | 6·19 | 5·58 | 5·46 |
| 2 | 4·58 | 6·46 | 5·22 | 6·42 | 5·42 | 6·18 | 6·59 | 5·45 |
| 3 | 4·58 | 6·46 | 5·22 | 6·42 | 5·43 | 6·17 | 6·0 | 5·44 |
| 4 | 4·59 | 6·46 | 5·23 | 6·41 | 5·44 | 6·16 | 6·0 | 5·43 |
| 5 | 5·0 | 6·46 | 5·24 | 6·40 | 5·44 | 6·15 | 6·0 | 5·42 |
| 6 | 5·0 | 6·46 | 5·24 | 6·40 | 5·44 | 6·14 | 6·1 | 5·40 |
| 7 | 5·1 | 6·47 | 5·25 | 6·39 | 5·45 | 6·13 | 6·1 | 5·39 |
| 8 | 5·2 | 6·47 | 5·26 | 6·38 | 5·45 | 6·12 | 6·1 | 5·38 |
| 9 | 5·3 | 6·47 | 5·27 | 6·37 | 5·46 | 6·11 | 6·2 | 5·37 |
| 10 | 5·3 | 6·47 | 5·28 | 6·36 | 5·47 | 6·10 | 6·2 | 5·36 |
| 11 | 5·4 | 6·47 | 5·29 | 6·35 | 5·47 | 6·9 | 6·3 | 5·35 |
| 12 | 5·4 | 6·48 | 5·29 | 6·35 | 5·48 | 6·8 | 6·4 | 5·34 |
| 13 | 5·5 | 6·47 | 5·30 | 6·34 | 5·49 | 6·7 | 6·4 | 5·33 |
| 14 | 5·6 | 6·47 | 5·30 | 6·34 | 5·50 | 6·6 | 6·5 | 5·32 |
| 15 | 5·7 | 6·47 | 5·31 | 6·33 | 5·50 | 6·4 | 6·5 | 5·31 |
| 16 | 5·8 | 6·47 | 5·32 | 6·32 | 5·51 | 6·3 | 6·6 | 5·30 |
| 17 | 5·9 | 6·46 | 5·32 | 6·32 | 5·51 | 6·2 | 6·7 | 5·29 |
| 18 | 5·10 | 6·46 | 5·33 | 6·31 | 5·51 | 6·1 | 6·7 | 5·28 |
| 19 | 5·11 | 6·46 | 5·34 | 6·30 | 5·52 | 6·0 | 6·7 | 5·27 |
| 20 | 5·11 | 6·46 | 5·35 | 6·29 | 5·52 | 5·59 | 6·8 | 5·26 |
| 21 | 5·12 | 6·46 | 5·35 | 6·28 | 5·52 | 6·58 | 6·9 | 5·25 |
| 22 | 5·12 | 6·46 | 5·36 | 6·27 | 5·53 | 5·57 | 6·9 | 5·24 |
| 23 | 5·13 | 6·46 | 5·37 | 6·26 | 5·54 | 5·56 | 6·10 | 5·23 |
| 24 | 5·14 | 6·45 | 5·38 | 6·25 | 5·54 | 5·55 | 6·10 | 5·22 |
| 25 | 5·15 | 6·45 | 5·39 | 6·24 | 5·55 | 5·54 | 6·11 | 5·21 |
| 26 | 5·16 | 6·44 | 5·40 | 6·23 | 5·55 | 5·53 | 6·11 | 5·21 |
| 27 | 5·17 | 6·44 | 5·40 | 6·22 | 5·55 | 5·52 | 6·12 | 5·20 |
| 28 | 5·18 | 6·44 | 5·41 | 6·21 | 5·56 | 5·50 | 6·12 | 5·19 |
| 29 | 5·19 | 6·43 | 5·41 | 6·20 | 5·57 | 6·49 | 6·13 | 5·18 |
| 30 | 5·19 | 6·43 | ... | ... | 5·57 | 5·48 | 6·13 | 5·17 |
| 31 | 5·20 | 6·42 | ... | ... | 5·58 | 5·47 | ... | ... |

### PHASES OF THE MOON.

| | | | H. | M. | |
|---|---|---|---|---|---|
| 4 Jan. | ○ | Full Moon | 11 | 30 | p.m. |
| 11 „ | ☽ | Last Quarter | 5 | 43 | „ |
| 19 „ | ● | New Moon | 9 | 10 | „ |
| 27 „ | ☾ | First Quarter | 6 | 51 | „ |
| 3 Feb. | ○ | Full Moon | 9 | 58 | a.m. |
| 10 „ | ☽ | Last Quarter | 10 | 51 | „ |
| 18 „ | ● | New Moon | 3 | 44 | p.m. |
| 26 „ | ☾ | First Quarter | 5 | 27 | a.m. |
| 3 Mar. | ○ | Full Moon | 8 | 42 | p.m. |
| 11 „ | ☽ | Last Quarter | 5 | 56 | a.m. |
| 19 „ | ● | New Moon | 8 | 9 | „ |
| 26 „ | ☾ | First Quarter | 1 | 2 | p.m. |
| 2 April | ○ | Full Moon | 8 | 5 | a.m. |
| 10 „ | ☽ | Last Quarter | 1 | 24 | „ |
| 17 „ | ● | New Moon | 9 | 40 | p.m. |
| 24 „ | ☾ | First Quarter | 6 | 47 | „ |

# Tropical Industries.

## ARROWROOT—ITS CULTIVATION AND MANUFACTURE.

BY THE EDITOR.

Although several papers on arrowroot-growing and on the manufacture of the commercial starch have from time to time been published in the earlier issues of the "Queensland Agricultural Journal," yet, as the present-day subscribers are unable to obtain copies of those journals owing to their being out of print, it is deemed advisable to collate all available information on the industry and present it in pamphlet form to intending arrowroot-growers, from many of whom inquiry is being frequently made as to the prospects of the industry in Queensland.

It is now over fifty years since the industry was first established by the late Mr. George Grimes at Oxley Creek, where he erected the first machinery for manufacturing arrowroot on a commercial scale. As soon as this took place, the writer, who had been growing arrowroot in the same district and manufactured it with most primitive appliances, as will be shown later on, entered more largely into the business of cultivating the plant, and abandoned the manufacture in favour of supplying Mr. Grimes's mill with the raw material, to their mutual benefit.

The bulbs were sold at £2 10s. per ton, and on the then virgin scrub soils between Oxley Creek and Rocklea (then known as the Rocky Waterholes), and on the Brisbane River, the yield was enormous. Two varieties were grown at that period—the Bermuda or *Maranta arundinacea;* and the large purple variety, *Canna edulis,* called in the West Indies "Tous-les-mois." These differ materially from each other both in habit of growth and in size, shape, and colour of the bulbs.

The Bermuda plant is diminutive, rarely attaining a greater height than from 3 to 4 ft. The blossom is white, and the tubers, which cluster round the roots, are also white, with a thin shiny skin and bare of rootlets. They adhere to the roots of the plants much in the same manner as potatoes, and are neither very large nor numerous. The starch yielded by the Maranta is of excellent quality, and usually commands a higher price in the English market than that of *Canna edulis.* How little actual difference there is between the products of the two varieties is indicated by the following analysis, taking the best Bermuda arrowroot at 2s. per lb. and the Queensland arrowroot (*Canna edulis*) at 3d. per lb.:—

| | Bermuda Arrowroot. | Queensland Arrowroot. |
|---|---|---|
| Moisture .. .. | 13.00 to 16.50 .. | 17.36 |
| Starch .. .. | 82.24 .. | 81.52 |
| Ash .. .. | .124 .. | .142 |
| Proteids .. .. | .052 .. | .078 |
| Fibre .. .. | 4.09 to 1.20 .. | .90 |

The result is, therefore, chemically, about the same, particularly in regard to starch, which is the chief constituent. There is a little more moisture in the Canna, and more fibre in the Maranta. Under the microscope, the Canna arrowroot shows a more silky texture, and the grains are slightly coarser.

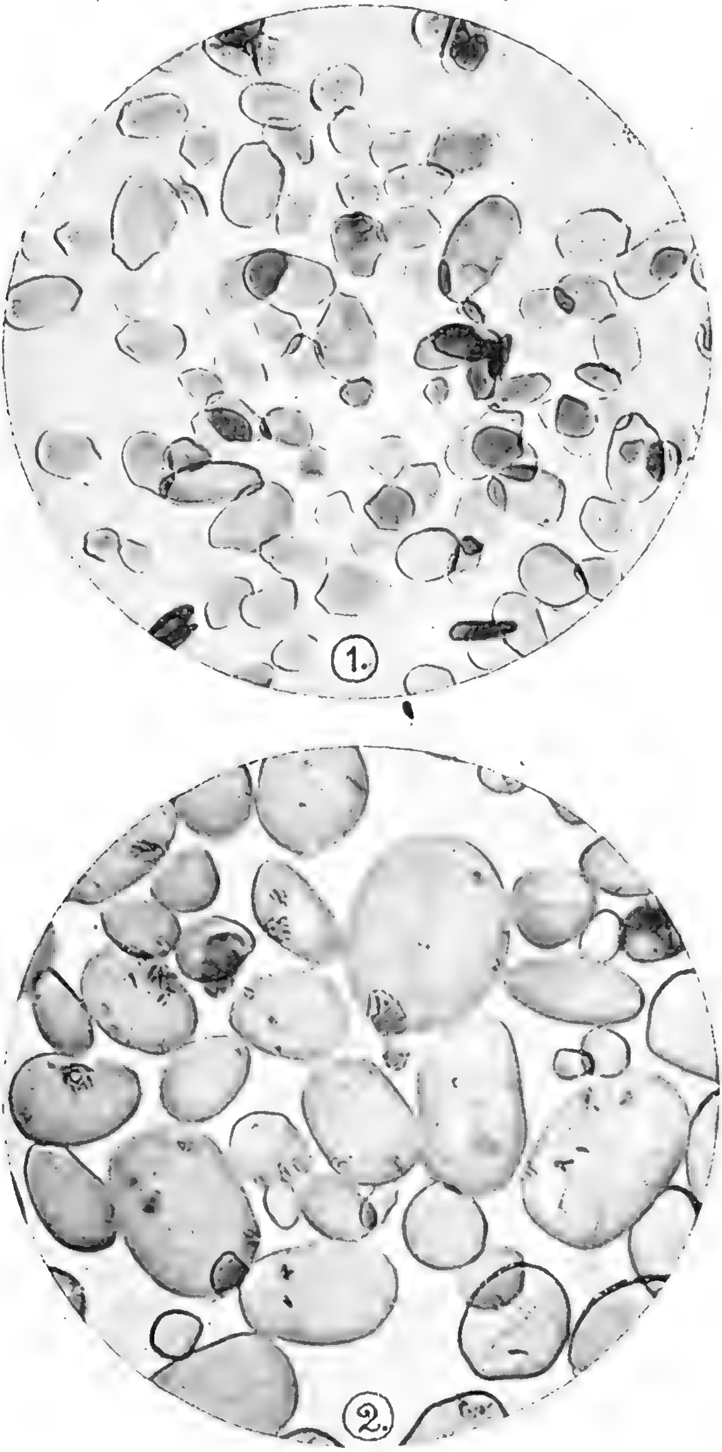



PLATE 6.—STARCHES MAGNIFIED 250 DIAMETERS

1. West India Arrowroot (*Maranta arundinacea*).
2. Tous-les-mois (*Canna edulis*), Queensland Arrowroot.

The reason why Maranta has never become popular in this State is that it does not yield one-quarter the weight of bulbs, nor is the starch content equal to that of Maranta grown elsewhere, besides which the excess of fibre in this variety makes the matter of treatment more difficult.

A remarkable point about the sale of Queensland, or "Australian Arrowroot" as it is called in England, is that it cannot be sold in Great Britain without some qualifying term attached, such as "Queensland" or "Australian arrowroot." How this has come about is rather interesting. When the Drugs and Food Act was passed by the Imperial Parliament, it was specified that "Arrowroot is the product of the plant *Maranta arundinacea.*" That is what Bermuda and Mauritius arrowroots are made from. Manufactured arrowroot from the *Canna edulis* was then practically unknown in Great Britain. I have shown above what little difference there is between the two. It has actually been stated that Queensland arrowroot is an adulterant! Whereas it is generally conceded that, so far from that, it is preferable as a food to the Bermuda product. The purple variety, which is, as said, exclusively cultivated in Queensland, grows to a great height, often rising to 8 ft. or 9 ft. It has very large, broad, ribbed leaves; and as many as 15 to 20 stalks rise from a single stool, each stalk representing a large bulb. In the flowering season the plant sends up a long, straight spike, from the head of which bursts a beautiful bunch of bright scarlet flowers, having the appearance of those of the common Canna known as "Indian Shot," but far larger. The seeds do not often mature, however, as do those of the Canna family generally. The bulbs from which the arrowroot of commerce is prepared form a compact mass on and near the surface of the soil, and so prolific is the plant that I have dug from a single stool as much as 60 lb. and even 80 lb. weight of bulbs.

## METHOD OF CULTIVATION—SOIL AND CLIMATE.

It does not follow that because there are, at present, only one or two principal centres of arrowroot manufacture in Queensland, therefore the plant will thrive only in these localities, which are mainly located on the South Coast line, at Pimpama, Coomera, and Ormeau. On the contrary, it grows luxuriantly on all the coast lands—from the Tweed River in the far South to Cooktown in the far North. As to soil, it prefers the rich alluvial scrub lands on river and creek banks, but does very well also on the deep black soils of open country. This refers to the purple variety. The Bermuda plant prefers a more sandy loamy soil, deep, with no clay subsoil. The writer grew both varieties at Oxley on the newly-cleared scrub land bordering that creek, and found that the Maranta (Bermuda) did not thrive well on the rich soil, many plants producing only two or three tubers, 6 or 7 in. long, and about 1 in. in diameter. The purple Canna, on the contrary, grew most luxuriantly, and produced an enormous quantity of bulbs, which found a ready sale at Mr. Grimes's mill, then located on the Brisbane River.

The climate and rainfall in the districts named were exactly suited to the well-being of the plants, and it is worthy of note that no insect or fungoid pests were ever observable either on leaf, stem, or bulbs. It follows that a deep, rich, well-drained soil and a moderate rainfall are all that is needed to ensure a good crop.

PLATE 7.—FIELD OF ARROWROOT AT PIMPAMA, 6 MONTHS OLD.

The accompanying illustration (Plate 7) represents a well-grown field on the Pimpama River (32 miles from Brisbane), on the property lately belonging to Messrs. Lahey Bros., who had a very extensive manufacturing plant, where cornflour was also prepared.

## CULTIVATION.

A visit to some of the arrowroot farms serves to show that there is a similarity among them all, both in preparation of the land, planting, after cultivation, and harvesting.

Where planting takes place in newly burnt-off scrub land, the innumerable stumps, of course, occupy so much of the surface as to preclude any ploughing. It then becomes necessary to dig holes with a sharp mattock or hoe which will cut the roots of the felled trees with which the ground is matted. The rows should be about 6 ft. apart with 4 ft. 6 in. between the holes; but, owing to the presence of stumps, very little regularity can be observed, and the planter must do the best he can as to distances between plants. On open cleared land, where the plough can be used, the proper distances can be observed. The land, in the latter case, should be thoroughly well ploughed, harrowed, and pulverised. Then shallow drills are drawn with the plough about 6 in. deep, and at the regulation distance of 4 ft. 6 in. apart single small bulbs are dropped and covered by turning a furrow over them on each side. On very rich new land, the best results have been obtained by placing the rows 8 ft. apart. As the land becomes poorer, the rows may be closer together, but should not be of a less width than 6 ft. I saw a field lately at Pimpama, on what was once my old sugar plantation (Ormeau), in which the rows were 6 ft. apart, yet in the month of April the plants had spread to such an extent that it was difficult to walk between them.

When the plants are above ground, they must be kept clean as in the case of other crops, and by the time they are about 3 ft. high they will want little further cultivation beyond throwing up a furrow against the roots—hilling up, in fact, as with potatoes. From this time forward, the heavy foliage will soon have covered the ground, thus effectually preventing the growth of weeds.

The planting season extends from August, after the last frosts, to the end of November and even up to January in some late localities. When full grown, a field of Canna presents a very pretty sight, the broad leaves of dark-green giving a fine impression of richness and contrasting vividly with the numerous scarlet blossoms to be seen on the plants. From six to eight months—the latter term as a rule—bring the crop to maturity, and a little frost is then beneficial by shrivelling up the tops and concentrating the starch in the bulbs. Supposing the crop ready to harvest in July or in the beginning of August, when one or two frosts have touched the plants, the manufacture should be at once begun, and carried on until the end of October. If the work is protracted into the spring months, the bulbs begin to shoot, and the yield of starch is consequently lessened in quantity and deficient in quality.

## HARVESTING.

When the bulbs have come to maturity—that is, in from eight to nine months after planting—and when the plants have, as stated above, had a touch of frost, then is the time to commence the harvest. Mr. D. Lahey, in a paper entitled "When to Harvest Arrowroot," said:—

"A good test for ascertaining when arrowroot is ready for digging is the following:—Observe the outer leaf of the bulb. A triangular slit will be noticed pointing downwards. If the slit appears white, the bulb is still immature, but as soon as it turns purple the crop may be harvested.

Arrowroot may be left to stand over for two seasons, as in the case of sugar-cane.''

The latter statement is important, for it has happened in some cases that, when the crop was larger than the available mill power was capable of dealing with, the growers turned their cattle into the field. Had the crop been held over, it might have been possible to get it in during the next season, and thus avoid a great deal of extra labour.

When harvesting, the stalks are first cut down with a hoe, cane knife, or reaping hook. The stool is then dug up with a strong mattock or a stout-eyed No. 3 grubbing hoe. A spade or fork is quite useless for the work, as the stool has a strong hold of the ground, in addition to which the bulbs of *Canna edulis* cling firmly together by the masses of rootlets proceeding from each bulb. When free from the soil, the bulbs must be separated, and all earth adhering to them knocked off. As soon as dug, they must be carted to the mill; therefore, it is well not to take up more than can be operated on each day. Every day's exposure to the weather or to the hot sun has an injurious effect upon the colour of the manufactured starch.

The average return of a good crop is about 30 cwt. of starch, or five to six times the quantity in tons of bulbs. From 12 to 20 tons per acre have been dug from a field in which the plants were set at distances of 5 ft. between the plants in rows 6 ft. apart. It goes without saying that the yield will vary according to soil, locality, season, good or bad cultivation, and proper washing, grinding, and drying appliances; but, as a general rule, the yield of starch may be set down at from 15 cwt. to 30 cwt. per acre, although, under most exceptional circumstances, it is recorded that as much as 4 tons of finished arrowroot per acre have been obtained. I cannot, however, vouch for this statement.

## MACHINERY AND MANUFACTURE.

The machinery employed in the manufacture of arrowroot in the very early days of agriculture in Queensland was as primitive as that used by the ancient Britons for pounding grain or by the Australian natives for crushing the seeds of nardoo. The first growers made use of a grater made by punching holes with a nail in a piece of kerosene tin. Gradually, improvement crept in, until a hand machine was constructed by the writer which much accelerated the work, but was still only a makeshift.

Since that time modern machinery has been introduced capable of turning out from 10 cwt. to 30 cwt. of commercial arrowroot per day. Such a plant may be thus described:—

Motive power, a 6 to 10 h.p. engine, root washers, carriers, grinding mills, cylinders, elevators, rotary sieves, shaker sieves (two), chute, patent circuitous trough (for which Mr. Lahey holds a patent), agitators and sieves, centrifugals for draining, tables, and calico for drying.

The whole of the work, after the tubers have been raised to the highest point of the building, is effected by gravitation. The tubers (or roots as they are erroneously called), as they come from the field, are tipped from the drays on to the carrier, whence they are automatically carried to the tuber-washing trough. Running through the centre of this is a spindle with diagonally inserted pegs of sufficient length to clear the bottom and sides of the trough by about 1 in. Here the bulbs are thoroughly cleaned of all dirt, stones, &c., and they are then passed on to the grater, which is a large, wooden cylinder covered with perforated iron, burred, on to which the bulbs drop from a hopper. A stream of water pours upon this continuously from above, and the pulp and starch held in suspension pass on to a shaking sieve. From this the farina and water pass to a second sieve, the pulp being ejected on the other side of the first sieve. On leaving this sieve, which is perforated with very fine holes, the water and farina are shot into a large trough, where the latter soon settles at the bottom.

When a sufficient quantity for the day's work has passed into the trough, the farina is allowed to settle firmly, and the water is gradually drawn off through a series of taps till the farina is left in a solid mass at the bottom.

Now, it will be seen that the surface of this mass is covered with a dirty slime. This is washed off and is put aside for pig food, as a certain amount of farina is removed with it during the washing. Water is then again admitted, the farina is stirred up with it, and it then passes through a fine silk sieve into the next trough, leaving the first one clear for the following day's work. After further skimming and washing, the now almost clean product passes into the circular trough which runs right round the building. In this there is an agitator, something like the paddle-wheel of a steamer, which revolves and thoroughly stirs up the whole mass.

When the agitation has proceeded for some time, the farina is once more allowed to settle, and a final superficial washing of the mass takes place.

This process does away with all hand-washing—in fact, from the time when the bulbs are emptied from the drays on to the carrier, they are not handled in any way, except to cut off any stalks which may not have been cut off close enough in the field.

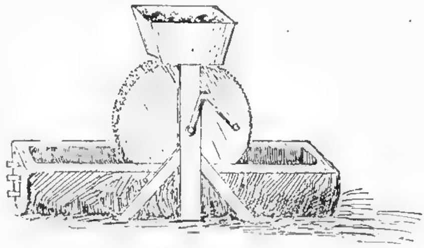
The farina is finally dug from the circular trough, and is passed through a centrifugal machine to extract all possible moisture. It is then taken to the drying ground, where it is exposed to the sun on frames covered with calico. Should a shower of rain fall upon it whilst it is drying, the rainwater has the singular effect of turning the farina brown, when it has to be rewashed. Hence the weather must be carefully watched during the drying process. After being thoroughly dried, the farina, which is now brilliantly white, is bagged and put up in various forms for export.

Most mills are constructed on the same plan, and the process is practically the same in all.

It may be interesting here to show how the earliest arrowroot-growers manufactured the farina.

The bulbs were well washed, and all roots pared off. Then they were grated by hand on a grater made of part of a kerosene tin punched full of holes, whose ragged edges served to reduce the bulbs to pulp. This was done over a tub of water. Two or three other tubs covered with calico were provided, and the pulp and farina were separated by working the hand round and round on the calico, water being poured over the mass. The pulp, having been thus separated, was sent to the pigs, and the farina at the bottom of the first tub was well stirred and the water poured off, when the farina passed to the next tub, and so on for three or four washings, when the clean farina was dried on calico frames. This process was necessarily a very slow one, but, as arrowroot was then worth 1s. per lb., it was very remunerative.

The writer improved upon this by constructing the primitive machine here depicted.


HOME-MADE ARROWROOT MILL.

A log about 2 ft. in diameter and 8 ft. long was hollowed out by axe and adze to form a trough. At the head of this trough was fixed a framework much like the wooden stand of a grindstone. A large wheel was then cut from a sound log 3 ft. in diameter and 1 ft. wide. Tin plates, turned into graters (which required frequent renewal) by punching holes in them with a nail, were next nailed on to the edge of the wheel, to which a wooden axle and handle were fitted. The wheel, when placed in position, turned in the water with which the trough was filled. Above the wheel was a wooden hopper from which the bulbs dropped on to the wheel. This wheel was easily turned by one man, and the grated bulbs dropped into the water in the shape of pulp and farina. The latter gradually settled at the bottom, and the pulp was removed by a narrow-tined fork and by hand. After a short interval to allow the farina to settle down firmly, pegs were withdrawn from the lower end of the trough and the water drawn off. The farina was then dug out of the bottom of the trough, and was passed through calico stretched over a tub. By hand-stirring and at the same time pouring on clean water, the whole of the farina passed through the calico into the tub, leaving the gross impurities behind. This operation was repeated three or four times until the arrowroot was perfectly white and free from any foreign substance.

After the last washing, it was placed on shallow trays or calico frames and dried in the sun. The arrowroot at that time (1863) was readily sold locally at 1s. per lb., and a small quantity sent to London brought 1s. 6d. per lb.

Such a machine to-day would only prove a source of loss to the grower.

With the present up-to-date arrowroot-mills, the whole process—from the digging of the bulbs to the drying of the prepared farina—occupies about twenty-four hours.

It will easily be understood, from what I have written about the process of manufacture, that it is of little use trying to manufacture arrowroot unless there is a plentiful supply of good clean water.

One of the principal growers and manufacturers at Yatala, near Beenleigh, estimated that, when working his mill three days a week and producing about half a ton of arrowroot a day, 24,000 gallons of water were used every eight hours. The refuse fibre and pulp are carted back to the fields and utilised as manure.

Another grower stated that arrowroot gave a monetary return about equal to that from maize and potatoes; but it was a surer crop. It would stand flooding that would kill potatoes, and dry weather would not affect it so adversely as it would corn. Both these troubles I have experienced, and can quite bear out his statement.

## YIELD AND VALUE OF CROP.

The yield of commercial farina may be set down at from 1 to even 2 tons per acre and the price ranges from £16 to £20 per ton. Late market reports give the price in London at from 2d. to 3¼d. per lb.; Bermuda being quoted in October, 1911, at 1s. 7d. per lb.

A considerable item of expense in the manufacture is the cost of firewood, seeing that it takes a cord of wood for each ton of tubers. The tubers contain from 20 to 30 per cent. of starch or 400 to 600 lb. of starch per ton of tubers.

## COST OF MACHINERY FOR ARROWROOT AND CORNFLOUR.

Such a mill as I have described would cost, according to capacity, from £500 to £1,200, exclusive of about £200 for the necessary drying and storage sheds. Where cornflour is made, the cost of a mill may run to over £4,000, owing to additional and more complicated machinery for producing this product, although the process is much akin to the manufacture of arrowroot. Briefly, the corn (maize) is first steeped in hot water, and is then ground between large millstones, after which it passes through sieves into huge vats, when it settles, and the gluten remains on the surface. This gluten cannot be washed off without the aid of chemicals.

## AREA UNDER ARROWROOT IN QUEENSLAND, AND PRODUCTION.

In the principal arrowroot-growing districts above mentioned there were, in 1910, 366 acres planted, mostly in small areas. According to the Government Statistician's annual report published in August, 1911, the yield of bulbs amounted to 4,275 tons—an average of 11.68 tons per acre—from 3,132 tons of which were produced 718,636 tons of commercial arrowroot; value, £7,744. The price of Queensland arrowroot has of late had a considerable upward tendency; and whereas the London price to the Queensland manufacturer has been as low as £14 per ton, British importers during the past year paid up to £30 per ton. This rise, which, at the time of writing, appears to be permanent, has not failed to give a stimulus to the industry, and next year's statistics in reference to the production may show a much larger area planted.

In July, 1909, there were 241 acres under this crop, nearly all in the districts named; and the yield amounted to 1,555 tons of tubers, of which 1,197 tons were used for the production of commercial arrowroot, the quantity of which was estimated at 300 tons, divided amongst the different districts as follow:—Pimpama, 100 tons; Coomera, 40 tons; Yatala, 10 tons; Ormeau, 50 tons; and Nerang, 60 tons. The commercial arrowroot produced was only 246,064 lb. The Australian requirements are about 350 tons annually, and, with the large increase in population by immigration and otherwise, this lemand is constantly increasing, which means that, unless the area devoted to arrowroot cultivation is considerably extended, from 50 to 100 tons have to be imported to supply the deficiency:—

| Year. | Imports. | | Exports. | | Production. | |
|---|---|---|---|---|---|---|
| | Quantity. | Value. | Quantity. | Value. | Quantity. | Man'fact'ers Value. |
| | Lb. | £ | Lb | £ | Lb. | £ |
| 1905... ... ... ... | 2,240 | 12 | 597,325 | 5,439 | 758,520 | 4,028 |
| 1906 .. . ... ... | ... | ... | 491,771 | 3,949 | 759,978 | 3,639 |
| 1907... ... ... .. | 78 | 1 | 658,619 | 5 389 | 497,891 | 3,292 |
| 1908... ... ... ... | 103 | 1 | 560,105 | 5,792 | 480,620 | 4,013 |
| 1909... ... ... ... | 82,032 | 886 | 218,614 | 3,250 | 246,064 | 3,332 |
| 1910... ... ... ... | * | * | * | * | 718,636 | 7,744 |

* Not available.

It will be seen from the above that, roughly, three times the weight of tuber was treated in 1910, as compared with the figures for 1909, with an equivalent increase in the marketable article. A great deal of the latter finds its way to the Southern markets, where it meets with a ready sale. There were only 246,064 lb. made in 1909, which was a year of partial failure. During 1910 the quantity manufactured was 718,636 lb., but in these days of facile transport a commodity of a non-deteriorating nature does not glut the market or materially affect the standard retail price. Naturally the produce of one calendar year is dealt with commercially during the year following; but the statement above, though only supplying figures to the end of 1909 (those relating to imports and exports for 1910 not being available), shows that there has always been a considerable proportion of our arrowroot sent out of the State.

## CULTIVATION OF THE DATE PALM.

Notwithstanding ocular evidence that the date palm thrives luxuriantly and produces heavy crops in many parts of Queensland, especially in the North-Western interior, the cultivation of the date palm for the production of dates on a commercial scale has not yet been undertaken. Yet the palm will grow and thrive with absolutely no attention in the way of cultivation, and the grower has not to contend with the thousand and one fungoid and insect pests which keep the citrus and apple-grower on the *qui vive* pretty well all the year round. Excellent dates have been sent to us from Sandgate, Helidon, the neighbourhood of Brisbane, Barcaldine, Charleville, Cunnamulla, Longreach, Thargomindah, and other places in the West, proving that the climate of far sundered districts is favourable to the production of this universally-used fruit. If the temperature of these Western districts be compared with that of Biskra,

PLATE 8.—DATE PALM IN THE BRISBANE BOTANICAL GARDENS.

Northern Africa, in latitude 34 deg. 51 min., at an elevation of 410 feet, it will be seen that the temperature of both localities is much the same; for instance:—

| | Queensland. | | Biskra. |
|---|---|---|---|
| Average annual temperature ... ... ... | 67·74 | ... | 68·5 |
| Average winter temperature (coldest month) ... | 48·61 | ... | 50·2 |
| Average summer temperature (hottest month) ... | 84·90 | ... | 89·8 |

I do not know exactly what is the lowest temperature recorded at Biskra, but the mercury falls in some of the above-mentioned districts of Queensland as low as 26.4 F. in July in the coldest years, and seeing that the date palm can withstand a temperature of 26 F., it can consequently be safely planted in such localities. In proof of this, there are, in Barcaldine and Charleville, many ten to twenty-year-old trees which yield heavy crops every year. I have seen single date palms near Barcaldine which bore from 10 to 14 heavy bunches of excellent fruit.

In the Queensland districts suitable for date culture the rainfall ranges from 12 to 24 inches annually, and the height above sea-level of Barcaldine and Longreach is from 400 to 600 feet.

The soil is generally sandy, except on the black soil plains, but the sandy districts, erroneously designated as "desert country," are remarkably fertile when irrigated, and are especially adapted to date culture.

So far Queensland dates have never appeared on the market, all the fruit produced being utilised as food for stock and poultry. But it is indisputable that we could produce in Queensland, not only all the dates which are now imported into Australia and New Zealand, but that we could also establish a regular export of dates equal in every respect to the African fruit. The date palm itself affords an example of marvellous productiveness. In general utility it approaches closely to that of the cocoanut palm. If the vast sandy deserts of Africa (including Egypt) and Persia were not adapted to the perfect evolution of the date palm, those deserts would be uninhabitable and unpopulated. Hence one can understand the gratitude of the Arabs and Persians for the heavenly gift of a tree which draws its sustenance from the burning sand, and in no less degree from the heated atmosphere, and from the brackish water, so harmful to nearly all other plants. The beneficent date palm retains its graceful green crown in the blazing heat of a merciless sun. It provides the dweller in the desert with the wood and roofing needed for his dwelling, with fibre for making his tent and clothing, with rope for the harness of his horses, camels and mules, and furthermore with a nourishing, pleasant food, and even with a sweet and spirituous drink.

This most useful palm takes, in the desert, the place of the grape in Italy, the cocoanut palm in Polynesia, and the banana in many Southern lands. If all the African date palms were to be suddenly destroyed, the countless Arab hordes of the Sahara would disappear. The riches of the fertile oases of the desert are reckoned by the number of date palms owned by the inhabitants.

## HABITAT.

The date palm thrives best in the rainless tropical or semi-tropical region of Northern Africa, Arabia, Persia, Egypt, Nubia, Syria, and Australia. It is not indigenous further to the east than the Indus. It

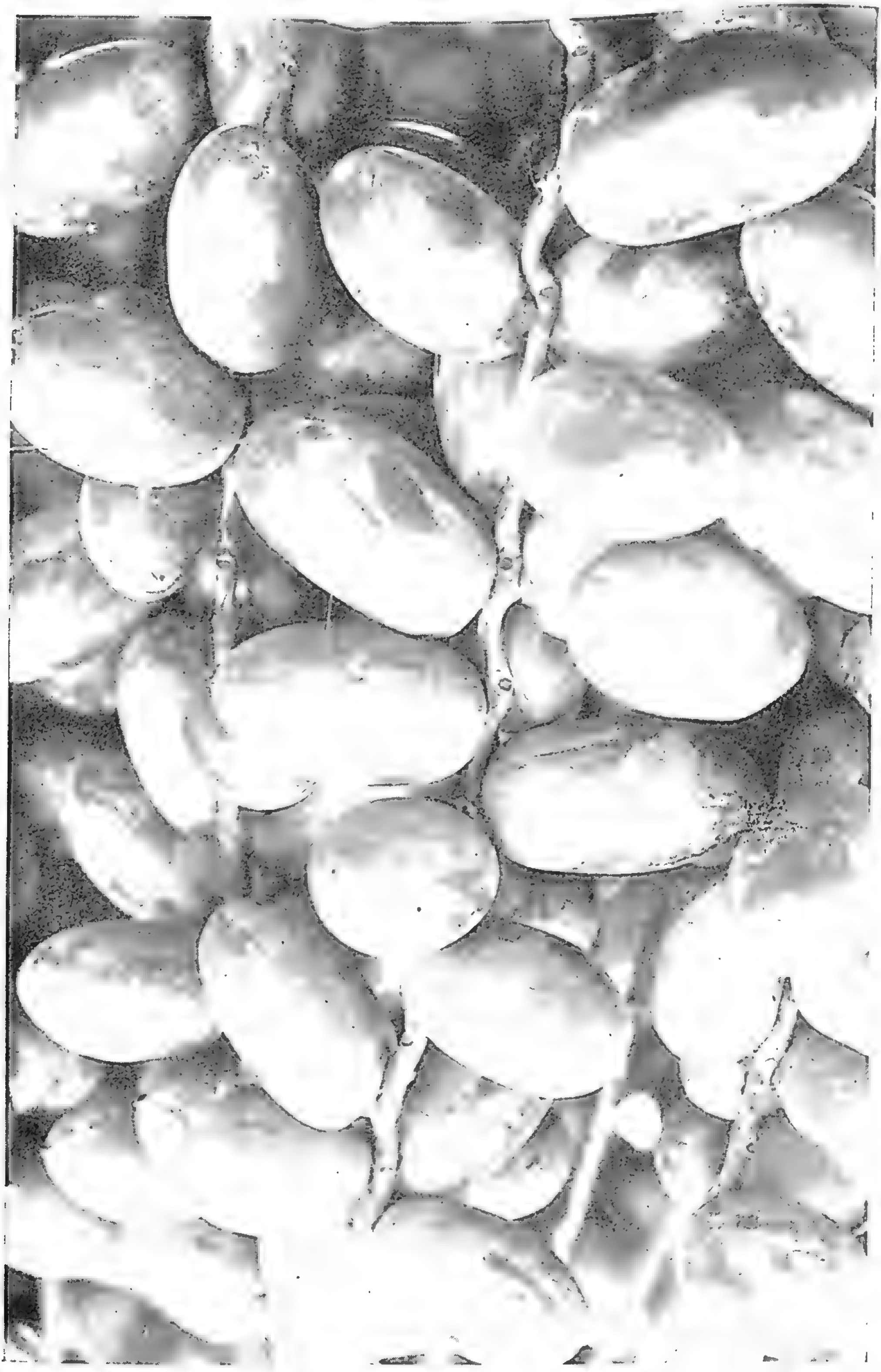


PLATE 9.—DATES (NATURAL SIZE) GROWN BY H. L. PENTECOST, HELIDON.

extends farther towards the North than most of the other species of palms. It is indigenous in the Canary Islands. In the South of Senegal and in the Oasis of Darfur it is not found. Link ("die Urwelt," 1., p. 347) says that the date palm blooms and fruits in Southern Europe, Sicily, the Morea, and Southern Spain. In Sicily, too, the palm thrives at an elevation of 1,700 feet above sea-level, as at Aderno Trecastagne on Mount Aetna, but it is questionable if the palm fruits there.

It thrives best in the belt between the 35th and 19th parallels of North latitude. For the most perfect development of the fruit an accumulation during eight months of the year of 5,100 deg. F. is needed. If the total of temperature be less the fruit will certainly set, but will not attain its full size, will have a bitter taste, and is wanting in the saccharine matter and albumen to which it owes its nourishing properties. These perfect climatic conditions are found in the Sahara Desert and in North and South-Western Queensland. In the Sahara the average temperature ranges between 68 and 76 deg. F., according to locality. The hot season begins in April and only ends in October. During the summer —July—the mercury rises to 86 deg., and in winter—January—it falls to 61 deg. F. The most celebrated date-producing district of Northern Africa—Biskra—lies in latitude 34 deg. 51 min., and at an elevation above sea-level of 410 feet. Towards the South it faces the hot, tropical sun, and in the North it is protected by high mountain chains. The mean annual temperature is 68 deg. 5 min. (in January 50 deg. 2 min., in July 89.8). In winter the mercury seldom falls more than two degrees below freezing point, and the date palm can safely withstand 6 deg. of frost.

When we compare the temperature of Queensland with that of Biskra, we find that the comparison is in every way favourable to Queensland. I shall presently explain how.

## SOIL AND RAINFALL.

In respect of the class of soil needed for the successful cultivation of the date palm, it may be briefly stated that the most suitable is a sandy loam. The palm flourishes in Egypt in pure sand. In Arabia, where most excellent dates are produced, the soil is of granitic formation. All granitic, schistose, sandy, and limestone soils are adapted to date culture.

On the coastlands, immediately on the sea-coast, the date palm produces very scanty crops of poor fruit. The average height above sea-level of the central district of Northern Africa, where the date palm flourishes in all luxuriance, ranges from 600 to 2,000 feet. In a few oases in Egypt the trees are found in great numbers from sea-level up to an elevation of 600 feet, and the date-producing districts on the rivers Euphrates and Tigris, in Turkey, are situated at a like elevation.

As regards rainfall the date palm demands from 5 to 10 inches annually, although fine fruit is produced in localities where the precipitation ranges from 10 to 25 inches. Notwithstanding the need for a hot, dry climate, the tree requires much underground moisture, and hence its cultivation is mainly restricted to those oases where underground water exists. It thrives in rainless regions, but only in such situations where

PLATE 10.—DATES GROWN BY MR. W. C. WILSON, AT MIVA, KILKIVAN DISTRICT.

the soil overlies water (as, for instance, in the Burdekin Delta in North Queensland) or where water can be supplied from artesian wells. Swamp-water is highly detrimental to the date palm.

## IRRIGATION AND OASES.

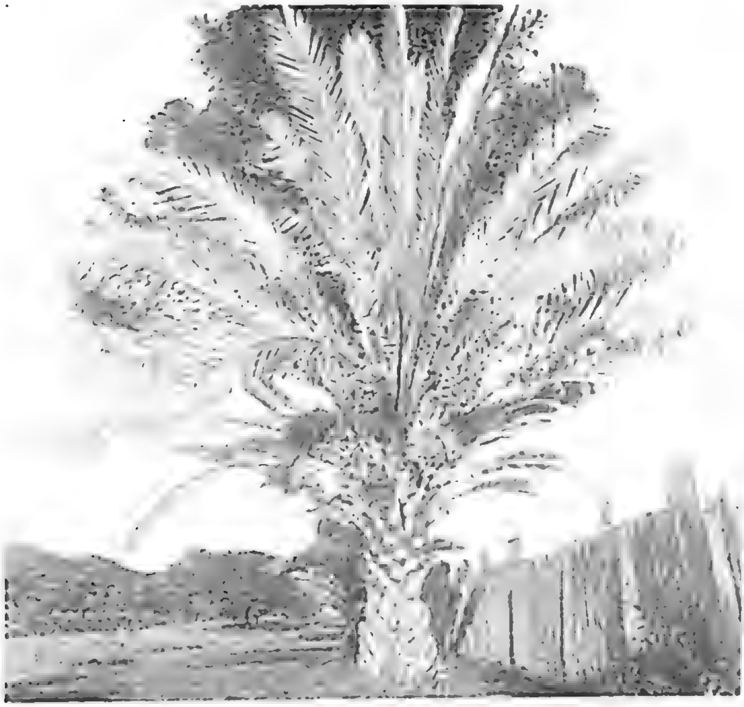
Charles Martin, in his work "du Spitzberg au Sahara," says:—"The oases of the tableland are all watered either from some stream or from plentiful springs, and they are situated at no great distance from the shores of the Mediterranean Sea. The first oasis beyond this district is that of El Kantara (Mangin). To reach this one passes through a gorge which is known as "The Mouth of the Desert," or "Entrance to the Desert." This oasis rises to a height of 1.800 feet above sea-level, and the climate is just hot enough to ripen the dates. The oases of the valleys of Erosion are irrigated by means of natural or artesian wells. An example of this is found in the Oasis of Quargla, which lies in a deep depression. Here date trees are planted to the number of from 1,000 to 1,100 per hectare (2¼ acres). Beyond these plantations there are numerous wild date palms, which yield smaller crops, but whose fruit is of far better flavour.

In the oases of the sandy desert large artificial water reservoirs are constructed, with the object of enabling the roots of the palms planted in excavated hollows to penetrate through the sand to the subterranean water. These hollows are from 18 to 30 feet deep, with sloping sides. The sand is kept back by means of mats made of palm leaves. In the centre of the hollow, a well, 25 ft. deep, is dug. Such localities are always liable to be overwhelmed by an avalanche of sand. Each oasis consists principally of date palms, which to all appearance form an uninterrupted forest, but, as a matter of fact, the trees are planted in rows, and in gardens divided from each other by earthen walls. The water flows through openings in these walls into the enclosed space. The earth of which these walls are constructed is taken from narrow pathways, and as these pathways are rendered by this means lower than the surface, they serve not only for the purposes of locomotion, but also as outlets for superfluous water.

## INFLORESCENCE OR FLOWERING OF THE DATE PALM.

The date palm belongs to the order dioecious plants—that is to say that the male flowers, and the female or fruit flowers, grow on two different trees. The male flowers are considerably larger than the female. They are only provided with stamens, and before the pollen matures they form a closely folded ball, which is enclosed in a covering called the spathe.

"It blossoms," says Mr. Tristram, in his book "The Great Sahara," "in the month of March. The male flower is borne on a very short calyx. The female flowers present a double floral envelope, each whorl of which is formed of three pieces, constituting three distinct pistils, each surmounted by a stigma in the form of a hook. Of these three pistils, only one develops itself and becomes an elongated ovoid berry, with a slight epidermis of a yellowish red, a solid and slightly viscous pulp, and an



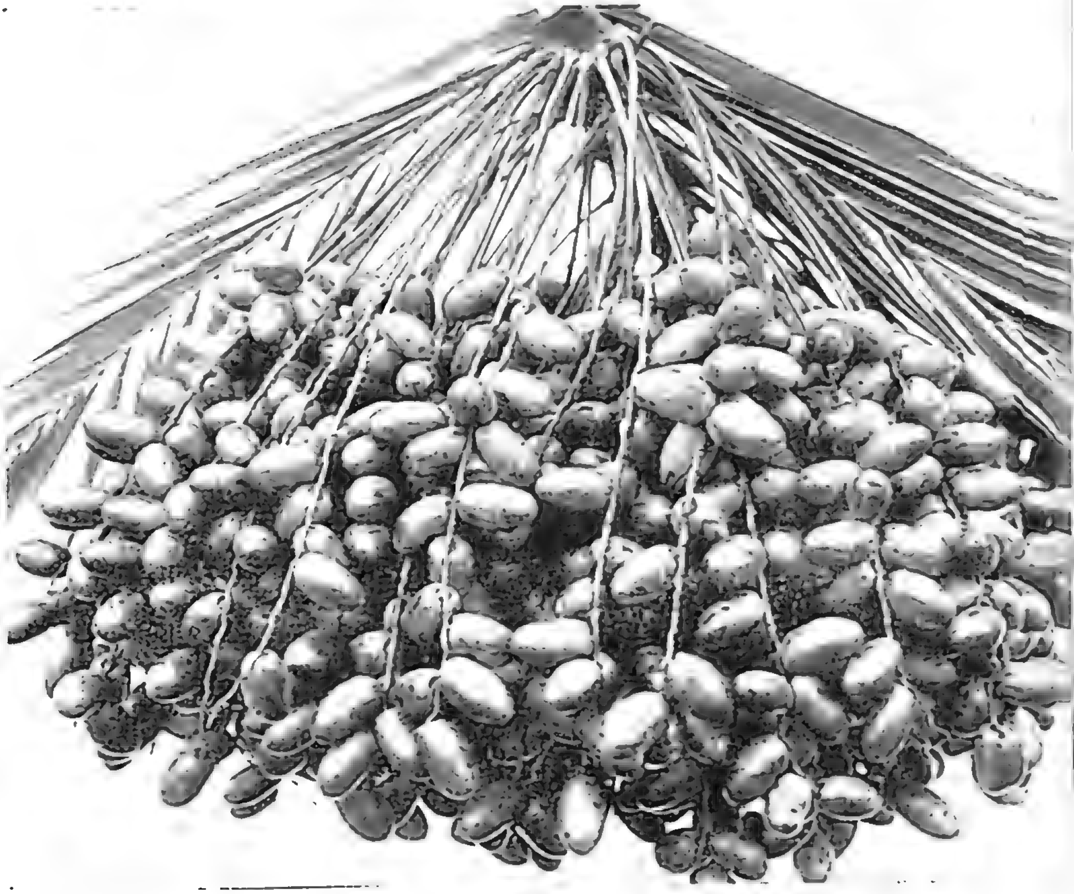


PLATE 11.—DATE PALM AND FRUIT AT HELIDON.

endocarp represented by a slight pellicle enveloping the nucleus, which is the seed. The seed is grooved, and on the opposite side of it is a depression containing the germ.''

The late Baron v. Mueller stated that one male tree is considered sufficient for fifty females. Watts allows one or two males to from eighty to two hundred trees.

## PROPAGATION.

The best trees are produced from suckers three or four years old, having an average weight of about 6 lb. Those raised from seed are much slower in maturing, and are generally poor. The sucker is taken from the foot of the stem of an adult tree. When first planted it must be watered daily for six weeks, and on alternate days for another six weeks, after which the trees are watered once a week in summer and every month in winter. The nut does not commence to germinate until from six to twelve months have elapsed after planting, and then grows very slowly for the first two years. The trees yield fruit in from five to six years, and are in full bearing at from twenty to twenty-five years, after which they continue fruitful for about 150 years. Several bunches of flowers are formed in a season, each producing often as many as 200 dates. Select trees are reported as having borne a crop worth £2; but the average may be put down at 4s. per tree annually, common kinds less than 1s. A good date tree is sometimes exchanged for a camel in North Africa.

## FECUNDATION.

In order that the date palm may fruit properly, artificial fertilisation must be resorted to, because, although the female blossom may be fertilised to some extent by the scattering of the pollen by the wind, still this is not a sufficient means of perfect fertilisation. Hence the necessity for carrying out fertilisation, which is accomplished as follows:—

'' In Algeria, and all over the East,'' says Mr. Cossona, a botanist who has studied the subject on the spot, '' towards the month of April the trees begin to flower, and then artificial fecundation is practised extensively. The male spathes are opened at the time when a sort of crackling is produced under the finger, which indicates that the pollen of the flowers in the cluster is sufficiently developed, yet has not escaped from the anthers. The cluster is then divided into portions, each containing seven or eight blooms. Having placed these pieces in the hood of his burnous, the workman climbs to the summit of the female tree, supporting himself by a loop of cord passed round his loins, and at the same time round the trunk of the tree, and, having split open the spathe with a knife, he slips in one of the fragments, which he interlaces with the branches of the female cluster, the fecundation of which is thus made certain.''

Archer says that wild palms are fecundated by bees. The Arabs even keep the pollen from one year to another in case the male flower should fail in the succeeding season. According to Wallis, the pollen is said to remain active for one or two months after its removal from the tree, so the flower is carefully kept and used as occasion demands.

Hasselquist, who travelled in Egypt, describes the operation as follows:— "When the spadix has female flowers which come out of its spathe, they search on a tree that has male flowers, which they know by experience, for the spadix has not yet burst out of its spathe. This they open, take out the spadix, and cut it lengthwise in several pieces, but take care not to hurt the flowers. A piece of this spadix with male flowers they put lengthwise between the small bunches of the spadix which has female flowers, and then lay the leaf of a palm over the branches. In this situation I yet saw the greatest part of the spadices which bore their young fruit, but the male flowers which were put between were withered. The Arab also stated that unless they in this manner wed and fecundate the date tree, it bears no fruit. Secondly, they always take the precaution to preserve some unopened spathe with male flowers, from one year to another, to be applied for this purpose in case the male flowers should miscarry or suffer damage. Thirdly, if they permit the spadix of the male flowers to burst, or come out, it becomes useless for fecundation; therefore, the persons who cultivate date trees must be careful to hit the right time of assisting the fecundation, which is almost the only nicety in their cultivation."

To climb trees which have no branches but at the top, and the straight and slender stem of which cannot support a ladder, the Egyptians employ a sort of girth fastened to a rope that they pass round the tree. On this girth they seat themselves and rest their weight. Then, with the assistance of their feet, and holding the cord in both hands, they contrive to force the noose suddenly upward so as to catch the rugged protuberances with which the stem is symmetrically studded, formed at the origin of the branch-like leaves that are annually cut. By means of these successive springs, the top of the tree is reached, where, still sitting, they work at their ease, either in lopping off the leaves or gathering fruit, and afterwards descend in the same manner.

[TO BE CONTINUED.]

---

## THE COMING BOOM IN COCOANUTS.

Mr. Hamel Smith, editor of "Tropical Life," writes as follows on the subject of "booms" in tropical products and on the need for competent estate managers:—

### WHO WILL LOOK AFTER THE ESTATES?

Whatever differences of opinion may exist in London to-day as to the future of the £50,000,000 that have been actually paid up to now for planting rubber in the East and elsewhere, and whether, when the top price drops to 3s. per lb., or lower, Brazilian and indigenous rubber will be left behind, there seems no difference of opinion as to our being on the eve of an active cocoanut boom.

This was particularly noticeable at the Rubber Exhibition. Interested and absorbed as visitors were in the exhibition, time and again conversations about rubber prospects and possibilities would stop short, and be switched right on to cocoanuts. The idea one gathers from the sudden change is that since the public will swallow no more rubber promotions and still has plenty of money to invest, a new outlet must be found for them to do so. Cocoanuts certainly offer a very favourable opportunity, since there is an insatiable demand for the oil, and, given favourable circumstances, the prices obtainable either for copra or oil, even if the area is considerably increased, will leave a substantial margin of profit, since the cost of lands suitable for cocoanut planting is low; that is to say, the prime cost, apart from promoters' and boom profits, should be low, and, on the conservative basis of forty-eight trees to the acre and forty nuts to the tree, 2,000,000 nuts in round figures can be looked for from each 1,000 acres cultivated.

As we said last year, in our March (1910) issue, when writing on the "Rubber Boom," we are pleased to see a portion of the surplus wealth of this country being profitably invested overseas, as it broadens the basis of our investments, and it is all the better if other outlets for investment are added to tea, rubber, sugar, &c. Now it is to be cocoanuts, next, perhaps, soya beans, ground-nuts, &c.; last, but not least, when the public want a "sure thing" without 300 per cent. dividend, we shall have cacao. Whatever the industry is the public will respond provided they see a possible profit and do not have to wait too long for dividends.

Investing their money in these agricultural undertakings forces the public here to be aware that the tropics are not only jungles or malaria swamps, and stimulates and expands the demand for our machinery and manufactured goods, thus helping to increase the demand for the cheaper class of labour on this side, and to improve the lot of the skilled artisan and render his prospects more assured. There is only one uncertainty about the whole matter—an uncertainty, too, that should not exist—and it is this:—

Who is going to plant up and attend to the estates, when the promoters, or promoting directors, have left the ship, which they are certain to do sooner or later, be it rubber, cocoanuts, or anything else? Where are all the managers and overseers necessary to immediately supervise the native labourers coming from? Our farmers and agricultural schools or colleges cannot supply them. There is only one thing to do; we must not delay in taking steps to train them—that is to say, we must establish agricultural colleges.

Even if we cannot get our tropical agricultural colleges yet awhile, arrangements can surely be made for those over here, or in our colonies, wishing to take up tropical planting as a career to attend a good agricultural college over here, and then be trained for a year at one or other of the leading experimental and botanic stations, to be found at all our chief producing centres. If some of the students are not amenable to rule and reason they can promptly be expelled, as their conduct would prove (already, we understand, has proved) contagious and contaminate others who wish to work steadily. We are glad to see, however, that the idea that an agricultural college is needed is rapidly gaining ground. "The Financier," always to the fore in such matters, devoted two columns to the subject in their issue of 26th July. In this they called attention to the article in our January number, when we asked that the suggested college, to be founded in Ceylon, should be established as a memorial to the late King. After this the journal dealt fully and appreciatively on Professor Wyndham Dunstan's (who first made the suggestion) introductory remarks on the subject in our book, "Notes on Soil and Plant Sanitation on Cacao and Rubber Estates," in which they say:—

"The evolution of the idea of an agricultural college for the training of young tropical planters has been outlined by Professor Wyndham Dunstan, of the Imperial Institute. In the course of an interesting introduction to Mr. Hamel Smith's recently published 'Notes on Soil and Plant Sanitation on Cacao and Rubber Estates,' Professor Dunstan considers 'it is high time that we recognised—as France and Germany have already done—that it is not safe to depend upon the chance of acquisition of knowledge during the kind of apprenticeship into which young men now usually enter as a first step in the planter's life.' In his opinion the young planter can find opportunities in this country for his preliminary scientific studies either at the agricultural departments of one of our universities or at one or other of the agricultural colleges where many of our most successful farmers at home and in the colonies acquired the rudiments of that knowledge which has stood them in excellent stead in after life.

"Professor Dunstan recognises what the most ardent advocate for an agricultural college would be the first to admit—namely, that such an institution has its limitations. The practical details connected with successful estate management in the tropics can be learned only on the estate, but the youngster setting out to acquire this knowledge would not find himself face to face with problems which cannot be solved by any one lacking adequate scientific acquirements. The question naturally arises as to whether it would be possible to carry the beginner's training far enough under the conditions which obtain at home to enable him to complete in a thoroughly satisfactory fashion his knowledge when working on an estate. This would be, in ninety-nine cases out of every hundred, impossible as things are at present, and that for reasons which must be obvious. It is at this juncture, then, that a properly placed and a properly equipped agricultural college in the tropics would prove of real service to the learner. What, then, is wanted is the taking of immediate steps to see this idea of an agricultural college in the tropics—let us say, for argument's sake, in Ceylon—brought to fruition. In common phrase, it is up to them (the leading men in the tropical planting world) to make a move, and, in our opinion, the sooner they do so the better."

With these remarks we cordially agree. In ten years' time the romance, but not the possibilities of assured incomes, will be knocked out of tropical planting; and then, if boys at school and men at college are not trained from the start to look to the tropics as they do now to the Church, Army, Navy, or the Bar as a profitable method of earning a living, and if they are not coached up to follow such a career, we can never expect to hold our own against other nations in tropical development and agriculture.

## "TROPICAL LIFE" ON TROPICAL QUEENSLAND.

In a notice on the work in Tropical Agriculture carried out by Mr. H. Newport, Instructor in Tropical Agriculture, Cairns, the editor of "Tropical Life," London, who takes every opportunity of dilating on the resources of our Northern coast districts, writes:—

"We are anxious to see this portion of the Empire take a more prominent part in its output of tropical products, particularly rubber, for it is a part that the Cape Peninsula (away from Ingham, and up through Cairns, 200 miles north, to the Torres Strait immediately opposite Papua) has been well qualified by Nature to play. It is true that on the east coast the mountains hug the seashore a bit, but not too much surely to prevent some nice cacao, coffee, and rubber plantations from luxuriating 2,000 or 3,000 ft. up, whilst cocoanuts will do well, we should imagine, right along the shore from a little south of Ingham up to the nose at Torres Strait, and down the west coast to where Queensland borders on the Northern Territory that formerly belonged to South Australia, but it has now been taken over by the Federal Government. On the west coast it may be flat and swampy, but a few miles of judiciously laid drains will go a long way to remedy this, and enable those who know how things are done in Malaya to come here and make a start. It may not prove a particularly 'soft job,' this planting up of tropical Queensland, but surely there are still some 'toughs' left in Australia, as there are elsewhere, with the grit, enterprise, and capital to make a start. The natural and physical difficulties to be overcome are, we fear, not so serious as the native question. Those who imagine that the last Australian aborigine disappeared years ago will, we understand, soon find out, if he takes a journey alone through the Peninsula, that this is but another of many myths."

[The remark on the native question seems to imply that our Northern aborigines are still a source of danger to the settler. This is certainly not the case. The war-like instinct is a thing of the past with the natives, who now rarely commit depredation. The natives are practically all well looked after by the Government, numbers being peaceably settled in native reserves, where they are living contentedly, and devote their energies to clearing land and farming. They are also always ready to take work on farms and stations, and practically the whole of our Northern country natives are visited twice a year by the Chief Protector of Aborigines, and he has nothing but good to say of them in his annual reports.—ED. "Q.A.J."]

## THE FUTURE OF RUBBER.

"Rubber News" gives the gist of a German discussion on the future of rubber as published in the "Berliner Tageblatt," and shows the divergent views held as to the prospective demand and supply:—

"The question as to what course the rubber market will take in the future, under the influence of the increasing production of the world, was discussed, the 'Berliner Tageblatt' states, at a recent meeting of the Rubber Section of the German Colonial Economic Committee. An opportunity was afforded for the first time to representatives of the rubber industry, the trade, colonial plantations and science to discuss the common interests of the industry. Mr. W. Freudenberg, of Bremen, in a report on the situation of the international market, estimated that in the year 1916-17 the quantity of plantation rubber to be expected would be about 110,000 tons, as contrasted with 76,000 tons at the present time, and to the former would have to be added 70,000 tons of wild rubber, if the output did not decrease. As compared with this position, it could be assumed that the world's consumption at the same period would reach 107,000 tons, with an average increase of 5 per cent. A considerable fall in prices, in the opinion of the author, would presumably be the result. On the other hand, Mr. Hoff, of the Central Association of Rubber Goods Works, in referring to the possibility of a further extension in the consumption of rubber, came to the conclusion that it is very possible that the larger quantity of raw rubber to be expected would be worked up by the rubber industry itself and by allied branches of industry.

"The question of artificial rubber was brought forward by Dr. Gerlach, of Hanover, who stated that the problem could probably be regarded as solved at the present time. If, however, twenty years were required to introduce synthetic indigo into practice, the speaker expressed the belief that a period equally as long, if not longer, would be needed in the case of rubber. The manufacture of rubber synthetically was opposed by much greater difficulties than the production of artificial indigo, as rubber was still a material which was extraordinarily hard to define physically. A simpler answer could not be given to the question as to whether it would be possible to place large quantities of artificial rubber on the market later on, and commercially utilise them, so that wild rubber would have to fear the rivalry of the synthetic material. The raw material from which artificial rubber was made had also first to be produced synthetically; and, from the nature of things, there were few chemical works which could successfully solve such problems. But artificial rubber, Dr. Gerlach contended, would certainly be placed on the market. The question of price would regulate itself, but in any case the artificial product must be cheaper in order to compete seriously with natural rubber, and the former, in his opinion, would not prejudice cultivated or natural rubber."—"Financier."

## THE SOJA BEAN AS A SOURCE OF RUBBER.

The high price of rubber during the year 1910 has had, says the "India Rubber World," a stimulative effect, that should not be overlooked, on the activity of those inventors who devote their attention to the production of synthetic rubber, rubber substitutes, and the perfection of the various processes for the reclamation or other means of using old rubber. Even the soja bean, a staple article of food supply in the Far East, and the residue of which, after extraction of the oil, in the form of beancake, is, with the bean itself, imported into Europe, for use as cattle feed, has been laid under contribution by the indefatigable searchers for a raw material for artificial rubber, a German patent having been issued for the manufacture of artificial rubber from soja bean oil.

## THE GROS MICHEL BANANA IN NORTH QUEENSLAND.

BY HOWARD NEWPORT, Instructor in Tropical Agriculture.

The introduction to Queensland of this variety of banana, known here as the "Fiji" on account of its fruit being imported thence to the Australian markets, but which would perhaps be more correctly associated with Trinidad, has been suggested as the obvious solution of the difficulty in obtaining in the fruit markets of the Southern States a home-grown banana of prepossessing appearance (on which point the saleableness largely depends), and a fruit therefore that will "take on" with the public and be readily disposed of by the dealers.

Whether this will prove the best, or any, solution remains yet to be seen, however, and is by no means obvious or assured.

The facts are, that in the Southern markets the Cavendish bananas from North Queensland often do not arrive in good condition on account of the bunches having to be cut young to obviate loss by pre-ripening in the holds of the steamers, and resulting damage, if not entire loss, from the method of packing. To make sure of obtaining a consignment that will not prove a loss, therefore, the dealers prefer to receive them in such a condition that there is no fear of their not travelling, even though it may involve a considerable time and some expense in artificially ripening them after receipt in the South. The natural result is a poorly-filled fruit of indifferent appearance that frequently has not even changed in colour as it ripened (the colour of the properly-ripened Cavendish banana is as yellow as the average fruit). On the other hand, the Gros Michel fruit from Fiji arrives in better condition and (since the public judge by appearance to such an extent) sells better.

The natural deduction is, therefore, that the Cavendish fruit is inferior to the Gros Michel, and the reason given for this is that it does not travel so satisfactorily. Hence the seemingly obvious solution of substituting the cultivation of the one for the other in the North Queensland banana gardens.

This, however, is only sufficient of the truth to confuse the issue. The real questions involved are those of cultivation, transport, and marketing. To take the last first: The market, or the public, require a prepossessing appearance coupled with as good a quality and flavour in the fruit as may be possible. Now the incontrovertible fact remains that the Cavendish when properly ripened not only meets these requirements to the fullest possible extent, but leaves the Gros Michel a somewhat indifferent second. But, unfortunately, the fruit-loving and fruit-buying public of the Southern States of Australia *do not have an opportunity of judging these fruits on equal terms.* If they did, there is no question that the popular verdict would be in favour of the variety Queensland is already producing.

This brings us to the real cause of the preference for the coarser but nicer-looking Gros Michel banana, and that is not its better quality but the better condition in which it is retailed—*i.e.*, its transport. From the point of view of the carrier, the variety that will stand the worst treatment best is the desideratum; but is it the best for the trade—*i.e.*, the grower on the one hand, and the dealer and consumer on the other?

That the hardier fruit should be the coarser in texture and flavour is but a law of nature, and the question is really one of treatment in transport rather than change of variety.

Given exactly similar treatment—that is, amount of handling, method of stowage, ventilation, &c., mile for mile of distance travelled—there is no reason why the Queensland fruit, the Cavendish, should not

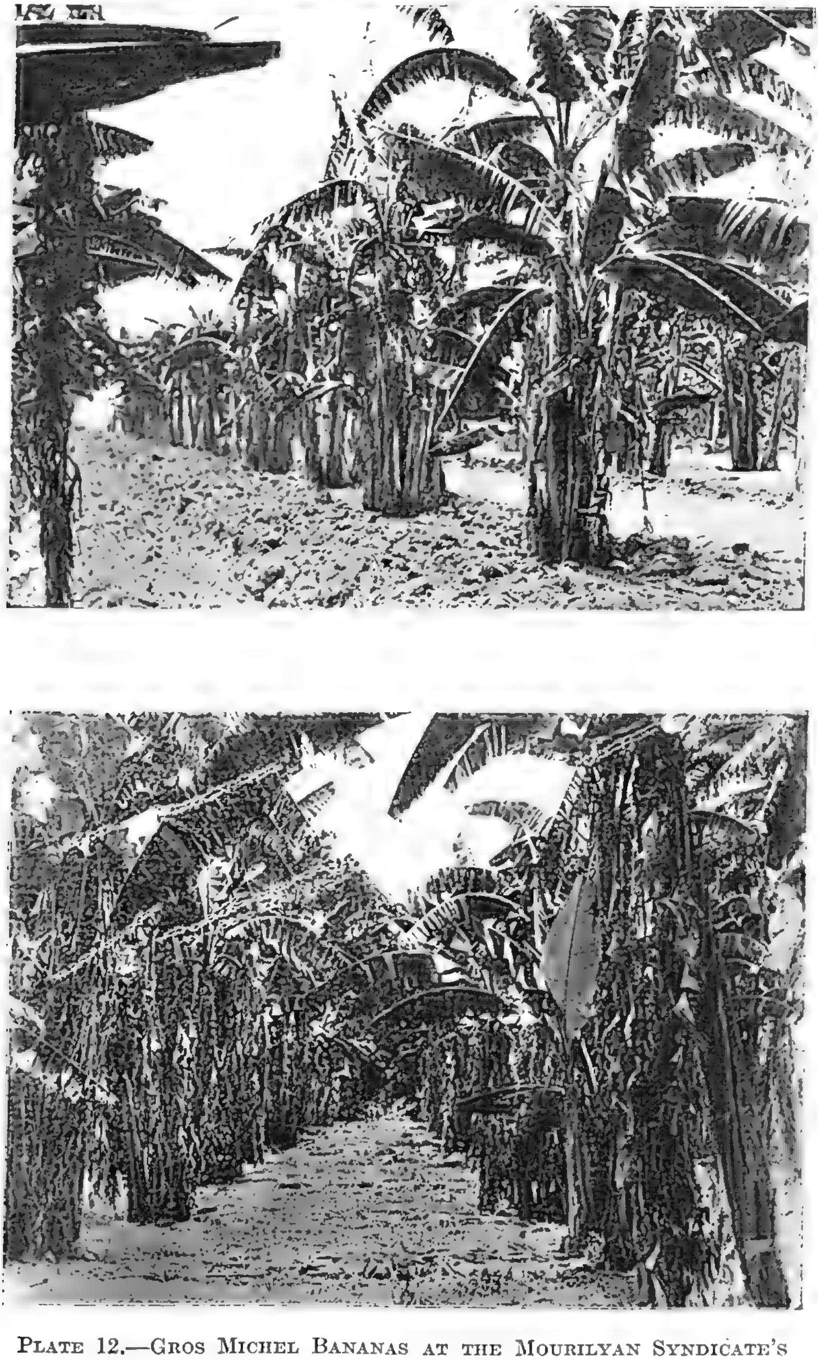


PLATE 12.—GROS MICHEL BANANAS AT THE MOURILYAN SYNDICATE'S PLANTATION, N.Q.

be placed on our markets in an equally good condition as the Fijian. It has been mooted that cold storage will enable this to be done, but with really tropical fruit this does not meet the case; nor is it entirely more gentle handling that is needed, but rather better stowage (along lines such as are in vogue in transporting bananas from the West Indies to London), the elimination of a great deal of the handling involved in transhipment, and particularly the elimination of the delay caused by the fruit-carrying steamers calling at ports *en route,* a stoppage of six hours, and consequent cessation of ventilation, doing more to bring about those changes in the fruit that cause its arrival in an undesirable condition than twenty-four hours with the ship in movement.

No doubt the argument will be brought forward that if any reorganisation of the shipping facilities are desired the amount of freight immediately offering must warrant it. This in reality throws the onus of cost and risk on to the unfortunate primary producer, who generally has not the capital to fall back on to pay for empty freight space until he can grow enough to fill it, nor to grow produce the realisation of which depends on facilities of transport that do not at the time exist. Likewise the inauguration of proper means of transport would involve a period during which not only would the newer plantings be required to come into bearing, but during which confidence must be established in the grower to cut later, and in the dealer to receive later cut and better-filled fruit.

It is not within the scope of this article to suggest how this difficulty may be overcome, but it is suggested that the large trade that has existed and the practically inexhaustible demand constitute some guarantee or warrant for attention to the matter, while the broad question of the establishment of another industry in our empty tropics should also prove a strong reason for making a determined effort worth while.

In the matter of cultivation of the existing varieties it is admitted there is room for improvement, but whole-hearted attention to this is not encouraged while the difficulties and uncertainties of transport and marketing remain.

Comparing the cultivation of the two species, Cavendish and Gros Michel, it must be admitted that the former and dwarf species lends itself the better to the conditions prevailing here. I have found in touring in the North that the idea prevails in parts that Gros Michel is a dwarf species, which is not a fact. This has perhaps arisen from the records of the importation of dwarf banana plants into Fiji and the knowledge that the fruit now being received from there are the Gros Michel. The passage which appears in the Kew Bulletin, 1894, pages 229-314, is as follows:—" The interesting story of the introduction of the Chinese banana to the Islands of Polynesia is thus told by Seemann (Flora Vitinsis, page 289): ' An important addition to their stock of bananas the Fijians received in the Vudi ni papalagi (*i.e.,* foreign banana), our *Musa chinensis* or *Cavendishi,* which the late John Williams brought in a wardian case from the Duke of Devonshire's seat at Chatsworth. . . . . Never attaining any greater height than 6 ft. and being of robust

PLATE 13.—GROS MICHEL BANANAS AT THE MOURILYAN SYNDICATE'S PLANTATION, N.Q.

growth, the Cavendish banana is but little affected by the violent winds which cause such damage amongst plantations of the taller kinds of Musa; and this advantage, coupled with its abundant yield and the fine flavour of its fruit, have induced the natives to propagate it to such an extent that it numbers amongst the most common bananas of the country.' "

The Gros Michel variety, on the other hand, is referred to by Dr. Nicholls, F.L.S., of the West Indies, in "Tropical Agriculture," page 160:—"The kinds most liked, however, in the American markets are the Martinique variety, with its large yellow fruits, and the Cuban variety. . . . . The Martinique kind is now the principal one exported, and it is known throughout the United States as the 'Jamaica banana.' In Dominica it is called 'figue la rose' and in Trinidad 'Gros Michel' banana." No mention is made in this reference to the size of the plant, nor are any records to hand here of its introduction to Fiji.

That the Gros Michel is anything but a dwarf in habit, the accompanying illustrations show; the name apparently applying more to the plant than the fruit as is generally supposed.

The season before last a number of suckers of this variety were imported by the Mourilyan syndicate from Jamaica, and last and this season the Department of Agriculture are similarly importing suckers. The illustrations at Mourilyan are of the progeny or suckers resulting from the original plants put out by the Mourilyan Syndicate near their sugar-mill. There are now from three to five plants in a stool, and are planted about 15 ft. apart. The average height now is about 15 ft., and they are not quite full grown. The one in bearing was quite 15 ft. to the stalk of the young bunch. These have had floods over the ground they were on, but not over the plants themselves, and were not weeded for nearly a season, hence were somewhat more untidy than if they had been attended to and the dead leaves cut. They were, however, healthy and strong. The cyclonic winds experienced there were not so severe as further north, and the plants also were considerably smaller than at the time of photographing (November); so little damage was done. There is possibility of damage in this direction, however, and it is significant that the Chinese growers in the vicinity would have nothing to do with the new variety, giving as their reasons the slowness of growth, its height and consequent possibility of being blown over, or of falling when heavily in fruit. In the very moist condition of the ground in our Northern districts even the Dwarf Cavendish will often fall over when in fruit, hence supports are generally used for the bunches from the time they are about one-third grown until ready to cut. In the case of the huge Gros Michel the length, number, and manipulation of similar supporting stakes or forks would be no inconsiderable item. While the fact that this banana will thrive in North Queensland has been demonstrated, however, it has not yet shown the suitability for existing conditions and facilities in cultivation on a large scale that the Cavendish has.

The illustrations of the Gros Michel bananas at Kamerunga are of last season's plants, received as very small corms, not the size of ordinary Spanish onions in many cases, and only raised with special care. They are now, as may be seen, some 12 ft. high, sturdy and healthy, though showing as yet no signs of fruiting.

These were planted in the field 12 ft. apart in January last (1911), and when photographed were therefore ten months old. In point of growth, size, and healthiness, they compare very well with the Mourilyan plants.

PLATE 14.—GROS MICHEL BANANAS AT THE KAMERUNGA STATE NURSERY.

Bunches of fruit obtained in the Innisfail district were seen, but owing to the very bad season experienced were hardly good enough for any real comparison to be made. As seen, however, while the individual fruit were larger, the number of hands and number of fruit were much less than on similar Cavendish bunches.

The bunches were more loosely built, and would admit, if transported, of *more natural ventilation between the individual fruit and* *hands* than would an average Cavendish bunch. The skin was thicker, and I should say distinctly coarser in grain and tougher, than the Cavendish; but when sampled the superiority of the Cavendish in point of flavour was amply maintained.

After all, the only claim to any sort of superiority by the Gros Michel banana lies in its ability to stand more knocking about (*i.e.,* in its coarseness and toughness), and it must be borne in mind that in being imported from Fiji it has probably better accommodation and certainly a more direct and uninterrupted voyage, and it is by no means yet shown that it will come out of the ordeal of the voyage from North Queensland to the Southern States in a condition to materially maintain this superiority.

While it is therefore in a measure still very much of a question as to whether Queensland has solved its difficulty, or is even doing the best thing in endeavouring to change its variety rather than its methods, to those desirous of giving this species a trial it will be of interest to learn that from now on healthy young Queensland-grown suckers may be obtained at about 2s. 6d. each.

## POTATOES AND POTASH.

Experiments at Rothamstead throw important light on the effect of fertilisers and potato blight. The potatoes in a particular field were repeatedly and carefully sprayed with Bordeaux mixture. The dates of the successive applications (says an exchange) were as follows:—June 27, July 7, August 2, 3, and 10. Early in August it was noticed that the leaves of all the no-potash potato plants were beginning to blight, while the foliage in all the plots to which potash has been annually applied still appeared to be practically unaffected. The blight made rapid progress on each of the five no-potash plots, while the foliage of the vines upon all the other plots for the most part ripened normally. Practically all the leaves on the no-potash plots were dead by the end of August, at which date there was still considerable foliage on the other plots. There was no decay of the tubers, however, on any of the plots, but the marked inferiority in yield on the no-potash plots was, no doubt, in considerable measure due to the relatively early death of the foliage. George Ville, the celebrated French agricultural chemist, found in his experiments that the suppression of potash reduced the crop of potatoes from 9 tons 16 cwt. to 4 tons 4 cwt., and wrote on the subject: "Whenever soil does not receive potash, or where it gets no manure, the plants are poor and stunted, with withered and dry leaves, and that, too, in the month of June, when the other plants are still in a state of luxuriant growth. As for the tubers, they become wrinkled, withered, and reduced in size, their preservation being almost impossible. . . . . The lack of potash in the soil is coincident with the potato disease, whence we may draw the conclusion that when plants are deprived of their chief mineral constituent, and consequently of one of the most essential elements of their existence, they become a prey to inferior organisms, such as microscopic fungi, &c."

# Botany.

## CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, C.M.G., F.L.S., Colonial Botanist.

### Order ORCHIDEÆ.

PHAIUS, Lour.

**P. grandifolius,** var. **Rowanæ,** *Bail.; n. var.* The Spotted Lily of Murray River, North Queensland. Character of whole plant that of *P. grandifolius,* only differing in the sepals and petals being marked with rather large yellowish dots. Named from a large painting made by Mrs. F. C. Rowan while on a visit to the native habitat. When specimens are to hand, the plant may prove worthy of specific rank.

### Order AMARYLLIDEÆ.

CALOSTEMMA, R. Br.

**C. album,** *R. Br.* (Plate 15).—The bulbs I mentioned in the August number of the "Queensland Agricultural Journal," as having been collected on Bountiful Island by Mr. E. W. Bick, are now flowering in the Brisbane Botanic Gardens, and there seems no room to doubt their being Dr. Robert Brown's plant, as I surmised; the plants here figured, however, show a smaller growth than that given in "Hooker's Icones," Tab. 2371, and reproduced in the "Queensland Flora." The plant is pretty, but its great interest lies in the fact that while many have hunted for it none had succeeded in finding it since Dr. Robert Brown collected his specimens in about 1803.

### Order FILICES.

POLYPODIUM, Linn.

**P. rigidulum,** *Sw.*, var. **diversipinnæ,** *Bail.; n. var.* (Plate 16). This variety differs from all others in the great diversity in the form of its pinnæ upon the same frond, as will be seen in the accompanying illustration, showing various pinnæ, all taken from a single frond; the plant attains a height of over 4 ft.; is of a pleasing green, and, like other varieties of the same species, takes kindly to cultivation, and doubtless will soon be common in our bushhouses.

Hab.: Glass House Mountains, *C. T. White* (Field Naturalists' Club Excursion, May, 1910).

### Order FUNGI.

SECTION UREDINEÆ.

HEMILEIA, Berk. and Broome.

I. (Æcidium Stage).—Unknown.

II. (Uredo Stage).—Forming effused pulverulent orange patches on the under surface of living leaves, or on young shoots and fruits; uredospores, grouped in small heads or clusters, produced at the apex of fascicles of hyphæ emerging through the stomata, reniform or subglobose, the whole or a portion only of the epispore warted; germ-spores 3—5.

PLATE 15.—CALOSTEMMA ALBUM, *R. Br.*

III. (Teleutospore Stage).—Teleutospores originating from the centre of the heads of uredospores after the latter are fully developed, unicellular, broadly ovate, umbonate; germ-spore apical; promycelium simple, 3—4—septate, each septum producing a single sporidium borne on a slender sterigma.

In some species the head of uredo and teleutospores is surrounded at the base by paraphyses.

**H. Woodii,** *Kalchbr. and Cooke.*

I.—Unknown.

II.—Hypophyllous; uredospores in small heads, forming somewhat irregularly defined pulverulent orange patches 1—2 c.m. across; spores broadly elliptical or subglobose; those situated near the periphery of the head often show a slight concavity on the surface in contact with other spores; epispore thickly studded with small warts of uniform size, averaging about 30 $\mu$ diameter; pedicel slender.

III.—Teleutospores occupying the centre of the heads of uredospores, almost or quite colourless, broadly ovate, umbonate; epispore smooth, averaging 35 $\mu$ diameter; pedicel elongated, rather stout, septate; promycelium tube simple, 3—4, septate, each segment producing a subglobose sporidium 8—10 $\mu$ diameter, borne at the apex of a slender sterigma. The head of spores is surrounded by a varying number of slightly curved, smooth paraphyses, which are more or less triangular in section. The paraphyses or cysts forming the outermost and basal portion of the head of spores are very variable in number and size, but can always be found, even when all the spores are mature; whereas in *H. vastatrix* ("coffee leaf disease") bodies similar in appearance, and occupying a like position, are present when the head is forming, but eventually develop into normal spores. The teleutospores are more abundant in proportion to the uredospores in the present species than they are in *H. vastatrix.*

Hab.: On living leaves of *Gardenia edulis*, Gilbert River. Also found on various Rubiaceous plants in Africa and Java. All the above is from Geo. Massee's "Revision of the Genus Hemileia," in Kew Bull. No. 2 of 1906, pp. 35-42.

FAMILY MELANCONIÆI.

GLŒOSPORIUM, Mont.

**G. Tristaniæ,** *Mass. Sp. nov.* Diagnosis not to hand.

Hab.: Virginia Creek, *Tryon and White.*

### Order ALGÆ.

The two following additions to our Algæ have been determined by Mr. A. D. Cotton, Kew, England:—

FAMILY CLADOPHORACEÆ.

CLADOPHORA, Kuetz.

**C. crinalis,** *Harv.*

Hab.: Brisbane River, *C. T. White.*

FAMILY GIGARTINACEÆ.

GIGARTINA, Stackh.

**G. brachiata,** *Harv.*

Hab.: Southport, *J. H. Simmonds.*

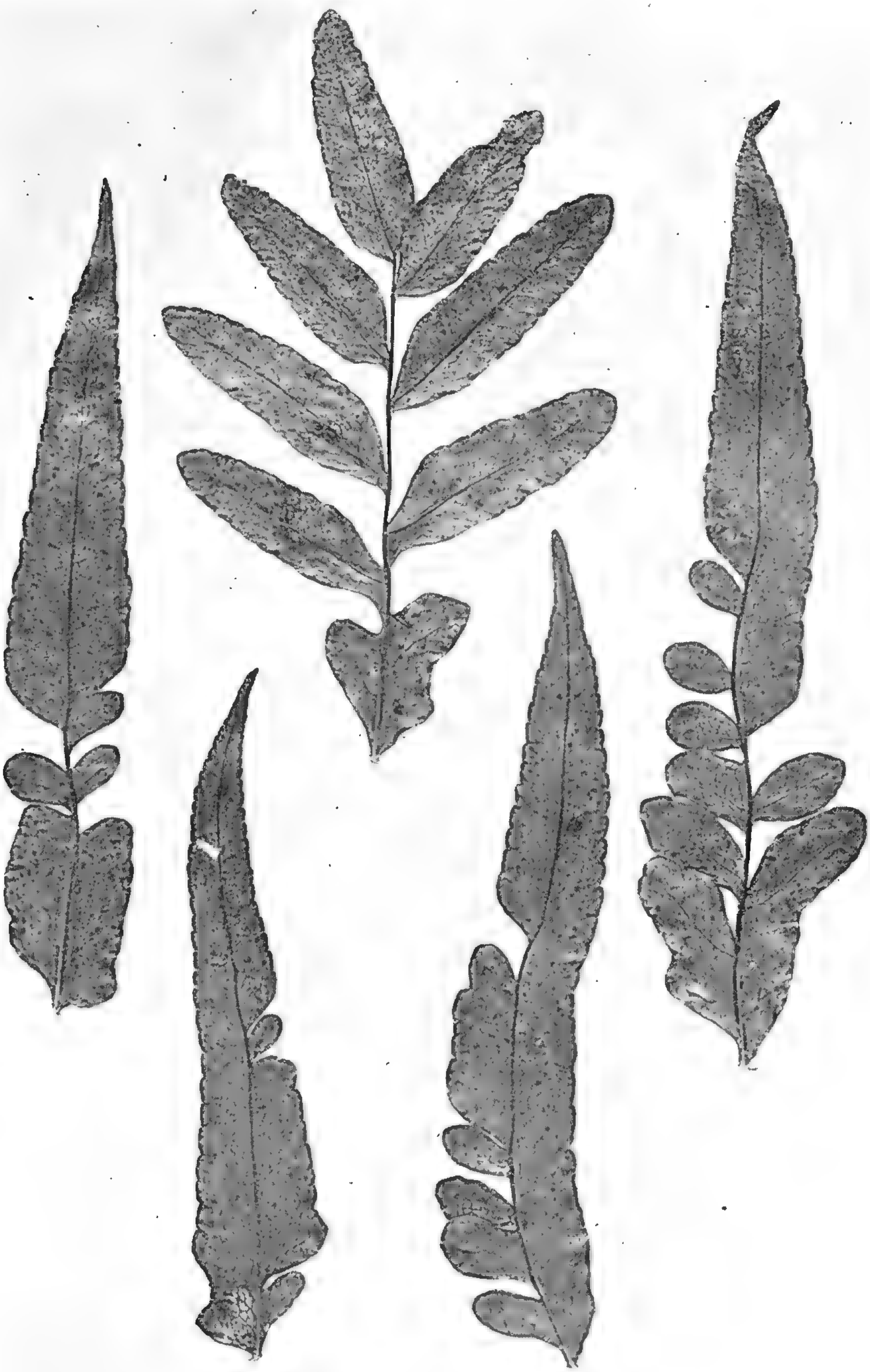


PLATE 16.—POLYPODIUM RIGIDULUM, *Sw.*, VAR. DIVERSIPINNÆ, *Bail.*
Five pinnæ from one frond.

## BRISBANE BOTANIC GARDEN SECTION.

### SHOWY SHRUBS OF THE N.O. RUBIACEÆ.

By J. F. BAILEY, Director.

Quite a number of decorative shrubs is furnished by the natural order of plants known as Rubiaceæ. One of the handsomest is *Pavetta natalensis,* a native of South Africa. It is a small-leaved species of compact habit, and, as will be seen by the accompanying illustration of one of the plants in the Gardens, is very floriferous. The heads are composed of numerous white flowers, and, on account of their lasting qualities, should be valuable for floral work of all descriptions. An indigenous species (*P. indica*) is also a showy plant; but the flower-heads are not so large as those of *P. natalensis. Ixora timorensis,* of Timor, and also of our northern scrubs, is a strong-growing shrub which is furnished with numerous large heads of white flowers at several periods during the year. This genus and its ally, *Rondeletia,* supply us with some of our brightest flowering shrubs. *I. coccinea* produces large heads of bright scarlet blooms; while in *I. Dixiana* they are of a dark orange colour. *R. odorata* (*R. speciosa*) is a general favourite in our gardens, and its bright vermilion flowers, disposed in heads, make a gay show. *R. amaena* is a pink-flowering species belonging, like the last-mentioned, to Mexico, which produces a wealth of bloom during the spring.

The well-known Gardenias also belong to this family of plants, but are not grown to any extent on account of their susceptibility to attacks from scale insects and fungus blights. If, however, they are placed in well-drained positions and properly cultivated, little fear need be entertained of enemies of this description. All the ordinary species—namely, *G. florida* (the Cape Jessamine), *G. globosa,* and *G. Thunbergia*—are handsome shrubs with white, fragrant flowers which are borne in profusion during the spring and early summer. The double form of *G. florida* is the one usually grown. Flowers useful for cutting are supplied by many choice varieties of *Bouvardia* a class of plant which is very popular among gardeners. There are few plants which give more satisfaction, provided the essential features for their successful cultivation are obtainable. Efficient drainage is of the utmost importance, and in a climate similar to that of the Brisbane district a fairly sheltered position is necessary—preferably where they get the sun in the morning only until about 10 o'clock. Among the many free flowering varieties obtainable from our local nurserymen, mention may be drawn to Priory Beauty (pale rose); Beauty of Brisbane, a locally raised white variety; *Bocki* (pink); President Cleveland (scarlet); and Salmon Queen.

*Pentas carnea* is a small-growing South African plant with bright-green foliage and pretty flesh-coloured flowers produced in large heads which are numerous on the plant.

During the summer months *Hamelia patens,* a strong-growing South American plant, is covered with tubular blooms of an orange-red colour.

Although not of floral beauty, the variegated forms of the New Zealand plant *Coprosma Baueriana* are worthy of a place in the garden on account of the foliage being liberally blotched with pale yellow, a feature of value in the garden when used to contrast with other shrubs in the borders. *Serissa fœtida* is a pretty little plant with small leaves and floriferous habit, abundance of white flowers being present during most of the year. Not by any means the least showy is the well-known Coffee (*Coffea arabica*), with glossy foliage and pretty white flowers borne along the branches.

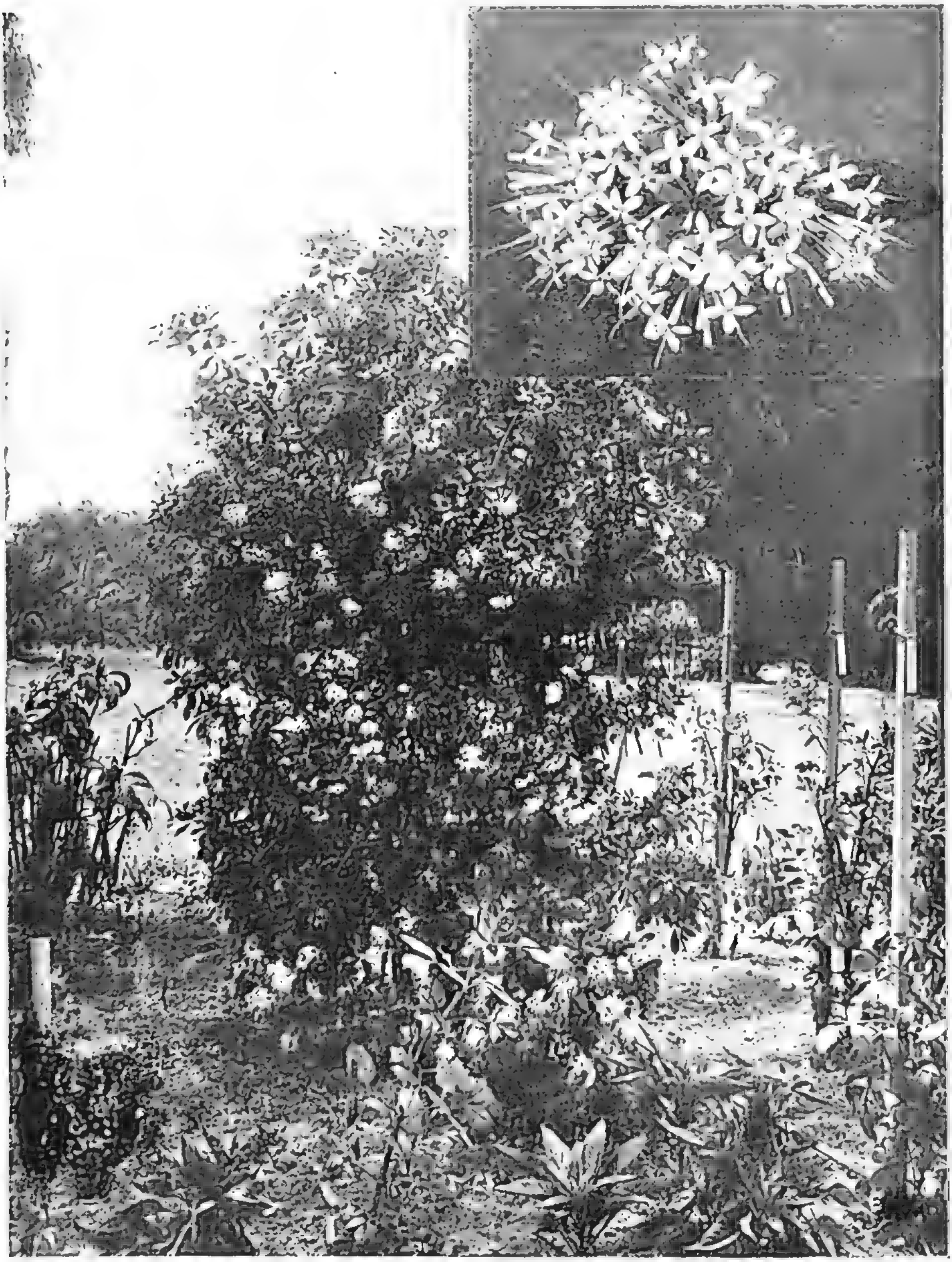


PLATE 17.—PAVETTA NATALENSIS.

# General Notes.

## PULLING FORCE OF TRACTION ENGINE.

Referring to an extract on this subject taken from the "Farmer and Settler," Sydney, and published in our October issue, Mr. G. A. Cook, Biggenden, writes:—

"*Re* horse power of steam engine, as per your letter in the 'Queensland Agricultural Journal,' from the 'Farmer and Settler,' I would like to ask, through the 'Queensland Agricultural Journal,' how the writer gets his 33-horse power from an 8-horse power engine; he states that 22.000 foot lb. is the actual power of 1 horse; that Watt allowed 50 per cent., or 33.000 foot lb. This would be about 12-horse power actual for 8-horse power nominal. I would like to know where he gets his 33-horse power from. I would like to say that a lot less than 50 horses will back pull an 8-horse power traction engine, if they can be started at the same moment as the throttle is opened. There is, however, one thing in the article I agree with—that is, the horses in a prolonged contest must give in, as they are constantly giving out, whilst the engine power is constantly being renewed."

## THE DATE PALM IN EGYPT.

Under this heading we published in September, 1911, a very interesting report on the cultivation and propagation of the date palm and the treatment of the fruit for local use and for export, which was forwarded to His Excellency Sir William MacGregor, by His Excellency the Governor-General of the Sudan. In the report, as published in the journal, two errors crept in, which have been kindly pointed out by Mr. G. H. Nevile, Station Darmalli, Atbara, Sudan. On page 132 the price of "agwa" is given as 40 to 50 paras per tin. There is no such coin in use in Egypt as the para; the word piastre = 2½d. should have been used. Then, on page 133, the price of an ardeb is given as 1 fuddah = 1/16d.; this should read 1 piastre = 2½d.

It would be helpful to Australian readers of articles from our colonies and dependencies in which British coinage, weights, and measures are not used if the equivalent British weights and values were given at the same time.

# Answers to Correspondents

## UNFRUITFUL POTATO CROP.

H. J. FIELD, Cooyar—

It is not an uncommon occurrence for a crop of potatoes to run to tops during hot weather when planted late in the season, and a similar condition will occur when the soil is warm and growth is forced by heavy rains, particularly when an unsuitable variety is planted. We had the same experience last week (10th December) when digging a crop, the haulms being of abnormal growth, but producing no tubers.

## TOY SUGAR MILLS—SHEEP IN MARYBOROUGH DISTRICT.

J. A. B. BLACKBURN, Nerudah, Maryborough—

Have nothing to do with what you call " toy sugar-mills." Years ago, small sugar-mills were proved to be a delusion and a snare. It would cost you more to produce sugar for home consumption than to buy it at the store. The most up-to-date mills often average only 1 ton of sugar from 8 to 10 tons of cane. From this you may calculate what 56 lb. of cane grown in your garden would produce—about 2 lb. of raw sugar.

As regards sheep in your district: As a rule, sheep do not thrive on coast country. But if you sow artificial grasses on rising ground—lucerne, if you have a plentiful supply of water for irrigation—you might succeed with Romney Marsh sheep in raising sheep and lambs for slaughter.

## SUMMER TREATMENT OF CITRUS TREES.

T. HOLDERNESS, Dappil, Maryborough—

Mr. Ross, Instructor in Fruit Culture, advises:—Citrus trees are best pruned after the crop has been gathered, and immediately before the summer growth starts. Citrus trees not bearing may be pruned during spring, summer, and autumn, and are best left untouched during winter.

# The Markets.

## PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR DECEMBER.

| Article. | | DECEMBER. Prices. |
|---|---|---|
| Bacon, Pineapple | lb. | $7\frac{1}{2}$d. |
| Bran | ton | £6 15s. |
| Butter | lb. | 10d. to $11\frac{1}{4}$d. |
| Chaff, Mixed | ton | £3 10s. to £6 10s. |
| Chaff, Oaten (Victorian) | ,, | £6 |
| Chaff, Lucerne | ,, | £6 10s. |
| Chaff, Wheaten | ,, | £2 10s. |
| Cheese | lb. | 7d. to 8d. |
| Flour | ton | £9 5s. |
| Hay, Oaten (Victorian) | ,, | £6 10s. |
| Hay, Lucerne | ,, | £4 to £5 10s. |
| Honey | lb. | 2d. to $2\frac{3}{4}$d. |
| Maize | bush. | 4s. 3d. |
| Oats | ,, | 3s. 2d. to 3s. 6d. |
| Pollard | ton | £6 15s. |
| Potatoes | ,, | £5 10s. to £10 10s. |
| Potatoes, Sweet | ,, | 1s. 6d. to 2s. 3d. |
| Pumpkins | ton | £6 10s. |
| Wheat, Milling | bush. | 3s. $7\frac{1}{2}$d to 3s. 8d. |
| Onions | ton | £8 to £9 |
| Hams | lb. | 1s. $1\frac{1}{2}$d. |
| Eggs | doz. | 10d. to 1s. $2\frac{1}{2}$d. |
| Fowls | pair | 3s. 3d. to 5s. 6d. |
| Geese | ,, | 6s. 6d. to 7s. |
| Ducks, English | ,, | 3s. 6d. to 4s. 3d. |
| Ducks, Muscovy | ,, | 5s. 6d. to 6s. 3d. |
| Turkeys (Hens) | ,, | 8s. to 10s. |
| Turkeys (Gobblers) | ,, | 15s. to 25s. |

## SOUTHERN FRUIT MARKET.

| | |
|---|---|
| Apples (Choice), per case | 12s. |
| Apples (Cooking), per case | 9s. |
| Apricots, half case | 3s. to 6s. |
| Bananas (Queensland), per bunch | 3s. to 9s. |
| Bananas (Queensland), per case | 7s. 6d. to 9s. |
| Bananas (Fiji), G.M., per bunch | 4s. to 9s. |
| Bananas (Fiji), G.M., per case | 14s to 15s. |
| Cherries, per quarter-case | 4s. to 9s. |
| Cocoanuts, per dozen | 2s. 6d. to 3s. |
| Lemons (local), per gin case | 2s. 6d. to 5s. 6d. |
| Lemons (Italian), per 180 box | 13s. 6d. |
| Oranges, per case | 7s. 6d. to 8s. |
| Oranges (Navels), per case | 11s. to 18s. |
| Oranges (Sevilles), per gin case | 2s. 6d. to 3s. |
| Mandarins (local Emperors), per case | 8s. to 12s. |
| Mandarins (Queensland), per case | 8s. to 12s. |
| Nectarines, per half-case | 3s. 6d. to 5s. |
| Passion Fruit (Queensland), per half-case | 5s. to 6s. |
| Papaw Apples, per half-case | 2s. 6d. to 4s. 6d. |
| Peaches, per half-case | 3s. to. 7s. |
| Peanuts, per lb. | $5\frac{1}{2}$d. |
| Pineapples (Queensland), common, per case | 9s. to 11s. |
| Pineapples (Queensland), Ripley's, per case | 9s. to 11s. |
| Pineapples (Queensland), Queen's, per case | 13s. to 14s. |
| Plums, per half-case | 3s. 6d. to 5s. |
| Rockmelons (Queensland), per bushel case and double case | 3s. to 7s. |
| Strawberries, (Queensland), per dozen punnets | 7s. to 24s. |
| Tomatoes (Queensland), per quarter-case | 3s. 6d. to 6s. |
| Watermelons (Queensland), per dozen | 12s. to 18s. |

## PRICES OF FRUIT—TURBOT-STREET MARKETS.

| Article. | DECEMBER. Prices. |
|---|---|
| Apples (Eating), per case | 14s. to 15s. |
| Apples (Cooking), per case | 8s. to 9s. 9d. |
| Apricots, per case | 2s. to 5s. 6d. |
| Bananas (Cavendish), per dozen | 1½d. to 3½d. |
| Bananas (Sugar), per dozen | 2d. to 3½d. |
| Cape Gooseberries, per case | ... |
| Cherries, per quarter-case | 6s. to 8s. 6d. |
| Citrons, per cwt. | ... |
| Custard Apples, per quarter-case | ... |
| Grapes, per lb. | 9½d. |
| Lemons, per case | 6s. to 7s. |
| Mandarins, per case | ... |
| Mangoes, per case | 2s. 6d. to 3s. 9d. |
| Nectarines, per case | ... |
| Oranges, per case | ... |
| Papaw Apples, per quarter-case | 1s. to 2s. |
| Passion Fruit, per quarter-case | 2s. 6d. to 3s. 6d. |
| Peaches, per case | 2s. to 4s. |
| Peanuts, per lb. | 3½d. |
| Pears, per case | ... |
| Persimmons, per quarter-case | ... |
| Plums, per case | 2s. to 4s. |
| Pineapples (Ripley), per dozen | 2s. to 3s. |
| Pineapples (Rough), per dozen | 1s. to 3s. |
| Pineapples (Smooth), per dozen | 2s. 6d. to 4s. 6d. |
| Rock Melons, per dozen | 7s. to 12s. |
| Strawberries, per tray | 2s. 6d. to 3s. 6d. |
| Strawberries, per dozen boxes | ... |
| Tomatoes, per quarter-case | 2s. 3d. to 3s. |
| Water Melons | 4s. 6d. to 15s. |

## TOP PRICES, ENOGGERA YARDS, NOVEMBER, 1911.

| Animal. | NOVEMBER. Prices. |
|---|---|
| Bullocks | £9 7s. 6d. to £10 12s. 6d. |
| Cows | £7 to £7 17s. 6d. |
| Merino Wethers | 23s. |
| Crossbred Wethers | 17s. |
| Merino Ewes | 17s. 3d. |
| Crossbred Ewes | 18s. 6d. |
| Shropshire Ewes | 19s. |
| Lambs | 17s. |
| Pigs (Baconers) | 47s. |
| Pigs (Porkers) | 28s. |

# Farm and Garden Notes for February.

FIELD.—The land intended for potatoes should now be ready for planting. Plant sound small potatoes, well shot, without cutting them. If large potatoes are cut into setts, there is a risk of their rotting, as the usual wet weather may be expected, with a hot, muggy atmosphere. Weeds will be very troublesome, and for that reason the sowing of lucerne should be deferred till later. Sow lucerne in deep rich soil, thoroughly worked and deeply ploughed. Cape barley, panicum, kafir corn, imphee, sorghum, and vetches may be sown; but it is risky to plant maize for a late crop, as early frosts would destroy the ripening grain. For an early winter crop, sow swede turnips and mangelwurtzels.

KITCHEN GARDEN.—Make preparations for good crops of vegetables for the early winter by ploughing or digging all unoccupied land, supplying well-rotted manure if needed. Chicken guano is also an excellent fertiliser, if prepared as follows:—

Spread a layer of black soil on the ground. Dump the fowl manure on to this, and pound it fine with the back of a spade; add harwood ashes, so that the compound shall contain—Soil, 3 bushels; fowl manure, 2 bushels; ashes, 1 bushel. Mix thoroughly, and a little before planting moisten the heap with water, or, better still, with urine; cover with old mats, and let it lie till needed.

Most market gardeners will have cabbages and cauliflowers ready for transplanting. Do this during the month. In the pamphlet on "Market Gardening" issued by the Department, it is recommended to sow the seed from the middle of January to the middle of March, arranging the time, however, to suit early and late districts. For winter crops, the Drumhead type, of which Flat Dutch and Queensland or Florida Headen are good examples, and are the most profitable. The Savoy cabbage does well here. The best cauliflowers to grow are the Large Asiatic, Eclipse, Early Dwarf, and Le Normand. If the aphis appears, spray with tobacco solution.

Sow French beans, butter beans, beet, carrot, turnip, radish, cabbage, cauliflower, cress, peas. Should the weather prove dry after the January rains, give the plants a good soaking with water. Gather all fruit of cucumbers, melons, French and other beans, and tomatoes as they ripen, to ensure the continued production of the vines and plants.

FLOWER GARDEN.—Thin out and tie up dahlias. Keep the weeds down, and never allow them to seed. Sow hardy annuals. This is the best month for sowing, as you will be able to keep up a succession of bloom during the succeeding months of autumn and winter. To ensure this, sow phlox, pansy, daisy, stocks, aster, nasturtium, hollyhock, candytuft, mignonette, sweet peas, dianthus, carnations, cornflower, summer chrysanthemum, verbenas, petunias, pentstamons, &c. Dianthus, sown now and planted out in March, will bloom during the whole year, if the dead stalks and blooms are regularly cut away.

Do not sow flower seeds too deep, as on the depth will depend greatly what results you will have as regards the seed germinating. It is easy to remember that seeds should be covered with fine soil to a depth equal to their own size; for instance, a pea is about one-eighth of an inch in diameter, therefore, cover it with one-eighth of an inch of soil.

# Orchard Notes for February.

## THE SOUTHERN COAST DISTRICTS.

The earlier summer fruits, including grapes, will be pretty well over; but pineapples, mangoes, and bananas are in full fruit. The bulk of the main summer crop of pines ripens during the month, and growers are consequently kept very busy sending them to our local markets and canneries, and to the Southern States. The planting of all kinds of tropical fruits can be continued where necessary, though earlier planting of both pines and bananas is to be recommended. Still, if the land has been properly prepared—namely, well and deeply worked—they can be planted ith safety, and will become well established before winter. The month is usually a wet one, and both tree and undergrowth are excessive. If unable to get on the land with horses to keep down weed growth, use the scythe freely in the orchard before weeds seed, as by doing so you will form a good mulch that will tend to prevent the soil washing, and that when ploughed in later on will add a considerable quantity of organic matter to the soil, thus tending to improve its mechanical condition, its power of absorbing and retaining moisture, as well as to increase its nitrogen contents.

This is the best month of the year in which to bud mangoes in the Brisbane district. The bark of the stock to be budded must run very freely, and the scion when placed in position must be tied very firmly. The bark of the scion should be slightly thicker than the bark of the stock, so that the material used to tie it keeps it firmly in its place. As soon as the bud is tied, ringbark the stock just above the bud, so as to force the sap of the stock into the scion, so that a union will take place quickly.

Where cyaniding of citrus and other trees has not been concluded, it may be continued during the month, as fruit treated now will probably keep clean and free from scale insects till gathered. If the trees have been treated with Bordeaux mixture, do not cyanide, as cyaniding should always be done previous to spraying with Bordeaux mixture.

If Maori is showing, spray with the sulphide of soda wash. Look out for Black Brand and also for the yellow Peach Moth towards the end of the month in the earlier districts. Spraying with Bordeaux mixture is advisable in the case of both of these pests.

Get land ready for strawberry planting, so as to be ready to set out runners next month. Some growers set out plants as early as the end of February, but I prefer March. Citrus and deciduous trees can still be budded during the month. Young trees in nursery should be kept clean and attended to; ties should be cut where necessary, and the young trees trained to a straight single stem.

## THE TROPICAL COAST DISTRICTS.

As the month is usually a very wet one in this part of the State, very little work can be done in the orchard other than keeping down excessive weed growth by means of a scythe. When citrus trees are making excessive growth and throwing out large numbers of water-shoots, the latter should be cut away; otherwise they are apt to rob the rest of the tree, and thus injure it considerably. Many of the citrus trees will come into a second blossoming during the month, and this will produce a crop of fruit ripening towards the end of winter and during the following spring. The main crop, where same has set in spring, will be ripening towards the end of the month, but as a rule insect life of all kinds is so prevalent at this time of year that the bulk of the fruit is destroyed. Where there is sound fruit, however, it will pay to look after. If the weather is wet, it should be artificially dried before packing; but, if there are periods of sunshine, then the fruit can be cut and laid out on boards or slabs in the sun, so that the extra moisture of the skin can be dried out. Care will have to be taken not to sun-scald the fruit, or to dry it too much; all that is required is to evaporate the surplus moisture from the skin, so that the fruit will not speck when packed.

Tropical fruits of all sorts can be planted during the month. Budding of mangoes and other fruits can be continued. Bananas must be kept netted, as fly is always bad at this time of year.

## SOUTHERN AND CENTRAL TABLELANDS.

The marketing of later varieties of apples, pears, plums, peaches, and nectarines will occupy the attention of the Stanthorpe growers. The grape harvest will also extend right through the month. Every care should be taken to see that the fruit fly and Codlin Moth are not allowed to spread. Although the best work in fighting these pests has to be done during the months of December and January, as on the action then taken, if carried out systematically, the freedom of the later fruits from infestation mainly depends.

Handle the fruit carefully, and see that no fly or Codlin Moth infested fruit leaves the district. The grapes, ripening as they do when this fruit is over in the earlier parts of the State, should be sent not only to Brisbane, but to all other parts of the State. For long shipment nothing can beat crates holding six 6-lb. baskets. The fruit should be gathered some hours before packing, and be placed in the sun, so as to become thoroughly dry, and to allow the stems to become wilted, as this causes the fruit to hang on the bunch much better, and consequently to reach its destination in better order.

If parrots and flying foxes are troublesome, organised shooting parties or poisoning with strychnine are the best means of dealing with these pests.

The crop of grapes will be about over in the Roma and other inland districts. Citrus trees, when infested by Red Scale, should be cyanided. The orchard should be kept well cultivated after every rain; and where there is no rain, but water is available for irrigation, if the soil requires it, the trees should get a good soaking, which, if followed by thorough cultivation, will carry the trees on till the fruit is ripe.

QUEENSLAND AGRICULTURAL JOURNAL

Vol. XXVIII. FEBRUARY, 1912. Part 2.

# Agriculture.

## TOBACCO-GROWING.

By R. S. NEVILL, Tobacco Expert.

In answer to the inquiries on the various phases of tobacco-growing:—

Time for seed-sowing depends upon locality.

In Southern Queensland, from 10th August to 10th December is about the usual time; but my own experience is that seed sown as late as 1st September is in plenty of time for transplanting, for the reason that you cannot transplant until all danger of frost is over.

In the North, for cigar tobaccos, from 1st August to 1st January, as the danger from frost there is very small, and plants can also be transplanted later, say to 20th February; whereas in Southern Queensland we cannot set later than 1st February, and that is very late. In the South it takes from 90 to 110 days ordinarily for tobacco to mature from the time it takes root in the field; in the North it takes from eighty to ninety days. The time for transplanting is any time when the weather is suitable—from 1st October until it is too late for the tobacco to mature; but it is best to have the crop growing, if possible, during the rainy season, as a humid atmosphere is necessary to obtain the best results.

Intending growers should bear in mind that very heavy forcing soils are not suitable for tobacco, as such soils produce a rank coarse tobacco of little commercial value. The soil should be a very friable one; and for cigar tobacco a high percentage of sand is desirable; for heavy dark pipe tobacco, a clayey soil is desirable; and for yellow aromatic tobacco, the poorest sandy soil that will produce a crop is considered the best. Atmospheric conditions play an important part; but just what those conditions are, we can only tell by experiment. Intending growers should remember that tobacco, like weeds, will grow anywhere, but always a small experimental plot should be tried first, before it is undertaken to grow tobacco commercially.

---

## A CHEAP SILO.

Many farmers are debarred from the erection of wooden or reinforced concrete silos, owing to the cost of such buildings; and others have no faith in stack silage. Any device which, by a combination of their silos, would be effective, and at the same time very largely reduce the cost of erection, would doubtless be gladly adopted in many farming districts. Such a device has been described to us by Mr. Leonard Dobbie, of Degilbo, who also supplied an illustration of what is termed by the patentee (Mr. S. Browne, of Singleton) "The Chaff Stack Pole and Netting Silo." We regret that the illustration sent is too indistinct to be reproduced in the journal. The full description of the construction of this silo, here given, was supplied by Mr. Browne to the "Adelaide Observer," 23rd September, 1911:—

"While this method of conserving fodder is more expensive than the building of a stack, it is very much cheaper than erecting a concrete or even a frame silo. On the other hand (says "The New South Wales Agricultural Gazette"), while it does not protect the forage from the weather as effectively as a concrete structure, the fact that the material is chaffed and closely packed ensures less waste than occurs in an ordinary stack. It is an intermediate silo—intermediate in cost, and intermediate in efficiency.

### METHOD OF CONSTRUCTION.

"The following particulars have been supplied by Mr. Browne, the patentee:—This silo is designed for chaffed cornstalks, sorghums, or any green crops, without going to the expense of erecting cement, brick, or other costly buildings. The only materials used are either poles cut from the forest, and sunk about 1 ft. in the ground, or sawn timber studs; and let-in plates, 6 in. by 2 in., laid flat on the ground. The only inside lining used is ordinary 1½-in. wire rabbit netting, stapled on the poles or studs. When building with sawn studs, it is as well to build in 10 ft. sections as to height, with a circular wood cap to receive the lower and next 10 ft. section studs, mortised into the cap. By this means the silo can be raised to any height in 10-ft. sections, the storage capacity being regulated by the diameter. The outward pressure of the silage is met by the wire netting, which overlapping inside gives great strength; while outside are bellybands of common No. 10 fencing wire, quadrupled to give additional strength, and enable a teamster's wooden switch to be used. As many bellybands can be used as may be deemed necessary, but two to each 10 ft. section are ample. The roof is designed to lower inside by weights outside, on rollers. The silo is built with sawn studs from the local mill, and the total material used to make the silo as it now stands, with about 90 tons of corn ensilage, was under £15. A roof taken from an American plan was afterwards put on at a cost of £6 15s., bringing the cost of the silo holding 90 tons chaffed corn silage up to about £21. A silo built on these lines to hold 250 tons of chaffed corn or other silage should not cost more than £40. The silage, when set, does not allow rain to get in at the sides; and in chaffing corn and blowing it in with an Ohio chaffcutter and blower the flag is carried to the sides of the netting, making a kind of papiermache rainproof covering. The inside following roof prevents the rain from getting in at the top. The silage had all the good cobs taken off, and used for horse feed through the summer; while the silage was fed to stock."

---

## THE RESULTS OBTAINED BY FARMERS IN FINLAND THROUGH CO-OPERATION.

Agricultural co-operation in Finland, although it was initiated but a few years ago, has now reached a high degree of development. This result is largely due to the work of propaganda and organisation carried out by the "Pellervo" Society, which was founded in 1899 for this purpose. Thus the contrary has taken place in Finland to what usually occurs in other countries: that is, there has been a central organisation before the single co-operative societies have been founded. It must also be pointed out that the "Pellervo" was founded by the intellectual members of the towns rather than by the farmers, because they realised that a prudent and well-organised agricultural co-operation was one of the principal sources of well-being for the country.

Nor were they mistaken: this is shown by the data contained in an article on agricultural co-operation in Finland in the September number of the "Bulletin of Economic and Social Intelligence" (International Institute of Agriculture, Rome), from which the information in this small article is summarised.

After the foundation of the "Pellervo" Society, and in consequence of the law of 1901 on co-operative societies, the development of the latter was very rapid. In fact, after the "Pellervo," forty-nine agricultural societies were founded in 1901, eighty-nine in 1904, and 1,122 in 1909.

In Finland the co-operative society extends its operations to the most varied branches of the agricultural industry. Some of the more important societies are those for dairy products. In 1908 there were 340 of these societies, with more than 33,000 members, who supplied the societies with 2,653,940 hectolitres (1 hectolitre = 22 gallons) of milk, taken from 238,000 cows. There were 10,912,000 kg. (1 kilogramm = $2\frac{1}{5}$ lb.) of butter sold, being 88.5 per cent. of the total exportation of butter from Finland.

The co-operative credit societies are of equal importance. They are carried on, on general lines, in accordance with the principles of the Raiffeisen Banks, and their business is almost exclusively the supply of small sums to small farmers. In 1909 there were 384 of these funds, with 15,000 members, to whom loans were granted for a sum total of 4,028,000 francs (an average of about 256 frs. (£10 13s. 4d.) per member).

The local co-operative credit societies are all affiliated to a central bank, which was founded in 1902 and carries on its operations by means of a loan of 4,000,000 frs. granted to it by the State and an additional annual subsidy of 20,000 frs. It acts as a kind of heart in the organism of the Finland co-operative credit societies, supplying capital to the small local societies, which have to submit to its control. In 1909, 340 co-operative societies out of 348 joined the central institute, receiving 4,000,650 frs. in loans (£166,693 15s.).

This centralisation has been brought about not only in connection with the co-operative credit societies, but also with the others. Thus, in addition to the central bank of which we have spoken, there is the important organisation, the "Hankkija," founded in 1905, the object of which is the purchase and sale of agricultural requirements; the "Labour," constituted for the same purpose; the "Valio," which is a central organ for the sale of the butter produced by the local co-operative societies; and, finally, the co-operative distributive central. In 1909 the four central societies (excluding the "Labour") comprised 859 co-operative societies, possessing a capital of 898,000 frs., their business for the year being 32,109,000 frs.

The co-operative societies in 1908 had a total membership of 181,500. Of this number, 33,000 belonged to co-operative dairies, 13,500 to co-operative credit societies, 100,000 to co-operative distributive societies, and 35,000 to the others. The total business done was 97,000,000 frs., of which 27,000,000 represented the sales of the co-operative dairies, 3,168,000 frs. the loans of the co-operative credit societies, 52,000,000 the sales of the co-operative distribution societies, and 8,000,000 frs. the business of the other co-operative societies. The amount of the purchases in common was 7,000,000 frs.

These figures are sufficient to demonstrate the development of agricultural co-operation in Finland, which really appears marvellous, when the geographical position, the distribution of the population, and the climate of the country are taken into consideration.

(Summarised from the "Bulletin of Economic and Social Intelligence," II. Year, No. 9, 30th September, published by the International Institute of Agriculture.)

## DESTRUCTION OF PRICKLY-PEAR BY MEANS OF ARSENICAL POISON.

### SUMMARY OF APPENDICES 1 AND 2 TO INTERIM REPORT OF BOARD OF ADVICE ON PRICKLY-PEAR DESTRUCTION.

Scattered plants of prickly-pear are best destroyed by *injecting* the poison. This may be done by means of any of the powder or liquid injectors, or by making a longitudinal incision in the second or third "leaf" of the plant and placing therein either about a teaspoonful of the dry powder (*a*), or a wineglassful of the concentrated solution of the poison (*b*).

With small plants one injection is generally sufficient, but with larger plants two or more "leaves" may have to be treated.

Large clumps of pear consisting of many plants, and denser pear generally, may be more economically destroyed by first lightly *spraying* with the diluted spraying solution (*c*), then mutilating or slashing the pear with billhooks, spudbars, or any suitable mechanical contrivance, and then again spraying.

In any case it is advisable to burn off the poisoned pear as soon as it has become dry enough to burn readily, as this operation destroys most of the young growth of seedlings &c., which is usually found under the clumps, and which is often not destroyed by the poison.

The mixtures are prepared as follows:—

#### (*a*) DRY POWDER FOR INJECTION.

Take—

Fifteen (15) pounds of common salt,
Ten (10) pounds of arsenic,
Four (4) pounds of caustic soda,

and mix these ingredients thoroughly. All the ingredients should be in powder. The mixture must be kept in air-tight tins or packages; otherwise it absorbs moisture from the air, and is inclined to set into a hard lump.

#### (*b*) CONCENTRATED SOLUTION FOR INJECTION.

The mixture of the dry powder (*a*), consisting of 15 lb. of common salt, 10 lb. of arsenic, and 4 lb. of caustic soda, is placed in a suitable vessel, and to it is added slowly and carefully, with constant stirring, cold water until the total volume is eight (8) gallons.

Should it be found that all the arsenic has not dissolved (which is shown by the fact that it appears as a sediment on the bottom of the vessel), it will be necessary to boil the mixture for a few minutes.

Certain brands of arsenic are more readily soluble than others, and we found "Red Rose" arsenic to be the most readily soluble of many tested.

#### (*c*) DILUTED SOLUTION FOR SPRAYING.

To eight (8) gallons of the concentrate (*b*), add cold water until the total volume of the solution is one hundred (100) gallons.

This strength of solution is the weakest which can be used economically for spraying, and at certain seasons it may be necessary to use the spraying solution somewhat stronger.

The addition of saltpetre, copper sulphate, or other compounds to the spraying liquid cannot be recommended. They are either useless or worse than useless.

On account of the highly poisonous nature of all arsenical compounds, great care must be taken in the preparation of the solutions, and, particularly, the vapours of the boiling solutions and the spray-laden atmosphere (when spraying) should never be inhaled. To prevent possible absorption of the poison through the skin, it is advisable always to rub vaseline or other grease on the hands and arms before commencing operations. There is, however, little danger if reasonable care is exercised.

Cattle must be kept off country on which pear is being poisoned either by spraying or by injection. The grass will generally grow again after a few weeks in favourable seasons, and cattle may then be allowed to graze with safety on the treated area.

J. C. BRÜNNICH,

Chemist to the Department of Agriculture and Stock.

Brisbane, 1st December, 1911.

---

## ONION-GROWING.

A crop of onions is usually one which well repays the grower for his trouble. We lately received a letter from a farmer at Degilbo, in which he stated that a Hindu settler at Booyal, last year, irrigated 1 acre of onions from a small creek. The result was a crop of 9 tons, which he sold at £16 per ton. This clearly demonstrates the value of irrigation, as does also the case of a tomato-grower, who, by careful cultivation and irrigation, took £120 worth of tomatoes from an acre; whilst his neighbour, who considered it too much trouble to irrigate, prune, &c., only realised £3 from his acre of tomatoes. However, we are now dealing with onion-growing. There are several excellent articles in former issues of this journal on the subject. Amongst others, the writer records that when, some years ago, it was said that onions could not be successfully grown in Queensland as a field crop, he determined to prove the fallacy of the statement. He accordingly raised a crop on his property (Forest Hill, after which the Forest Hill district was named). The seed was sown in April; the variety, Brown Spanish; the soil, a rich sandy loam. The land to which the plants were transferred was well worked and then rolled to make a compact hard bed. Transplanting was carried on throughout July, and, the season having proved favourable, the result was a heavy crop of fine bulbs, which gave a splendid cash return for the labour expended. If such a result can be obtained by a Hindu and a white farmer, it follows that, if other farmers would take the same trouble with the crop, the results would be similar.

There are thousands of acres of such land under cultivation in all parts of the State, and it only requires determination on the part of the farmers to enable them successfully to displace the importation of onions from the South and from Japan. The crop above mentioned averaged 6 tons per acre, and was sold at £25 per ton (1882).

The present price of onions in the wholesale market is £11 10s. per ton for new crop Globes. Suppose a crop to yield 8 tons per acre (and we know that there are often heavier crops), the cash return would be £92. There is, of course, a considerable amount of labour involved in planting out an acre or two of onions, and wages are to-day much higher than they were in the eighties, but that cost is amply compensated for by the net returns.

The first consideration in onion-growing is the nature of

## THE SOIL.

The most suitable soil for onions is a rich sandy loam, free, friable, and easy to work—a soil that will not cake, and not lying so low as to retain the superabundant moisture after heavy rains. In the latter case the land should be well drained. As the onion does not require intense heat to bring it to maturity, an eastern aspect is preferable to a western.

In preparing the seed bed, if it be intended to plant out the seedlings, it is very important to clear it of all weeds, grass roots, &c., and then to let the land lie for some time previous to sowing, exposed to the weather. As April and May are the best months for sowing the seeds, there will be not much trouble from weeds, especially if the soil has had two or three good scufflings between February and April. Should the land require manuring, plenty of stable dung, ashes, bone dust, &c., should be dug in. New scrub land is, of course, rich enough not to require any manure.

## PREPARING THE SOIL.

Whilst the soil should be carefully worked and reduced to a fine tilth, a firm seed bed must be made by solidifying the surface by rolling. If this be not done, the plant, instead of making a large well-shaped bulb, will run to neck, and resemble a leek rather than an onion. The best way to sow onions in the field is to drill them in, and about 2 lb. of seed will be required per acre. The drills should be from 12 to 15 in. apart, and the seeds may be dropped 2 in. apart. The plants will afterwards require thinning out to 6 in. apart. The superfluous plants may be planted out. The seeds should not be covered deeper than $\frac{1}{8}$ in.

After sowing, the plants, if the seed is good, will show up in about a week. The after cultivation consists in keeping down weeds, and, where the working of the soil has thrown it up against the bulbs, drawing it away from them. In planting out, it should be remembered that the bulb is not the root, the latter being below the bulb. Therefore, when planted, the roots only should be in the ground, whilst the bulb rides, so to speak, on the surface.

Onions may be considered ripe when the tops dry up. When this stage is reached, take them up by hand and leave them on the rows to dry, after which they may be removed to the barn, taking care not to bruise them. Very large onions are not so much in request as medium-sized ones; and the Brown Spanish is consequently more saleable than the large White Portugal. From 6 to 8 tons per acre may be harvested in a good season. At the present time (January, 1912) onions bring up to £15 per ton in the markets; but such a price cannot be expected to rule when the markets are fully supplied.

## KEEPING ONIONS.

Onion-growers usually find that if, owing to a slow market, onions have to be held over for any length of time, the chief difficulty is their liability to sprout. This must, if possible, be avoided, because, whenever growth is set up in any bulb or seed, that seed deteriorates in proportion to the extent of growth. Any one who has tried to eat an old seed potato, which has been inadvertently gathered up with a new crop, will be aware of this fact. Onions, when pulled, should not be stored away at once, but should be left on the ground for a few hours to dry. Then they should be put away dry, in the coolest shed or barn available. They require constant looking over to sort out any bad ones, for, as in the case of fruit, such as oranges, apples, pears, &c., a single rotting onion will infect all those in its immediate neighbourhood. It used to be the custom, and probably is to this day, in the good old-fashioned farm-houses in the old country, to hang the onions in strings to the kitchen rafters in company with hams, flitches of bacon, &c. This hanging in strings is a good plan where it is only a question of keeping a few for home consumption, but, in the case of many tons, the labour entailed would not be recompensed by the profit.

In an article on this subject in a French journal, mention is made of an observation of great importance which deserves the attention of farmers and market gardeners. After some experiments made on ten plots manured with chemical fertilisers, the resulting crops of onions were put away in bags and carefully numbered with a view to planting them out in the following spring to obtain seed from them. When the time for planting had arrived, it was found, to the astonishment of all concerned, that, under identical conditions of temperature and light, certain lots had sprouted, and were exhausted by young, premature shoots, whilst the other lots still remained hard and solid without a trace of a shoot. The collections having been carefully ticketed, it was easy to prove that the produce from plots deprived of sulphate of potash were exhausted by a too hurried vegetation, whilst that which had received the potash manure was perfectly preserved. Such experiments are well worth repeating, and it would be to the advantage of the agricultural world if those few advanced farmers who make such trials of fertilisers would publish the results of their experience.

In August or September onions in the Southern part of the State should be ready for market, therefore any advice as to the keeping of the crop, if found necessary, should be acceptable to growers. One hundred-weight of sulphate of potash per acre will have the effect above described.

## WATER SUPPLY TO FARMS.

### I.—THE COLLECTION AND STORAGE OF RAINFALL—*Continued.*

By ARTHUR MORRY, Surveyor, Department of Agriculture and Stock.

But it must be remembered that, although the figures given in our previous issue are almost incomprehensible even for a small farm of 160 acres, this could not all be collected and stored for future use. Some authorities state that about one-third of all the rainfall is absorbed by vegetation and plant life or lost by evaporation; another third sinks into the earth, and forms underground sheets of water which feed the springs and wells; while the remainder runs off the surface, and finds its way directly into streams and rivers. By practical experience it is found that about one-half the water that falls sinks into the soil, the quantity varying greatly in different districts according to the nature of the soil. A sandy soil will absorb the whole; a surface of a gravelly nature, a much smaller portion; while a heavy clay soil will speedily become water-logged and discharge the rainfall over the surface.

The average rainfall varies greatly over Queensland, and, before deciding definitely on the adoption of any plan for storage, the average for the district, extending over some years, should be ascertained. This can be done by referring to the official reports of the Meteorological Office. Rain gauges are so well known that a description is unnecessary, and indeed they are not required by farmers for this purpose, as all information can be obtained from the official tables.

Sudden storms, however, of short duration often discharge enormous quantities of water, complicating the question of storage and rendering its collection most difficult; but with due care and ample precautions the difficulty may be to a large extent met and much of the surplus precipitation conserved. Owing to these irregularities and sudden outbursts, the storage space should be large, for what is lost cannot be recovered.

Along the coast line the fall is much heavier than further inland, varying sometimes from 172.19 in. at Innisfail to 20.60 in. at Warwick, and even less in some inland districts; yet, owing to its uncertainty and irregularity, it is just as necessary to provide for its conservation in the coastal districts as further inland.

In making provision for storage, it is of great advantage to know the difference in rainfall between the driest and the wettest years; and a very large number of observations taken in many parts of the world have established the fact that the rainfall of the driest year is approximately one-half that of the wettest year, so that, with an average rainfall of 32 in., the fall in the driest year will approximate 21.60 in. and in the wettest year 43.20 in.

It is not an easy matter to determine the proportion of rainfall which sinks into the ground; that which flows over the surface is more easily determined, but the percolation is entirely dependent on the nature of the strata on which the rain falls. In some countries it is found that by far the greater proportion of percolation takes place during the winter months, and very little in the summer. Elaborate tables have been prepared extending over a long series of years, in which the rainfall, the percolation, and the difference or loss have been very carefully recorded, both for summer and winter. These figures, however, need not trouble us at present, as it seems to be established that the amount of percolation does not depend so much on the amount of rainfall as on the conditions under which it falls. When the ground is dry and hard as it is in summer, a heavy fall will give little or no percolation; but when it is loose and friable, a very large proportion sinks into the soil, and there remains until called upon to perform its useful functions.

A much larger proportion of the rain which falls on the higher grounds will flow over the surface, and thus be capable of collection and storage. Generally it finds its way into gullies and watercourses, which ordinarily are dry, but which during heavy rainfall are converted into rushing torrents; these gullies lend themselves admirably to our purpose, for it is not, in most cases, a difficult matter to construct a weir or dam of some kind across the section, and thus impound the priceless fluid until the time it may be required. On multitudes of farms these natural facilities exist, but, unfortunately, are seldom taken advantage of. By the expenditure of a comparatively small sum in damming up these gullies, very often an almost inexhaustible supply could be obtained or, if not inexhaustible, sufficient to carry the farm through a most trying season.

[TO BE CONTINUED.]

## A PROMISING GRASS.

By G. B. BROOKS, Instructor in Agriculture.

While on a visit to the North some months ago, my attention was drawn to a variety of "Chloris" or "Star" grass, closely resembling "Rhodes," and which has since been identified by Mr. F. M. Bailey, Colonial Botanist, as *Chloris barbata, var. decora.*

The outstanding features in connection with this grass were its robust growth, its quickly spreading habit, its being keenly relished by stock, and, moreover, its general appearance as a grass possessing a high feeding value.

Its feeding qualities could not, however, at the time be determined; but samples were forwarded to the Agricultural Chemist for analysis, the results of which have just come to hand.

### DISTRIBUTION.

This grass is to be found in several localities along the Northern coast, and, from information secured from various sources, has, during the past few years, been finding its way inland, probably as a result of the run of very favourable seasons. The writer traced it from Townsville, along the Northern Railway line, as far as Pentland; and in the December issue of the journal, Mr. J. R. Chisholm states, in reference to this grass, that it has firmly established itself at Prairie, a point still further West.

Fairly extensive areas were found at Charters Towers, adjacent to the city; while evidence of its spreading habits was to be observed in its being found along the various roads for a distance of 30 miles.

## HABITS OF GROWTH.

In habit of growth it closely resembles Rhodes. It has, however, a slightly broader flag, and is of a darker shade in colour. It is a very free seeder, and likewise sends out long surface runners or shoots, rooting at the nodes.

It is questionable, however, whether its power of encroaching on the less valuable indigenous or introduced grasses is equal to that of the Rhodes. Rhodes is undoubtedly one of the most aggressive of our grasses, and will, if it can secure a footing, smother out nut grass, a point worth knowing.

The Decora was not confined to any one class of soil, but was to be found growing on the poorest ridges as well as on the most fertile flats.

There is no question but that stock are very fond of this variety, and prefer it to most other indigenous sorts. It is this point that brings it under observation, for one cannot fail to notice the closely cropped areas, while the adjacent grasses, growing luxuriantly alongside, are scarcely touched.

## FEEDING VALUE.

This grass possesses a high feeding value, which is shown by the following analysis, supplied by Mr. Brünnich, the Agricultural Chemist. Two analyses of Rhodes grass are given for comparison:—

| — | Moisture. | Ash. | Fibre. | Carbohydrates by Difference. | Fat and Oil. | Proteins N x 6.25 | Total Nutrients. | Albumin Ratio. |
|---|---|---|---|---|---|---|---|---|
| Rhodes Grass ... ... | 7·39 | 10·98 | 24·00 | 48·01 | 1·20 | 8·42 | 57·63 | 1 9·22 |
| Rhodes Grass ... ... | 9·19 | 12·00 | 27·24 | 42·15 | 1·00 | 8·42 | 51·57 | 1 9 28 |
| *Chloris barbata, var. decora.* ... ... | 7·27 | 9·01 | 16 95 | 57·98 | 2·11 | 7·98 | 68·07 | 1 10·71 |

Remarks by Mr. Brünnich:—"This grass compares very well with Rhodes grass, and has a fair nutritive or albuminoid ratio. The grass appears to be well worth cultivating on a larger scale. 12/1/12."

---

## TREATMENT OF SEED POTATOES.

By R. JARROTT.

In perusing the many articles written lately on the cultivation of the potato and the treatment of seed, both in our own State, New South Wales, Victoria, and England, the British Journal of Agriculture was the only one that mentioned the treatment that used to be practised by my father about forty years ago, and I am awaiting with interest to see the conclusion that will be arrived at by the experiments at home.

The building in which we stored the potatoes was about 30 ft. square; one doorway faced the south, the other the north. The doors were made in two halves, so that either the top half or the bottom could be left open as required. Cement was not so plentiful and cheap in those days as it is now; so ant bed and cow dung were used to make a firm, smooth floor, and it answered the purpose well.

The seed was usually sorted in the field. When there was a sufficient quantity in the bag, it was securely tied, and, if there was any summer-grass or rubbish about other than potato tops, the bag would be covered to keep the sun off. At night, if there had been only one bag of seed gathered, it had to be taken to the barn and the potatoes spread out as thin as possible, so that they might get cool during the night. The following morning they would be placed between both doorways, so that they would be subjected to a *strong* light, but still out of the sun. Fresh wood ashes were then sprinkled over them to prevent the potato moth from depositing its eggs on them. The following day they would be turned over, and, as the floor was nice and smooth, this was done with a flat shovel. If much seed had to be treated, that brought in first was gradually worked back towards the ends of the barn. When a sufficient quantity of seed had been obtained, they were kept in the light as much as possible, and turned over every day or two, so that the skin would become green quickly. To assist in this, the south door was always kept open, except during wet weather. The top half of the north door was closed in the morning, to keep the sun from shining on the potatoes. When sufficiently greened, the seed was shovelled together at one end of the barn, and covered with a good coat of blady grass.

Seed treated in this manner will not be troubled with insect pests either before or after planting, neither will it be affected by heavy rains, which sometimes occur at planting time. This will be noticed when the succeeding crop is being lifted, as in most instances the seed will be quite sound.

This treatment applies to our own seed only, as that obtained from the Southern colonies usually arrives too late to allow it being treated in the above manner.

---

## GRAZING FARMS.

By W. G. BROWN, State Sheep and Wool Expert.

When parents in the metropolis with capital look around for an occupation for their sons, they are persuaded, in increasing numbers as time goes on, that there is nothing quite so good as a block of country whereon the youngsters shall grow sheep and wool. Besides this class, drovers, carriers, shearers, and farmers are taking to the business in greater and greater numbers.

At present, too, large numbers of men from the other States and New Zealand are over here "land-looking"; and the great majority of them see in the cheap lands of the West something pretty good.

Constantly, I am asked such questions as: "How much capital is required to take up unimproved country, fence, stock, and put it in working condition?" "Where is the best country for a grazing farm?" "What kinds of sheep are suitable for Western conditions?" &c.

The limitations of space forbid a detailed answer to all these questions in one issue of this journal, so I shall take them in sequence, the first one being: "What capital is required to take up, stock, and put in working order a grazing farm?" There are, of course, a good many classes of country to be considered, and the rent on these range from ¾d. per acre to as high as 4d. per acre, the price, of course, being in proportion to its carrying capacity in a series of years, as determined by the commissioners and the land boards. Approximately, the cost of improvement is the same on all classes of land, so, in an estimate of cost, the item of difference in rent is the only one which affects the account.

First, I shall take the case of a man who has sufficient capital to fully improve his country within a year or two of the issue of the "license to occupy." No hard-and-fast estimate can be given, as the conditions vary in such respects as, for instance, water supply. One block will cost very little to fully water, while a neighbouring selection will be quite dry, and full provision will have to be made. I shall put it that all water is to be provided by the incoming lessee, and my estimate is as follows:—

APPROXIMATE ESTIMATE OF IMPROVING A SELECTION OF 20,000 ACRES.

| | £ | s. | d. | £ | s. | d. |
|---|---|---|---|---|---|---|
| First year's rent, 20,000 acres, at 1d. (say) | .. | | | 83 | 6 | 8 |
| One-fifth survey fee (£60) .. .. .. | .. | | | 12 | 0 | 0 |
| Fencing: Boundary fence, netted against rabbits, 23 miles, at £65 per mile .. | 1,495 | 0 | 0 | | | |
| Less half-share of 18 miles done by neighbours .. .. .. .. | 585 | 0 | 0 | | | |
| | | | | 910 | 0 | 0 |
| Subdivision of 10 miles, at £30 (6-wire fence) | .. | | | 300 | 0 | 0 |
| Sheep-yard to hold and work 2,000 sheep .. | .. | | | 85 | 0 | 0 |
| Shearing-shed (boughs) for 5 shearers .. | .. | | | 10 | 0 | 0 |
| Woolroom for same (galvanised iron) .. | .. | | | 45 | 0 | 0 |
| Woolpress, £20; dray, £15 .. .. .. | .. | | | 35 | 0 | 0 |
| Harness and tools .. .. .. .. | .. | | | 50 | 0 | 0 |
| Horses— | | | | | | |
| 3 draughts, at £25 .. .. .. | 75 | 0 | 0 | | | |
| 5 saddle, at £8 .. .. .. .. | 40 | 0 | 0 | | | |
| | | | | 115 | 0 | 0 |
| Wages and food for 1 man .. .. .. | .. | | | 100 | 0 | 0 |
| 3 sub-artesian wells (200 feet each), at £1 per foot .. .. .. .. .. | .. | | | 600 | 0 | 0 |
| 2 windmills, with troughing and tanks, £120 each .. .. .. .. .. | .. | | | 240 | 0 | 0 |
| House and outbuildings .. .. .. | .. | | | 300 | 0 | 0 |
| Sheep at 4 acres to 1 sheep— | | | | | | |
| 4,000 ewes, at 7s. 6d. off shears .. .. | .. | | | 1,500 | 0 | 0 |
| 120 rams (3 per cent.), at 80s. .. .. | .. | | | 480 | 0 | 0 |
| Say £5,000. | | | | £4,865 | 6 | 8 |

The estimate given above is as close as the writer can give, after a good deal of experience and close inquiry. Of course, almost every item is only approximate, as the prices for labour, carriage, and stock vary in the different districts.

There is every indication that prices for wool and stock will remain at least as they are for several years, as the consumption of wool appears to have overtaken the demand, and wethers are relatively scarce. I am basing my estimate of returns on average prices for stock and wool as thus:—

RETURNS TO BE EXPECTED ON A CAPITAL OF £5,000.

| | £ | s. | d. |
|---|---|---|---|
| The wool off 4,000 ewes, 6 lb. 12 oz. each at 8d. per lb. .. | 812 | 10 | 0 |
| 80 per cent. of lambs on 4,000 ewes, 3,200, at 3s. per head | 480 | 0 | 0 |
| | £1,292 | 10 | 0 |

EXPENDITURE.

| | £ | s. | d. | £ | s. | d. |
|---|---|---|---|---|---|---|
| Shearing 4,000 ewes, at 6d. per head, including rouseabouts .. .. .. .. | 100 | 0 | 0 | | | |
| Carriage of wool to market, at 5d. per head (4,000 ewes) .. .. .. .. | 83 | 6 | 8 | | | |
| Extra labour and sundries .. .. .. | 166 | 13 | 4 | | | |
| | | | | 350 | 0 | 0 |
| Approximate net return .. .. .. | | | | £942 | 10 | 0 |

nearly 19 per cent.—a return which should leave an ample margin for contingencies. In the item, "Shearing-shed," I have purposely mentioned "boughs," for I consider such a most suitable shed. I have known one to have been in use for twenty-two years, and the owner still considers it better than a more expensive shed. The woolroom, however, should be of the best, as far as making it rain and storm proof goes.

It is necessary, of course, to put fresh boughs on the roof on the approach of each shearing.

I have tried to be liberal concerning expenses, and correspondingly conservative in estimating returns. In shearing, for instance, if the owner shears his own sheep, the work may be done at a cheaper rate, especially if there be home labour to do the necessary mustering, wool-rolling, &c.

For those with only limited capital, I shall give a concrete instance —one of several I have met in my travels. It is the record of hard unceasing work, with unremitting care and vigilance. The man in question was a carrier with a family; he selected a block of 10,000 acres of rough mulga country, watered on the frontage by a creek which, luckily for him, has not been dry in six years, the time of his term of apprenticeship to a quite new vocation. The land seemed to be so undesirable that it lay for over three years unoccupied prior to his selection. He told me that when he had paid his first year's rent and the fifth of the survey fee, all he had left was:—A wife and five children (three of them boys), a team of 8 horses and a light wagon, 3 cows, 10 goats, a few head of poultry, and £5. For three or four years he carried wool and stores to and from neighbouring stations, in the off-time fencing and building. His father-in-law (a selector) gave him 240 indifferent ewes, and from time to time he bought small lots of cheap ewes. At the end of the fifth year his position was:—He possessed 1,200 ewes and lambs, he had sold 143 fat wethers at 14s. 6d., and had a return of 21 bales of wool which averaged £10 7s. per bale in Brisbane. His country was fenced in and subdivided by 6 miles of fence, giving him 3 paddocks; and, to use his own words, "I am off the labour market for good." Recently he acquired a block of 10,000 acres for his son, aged 19 years. His returns for last year, put on paper, read:—

| | | |
|---|---|---|
| 21 bales of wool, at £10 7s. .. .. .. | | £217 7 0 |
| 143 wethers, at 14s. 6d. .. .. .. | | 103 13 6 |
| 3 young horses, at £13 .. .. .. .. | | 39 0 0 |
| | | £360 0 6 |
| Expenses— | | |
| Shearing 1,200 ewes and lambs, at 24s. per 100 .. .. .. | £14 8 0 | |
| Woolpacks and sundries .. | 5 0 0 | |
| Expenses of carriage of wool to market .. .. .. | 21 0 0 | |
| | | 40 8 0 |
| Net income for last year .. .. | | £319 12 6 |

All labour other than shearing was furnished by his own family. He carried his own wool to the terminus, and is in treaty for enough ewes to bring his complement up to 2,000 head, his estimate of the carrying capacity of his country; a noble record of hard work and thrift.

In several other instances I could quote, the selectors were shearers, and all, with the help of the occasional cheque at shearing time, are doing well.

Those are extreme cases, and there are instances of men starting all the way up from, say, a couple of hundreds of pounds up to £5,000.

As in all businesses, there is no royal road to success in this. Unremitting care and vigilance, *plus* hard work and thrift, will bring a full reward, especially if the beginner have a little experience and plain common sense.

## EARS OF THE HORSE.

It is a good sign for a horse to carry one ear forward and the other backward on a journey, because this stretching of the ears in contrary directions shows that he is attentive to everything that is taking place around him, and while he is so doing he cannot be much fatigued or likely soon to become so. Few horses sleep without pointing their ears as above, that they may receive notice of the approach of objects in every direction. Dr. Arnott says that when horses or mules march in company at night those in the front direct their ears forward, those in the rear direct them backward and those in the centre turn them laterally or across, the whole troop seeming thus to be actuated by one feeling which watches for the general safety.

# Dairying.

## THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF DECEMBER, 1911.

| Name of Cow. | Breed. | Date of Calving. | Total Milk. | Test. | Commercial Butter. | Remarks. |
|---|---|---|---|---|---|---|
| | | | Lb. | % | Lb. | |
| Lark ... | Ayrshire ... ... | 29 Nov., 1911 | 980 | 3·9 | 42·65 | |
| Auntie ... | ,, ... ... | 31 July ,, | 866 | 4·2 | 40·74 | |
| Butter ... | Shorthorn... ... | 10 Nov. ,, | 898 | 3·9 | 39·07 | |
| Glen ... | ,, ... ... | 30 Sept. ,, | 656 | 5·0 | 37·04 | |
| Lass ... | Ayrshire ... ... | 16 Oct. ,, | 823 | 3·9 | 35·82 | |
| Honeycomb | Shorthorn ... | 29 Aug. ,, | 706 | 3·9 | 30·73 | |
| Conceit ... | Ayrshire ... ... | 30 Nov. ,, | 691 | 3·7 | 28·44 | |
| Bangle ... | Shorthorn ... | 14 Aug. ,, | 578 | 4·0 | 25·82 | |
| Cocoa ... | Jersey ... ... | 1 May ,, | 487 | 4·6 | 25·20 | |
| Lady Margaret ... | Ayrshire ... ... | 4 Feb. ,, | 433 | 5·0 | 24·43 | |
| Burton's Pride ... | Shorthorn .. | 16 Nov. ,, | 641 | 3·4 | 24·11 | |
| Bliss ... | Jersey ... ... | 5 Sept. ,, | 470 | 4·3 | 22·66 | |
| Dot ... | Shorthorn ... | 4 Dec. ,, | 561 | 3·6 | 22·44 | |
| Mist ... | Holstein ... ... | 20 Oct. ,, | 488 | 3·9 | 21·23 | |
| Eve ... ... | Jersey ... ... | 27 June ,, | 444 | 4·2 | 20·88 | |
| Bluebelle ... | ,, ... ... | 20 April ,, | 416 | 4·4 | 20·54 | |

These cows were grazed on natural pasturage only.

---

## HOW TO CASE AND PACK CHEESE FOR EXPORT.

By E. GRAHAM, Dairy Expert, Department of Agriculture and Stock.

I am indebted to the Agent-General (Sir Thomas Robinson) for the following particulars of interest to those concerned in the preparation and packing of cheese for export:—

A conference of Tooley Street agents was convened by the Agent-General prior to his departure for Queensland, and from the information there elicited it is manifest that the cases containing and the methods of packing the cheese from this State do not give satisfaction, and suffer by comparison with the cases prepared by other countries.

The New Zealand cheese cases and system of packing are considered by London agents to more fully suit the trade, and, in order that the cheese exporters here may be made conversant with all the details necessary to bring their cheese export cases more in accord with London trade requirements, a specimen case, as used by the New Zealand cheese exporters, is here produced, and, for comparative purposes, a Queensland cheese case is also shown.

The main features wherein the cases differ are, that the timber used for constructing the Queensland case is rough sawn, and does not make a case as attractive in appearance as the dressed timber used in the New


PLATE 18.—Specimens of the Cases in which Cheese are exported to Great Britain from New Zealand and Queensland. The Queensland type of case is resting perpendicularly on the New Zealand package.

Zealand case. The local case is made with eight facets and is octagonal in shape, while the New Zealand case is constructed with twelve facets, with an even space of about 1 in. between each facet.

It is claimed that the additional facets give the cases greater strength, and that New Zealand cheese cases reach their destination in good order, while Queensland cheese cases are frequently broken, and the cheeses, consequently, more or less damaged. The edges of each facet in the New Zealand cases are dressed.

The cases should hold the cheeses tightly, so as to prevent any sliding or shifting.

The centre partition between the cheeses should be securely fastened.

The "trade description" brand, &c., should be indelibly impressed, not stencilled; and the weights should appear on both ends of the cases, and not on the sides of the cases, as frequently occurs.

Stencilled brands become obliterated by the handling and stowage in transit, and do not serve the purpose intended.

It should be shown on the end of each case whether the cheeses therein are coloured or "white."

It is hoped exporting factories will not be slow to comply with the advice tendered by the Agent-General, the substance of which is herein outlined, as it must be admitted that the presentation of dairy produce to purchasers in a sound and attractive package is of too great importance to be allowed to pass unnoticed by those anxious to command full market rates for their produce.

---

## COW HOUSES.

There is one type of cow house which is very common in many districts of Britain, but which is objectionable in several ways (says a leaflet issued by the Board of Agriculture). In it all the stock are fed from one central passage, while the manure and the milk are removed by the two at the sides. In this case the cows' heads are a long way from the fresh air inlets, and the animals breathe into each other's faces from opposite sides of the passage. In a building of this class, unless it is exceptionally well ventilated, the general health of the stock is likely to be low, and one infected animal may cause great damage. Such a cow house is also defective, in that the passages from which the milking is carried on are usually too narrow to secure milk standing in larger ones from 6½ ft. to 7½ ft.

Each cow stall should be proportionate in length to the class of animal that is expected to occupy it. For small cows, such as Jerseys, Kerries, and young Ayrshires, the stall (measured from the manure channel to the wall or division between the cows and the passage) should be from 6 ft. 9 in. to 7 ft. long, inclusive of the breadth of the trough. For Ayrshires, a stall of 7 ft. to 7 ft. 3 in. is quite sufficient, while Shorthorns require from 7 ft. 3 in. to 7 ft. 6 in., and exceptionally large cows 3 in. more. For the smaller cows, each double stall should be from 6 ft. to 6½ ft. wide, and for the larger ones from 6½ ft. to 7½ ft.

# Horses.

## CLIPPING HORSES IN PARTIAL FASHION.

The plan of clipping only parts of the horse's body, instead of having it clipped all over, which is very frequently resorted to in the case of horses employed in draught work, is not without its advantages where this class of horse is concerned, though it is scarcely suitable for light horses used for work at fast paces. These latter, as a general rule, require to be clipped over the whole of the body, the legs perhaps only being excepted, while with hunters and hacks it may also possibly in some cases be expedient to leave a so-called " saddle mark" on the back. But in the case of heavy draught horses, vanners, and other horses of this type which are not called upon to go faster than a slow trot, there does not exist the same necessity, when clipping them, to remove the whole of their coat, and with them, therefore, partial clipping will very commonly be found to meet the requirements of the case very satisfactorily. The special advantage associated with this method of clipping lies in the fact that it leaves the horse with some of the protection against cold with which Nature provides it in winter, while at the same time a large measure of relief from the unduly oppressive weight of the thick winter coat is afforded the animal by its removal from a portion of the body, so that the horse's efficiency for work is satisfactorily maintained. The plan, in brief, represents a compromise—and, where applicable, undeniably a very excellent one—between clipping and not clipping. It is certainly decidedly effective in promoting a horse's working capacity, partially clipped horses being in considerably better working condition than when left entirely unclipped, while they also thrive better in the stable in the former case.

### WHEN SUITABLE.

Partial clipping may suitably be resorted to whenever the work is of a slow order, being performed either at a walk, as with horses used in heavy draught, or at a slow-paced trot, as in the case of light-draught horses, unless their work should be of such an exacting nature as to render it expedient to have them clipped all over. But more usually, in these circumstances, it will suffice if they are clipped partially only. The adoption of this method is specially indicated in those cases where horses have to stand about much in the open for prolonged periods during the course of their work, inasmuch as such will, of course, experience particular benefit from being allowed to retain part of their full winter coat to protect them against the inclemencies of the weather while thus kept standing about. Under these conditions the method naturally shows to the greatest advantage.

## LEAVING PORTION OF COAT.

In clipping horses partially, either a smaller or larger portion of the coat may be left intact, according to the exigencies of the case. As regards the question how much of the coat should be removed, the rule applies, or should apply, that the harder the horse is worked the larger an area of its body ought to be clipped, whereas when the work is both moderate and very slow only a comparatively small portion need be subjected to clipping, the degree of relief afforded the animal from the hindering and burdensome nature of its heavy winter coat thus standing in exact proportion to the amount of work and exertion demanded of it. The parts primarily to be left unclipped are, of course, the back and the loins, for they are by far the most exposed, and unquestionably also amongst the most sensitive as regards susceptibility to the chilling effects of cold and wet, and particularly so the lumbar region. Hence these portions stand in more urgent need of the protective qualities of the winter coat, as Nature allows it to grow, than any other part of the horse's whole anatomy. By leaving the coat unclipped on back, loins, and croup, we ensure the horse retaining a fairly full measure of natural protection against inclement weather while at work, even although all the rest of the body is relieved of its thick covering by clipping, the portion intact acting as a sort of rug for the animal, and being very efficacious in keeping it warm. Any chance of a chill being contracted through the horse being kept standing about in the open for prolonged periods is thus reduced to a minimum, if not, indeed, entirely eliminated. The under parts of a horse's body are certainly those which can most readily dispense with their natural protective covering in winter, so that there is in many cases every justification for clipping them when clipping all over is not deemed expedient or safe. Moreover, it proves particularly advantageous to have these parts clipped, because, when unclipped, they are the most diucult to keep clean and to get dry when a horse returns to the stable from its work in a wet and dirty condition. Anyone having practical experience of strapping a horse will know that there is no part of its body more difficult to get at effectively with the brush or to rub dry with straw-wisps than the belly, and a great boon is thus conferred when this particular part is clipped, the task of grooming and strapping the animal being very much lightened, while not alone trouble, but time also, is saved in grooming.

## CLIPPING TRACE-HIGH.

It is very commonly advocated that horses be clipped trace-high, as it is termed, when partial clipping is decided upon, and frequently this is done, but more usually, in practice, the coat is removed to a higher line than merely to where the traces reach. In the majority of cases, probably, clipping only strictly trace-high would hardly afford sufficient relief to the horse, so that clipping higher is desirable. A very good plan, in my experience, is to clip the coat up to an imaginary line, drawn from just above the point of the shoulder to the point of the buttock. The shoulders may or may not be clipped, according to what is deemed expedient. Where it is desirable to remove the greater portion of the coat, an excellent idea is to clip over the whole of the shoulders and the neck, leaving only the withers, back, loins, and croup unclipped. If a horse is clipped trace-high, it will be well either to clip the whole of the shoulders, or else to leave them unclipped, rather than to shorten the coat on the lower but not on the upper portion. Such half-and-half clipping of the shoulders is hardly advisable, although one often sees it done. The clipping of the head and neck is optional. But where partial clipping suffices to keep a horse in fit condition for its work, there is really never any necessity to have those parts clipped. Neither is there any call to clip the legs; these, indeed, are best left unclipped when horses are partially clipped.—"Live Stock Journal."

---

# Statistics.

## COMMONWEALTH METEOROLOGY.

### RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

| STATIONS. | 1910. | 1911. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Dec. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| *North.* | | | | | | | | | | | | | |
| Bowen ... ... ... | 5·36 | 23·72 | 7·57 | 10 66 | 1·64 | 0·12 | 0·2 | Nil | 0·15 | Nil | 1·5 | 0·19 | 1·32 |
| Cairns ... ... ... | 11·59 | 34·49 | 27·43 | 35·35 | 52·31 | 2 08 | 1 44 | 1·48 | 0·27 | 0 6 | 0·88 | 1·95 | 0 90 |
| Geraldton (Innisfail) ... | 4·77 | 36·96 | 35·51 | 28·39 | 50 f3 | 3·58 | 5·10 | 6·20 | 0 79 | 0·30 | 0·73 | 1·61 | 0·75 |
| Gindie State Farm ... | 3·87 | 11·69 | 4·15 | 2·29 | 0·29 | 0·29 | Nil | Nil | 0·49 | ... | 0 81 | ... | 3.50 |
| Herberton ... .. | 9·71 | 11·43 | 13·16 | 15·35 | 14·17 | 0·58 | 0·36 | 0·49 | 0·5 | Nil | 0·9 | 0·62 | .5·36 |
| Hughenden . | 1·13 | 9·15 | 3·76 | 0·17 | 6·29 | 0·4 | 0·2 | 0·2 | Nil | Nil | Nil | 1·37 | 0·69 |
| Kamerunga State Nurs. | .. | ... | 23·08 | ... | 52·28 | 1·51 | ... | ... | ... | ... | ... | ... | ... |
| Mackay ... ... | 2·15 | 30·52 | 13·04 | 14 41 | 3 14 | 0·77 | 0·22 | 0·43 | 0·18 | 0·3 | 0·93 | 0·17 | 0·41 |
| Mossman ... ... | 19 91 | 32·76 | 21·95 | 71·64 | 37·10 | 1·44 | 0 33 | 1·28 | 0·39 | 0·09 | 0 55 | 0·86 | 3 31 |
| Rockhampton ... .. | 2·46 | 9·64 | 21·07 | 6 39 | 1·44 | 0·56 | Nil | 0·24 | 1·17 | Nil | 0·40 | 0·6 | 0·81 |
| Townsville ... ... | 6·77 | 25·40 | 19 24 | 4·24 | 3 02 | 0·7 | 0·11 | Nil | Nil | Nil | 0·39 | 0·31 | 2·84 |
| *South.* | | | | | | | | | | | | | |
| Biggenden State Farm | 5·96 | 10·37 | 7·34 | 6·25 | .. | ... | ... | ... | ... | 0·79 | ... | ... | ... |
| Brisbane ... ... | 13·99 | 10·30 | 5·84 | 4 69 | 0·88 | 0 90 | 0 9 | 1·70 | 2·22 | 0 84 | 4·95 | 0·84 | 1 94 |
| Bundaberg ... ... | 1·58 | 21·05 | 9·75 | 4·31 | 1·46 | 0·56 | Nil | 0·37 | 1·15 | Nil | 2·36 | 1·30 | 2·98 |
| Crohamhurst ... ... | 6·20 | 28·85 | 19·20 | 16·67 | 2·94 | 1·21 | 0·13 | 3·58 | 2·62 | 0·51 | 6·27 | 1·74 | 3·02 |
| Dalby ... ... .. | 3·29 | 8·08 | 2·24 | 3·20 | 0·76 | 0·91 | Nil | 0·68 | 0·43 | 0·42 | 3·45 | 1·99 | 1·55 |
| Esk ... .. .. | 7·53 | 11·90 | 6·04 | 3 54 | 0·99 | 1·90 | Nil | ... | 1·51 | 2·04 | 4·17 | 0 47 | 0 44 |
| Gatton Agric. College | 6·84 | 12·03 | 3·98 | 2·80 | 1·38 | 0·58 | Nil | 0 72 | 0 90 | 0·96 | 3 77 | 0·49 | 1·90 |
| Gympie ... ... | 1·96 | 9·13 | 5·33 | 6 02 | 1·88 | 0·32 | Nil | 0·97 | 0·48 | 0·26 | 2·42 | 0·50 | 2·10 |
| Ipswich ... ... | 5·04 | 8·15 | 4·19 | 2·51 | 1·38 | 0·42 | Nil | 0·59 | 1·12 | 0·34 | 4·71 | 0·25 | ... |
| Maryborough ... .. | 3·19 | 16·93 | 6·58 | 7·20 | 2·61 | 0·16 | 0·11 | 0·62 | 1·47 | 0·9 | 2·81 | 0·90 | 4·98 |
| Roma ... ... .. | 0·96 | 11·52 | 5·94 | 1·25 | 0·14 | 1·13 | Nil | 0·67 | 1·55 | 0·87 | 1·9 | 1·55 | 1·19 |
| Roma State Farm ... | 7·97 | 9·72 | ... | 5·39 | 0·04 | ·02 | .. | ... | 1·39 | 0·74 | 1·31 | 1·29 | 1·45 |
| Tewantin ... | 8·25 | 20·84 | 8·50 | 18·11 | 1·78 | 0·57 | 0·22 | 2·53 | 1·07 | 0·4 | 7·48 | 1·14 | 2·13 |
| Warren State Farm ... | ... | ... | 11 75 | 3·17 | ... | ... | Nil | 0·6 | 1·01 | ... | 0·64 | ... | ... |
| Warwick .. | 3·46 | 7·13 | 2 01 | 3·12 | 0·74 | 1 04 | Nil | 1·20 | 1·50 | 0·80 | 1·78 | 2·26 | 0·70 |
| ,, Hermitage State Farm | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 0·60 | ... | ... |
| Westbrook State Farm | 4·44 | 5·26 | 3·90 | 1·76 | 5·50 | 0·79 | 0·1 | 1·1 | 0·54 | 0·82 | 1·77 | 2·68 | 0·23 |
| Yandina ... ... | 16·05 | 12·04 | 10·73 | 12·02 | 2·68 | 0· | Nil | 2·43 | Nil | 0·30 | 2·90 | 1·36 | 1·87 |

The rainfall at Mossman for the year 1911 was 171·70 inches.

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND, Divisional Officer.

# Poultry.

## REPORT ON EGG-LAYING COMPETITION, Q.A. COLLEGE, DECEMBER, 1911.

Two thousand six hundred and sixty eggs were laid during the month. The weather has been very trying, the temperature ranging from 100 degrees to 107 degrees throughout the greater portion of the time; on several days hot winds were experienced, affecting the laying to a great extent. However, by throwing about water in the houses during the hottest days, all the birds were saved. One of Mr. Stewart's hens (No. 2 pen) was killed by a carpet snake on 1st December, and has not yet been replaced. Mr. Padman wins the monthly prize with 131 eggs. The following are the individual records:—

| Competitors. | Breed. | December. | Total. |
|---|---|---|---|
| J. F. Dalrymple, N.S.W. ... ... | White Leghorns ... ... | 121 | 1,071 |
| E. A. Smith ... ... ... ... | Do. ... ... | 117 | 1,027 |
| Yangarella Poultry Farm ... ... | Do. ... ... | 124 | 1,024 |
| J. Holmes ... ... ... ... | Do. ... ... | 126 | 1,019 |
| Range Poultry Farm ... ... | Do. ... ... | 106 | 1,006 |
| Alex. Smith ... ... ... ... | Do. ... ... | 105 | 984 |
| Cowan Bros., N.S.W. ... ... | Do. ... ... | 117 | 977 |
| J. Gosley ... ... ... ... | Do. ... ... | 120 | 967 |
| Jas. McKay ... ... ... ... | Do. ... ... | 105 | 952 |
| A. Hollings, N.S.W. ... ... | Do. ... .. | 111 | 951 |
| A. J. Cosh, S.A. ... ... ... | Do. ... ... | 120 | 949 |
| Mrs. Kinnear, S.A. ... ... | Do. ... ... | 100 | 942 |
| S. Chapman ... ... ... ... | Brown Leghorns ... ... | 126 | 942 |
| R. Burns ... ... ... ... | White Leghorns ... ... | 123 | 938 |
| A. H. Padman, S.A. ... ... | Do. ... ... | 131 | 916 |
| J. Zahl ... .. ... ... | Do. ... ... | 129 | 887 |
| H. Hammill, N.S.W. ... ... | Do. ... ... | 100 | 871 |
| R. Burns ... ... ... ... | S.L. Wyandottes ... ... | 106 | 843 |
| A. Astill ... ... ... ... | White Leghorns ... ... | 100 | 728 |
| Mrs. A. A. Carmichael ... ... | Brown Leghorns ... ... | 111 | 725 |
| R. W. Goldsbury ... ... ... | White Leghorns ... ... | 104 | 719 |
| J. K. Stewart ... ... ... | White Plymouth Rocks (1) | 95 | 565 |
| J. K. Stewart ... ... ... | Do. do. (3) | 89 | 533 |
| J. K. Stewart ... ... ... | Do. do. (2) | 74 | 458 |
| Totals ... ... ... | ... | 2,660 | 20,994 |

## DRINKING VESSELS FOR FOWLS.

In February, 1905, Mr. Frank H. Robertson, writing in the "Journal of Agriculture of Western Australia," on the subject of care of fowls, suggested the following simple plan for providing water for poultry without any danger of drowning young chickens:—

Herewith are illustrations of drinking vessels for fowls. The first shows a kerosene tin cut with an ordinary tin-opener in such a manner that the water is protected from the sun by the sides of the tin acting as verandas all round; all sharp edges are hammered down to guard the fowls' wattles against being cut or scratched. To prevent the tin rusting, a coating of the bottom with tar inside and out is advisable, and if the

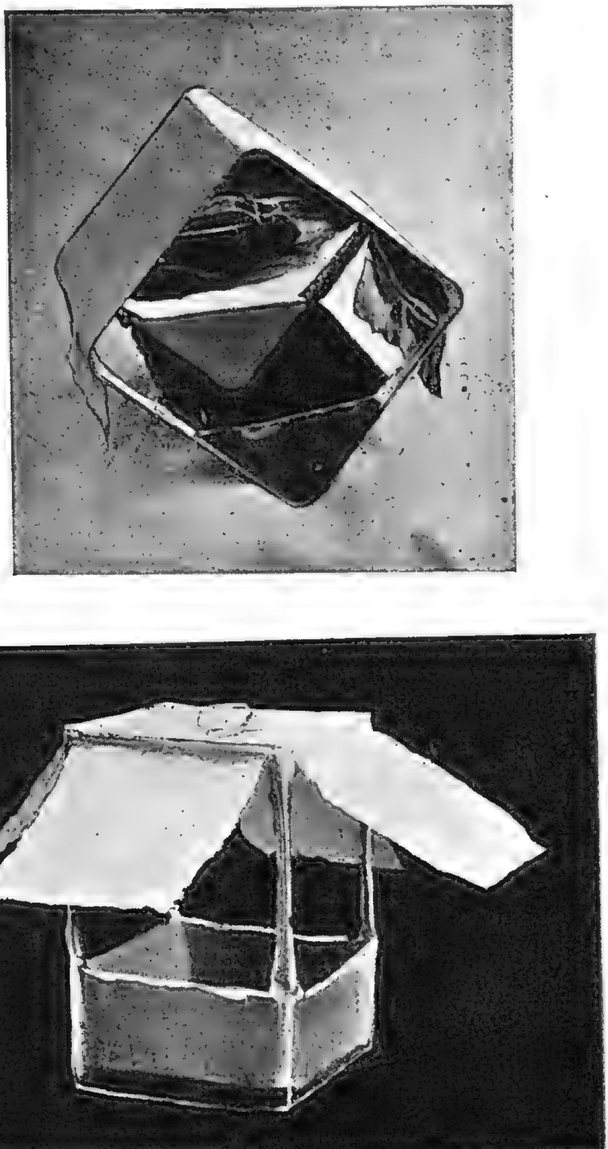


PLATE 19.—KEROSENE TINS UTILISED AS DRINKING VESSELS FOR POULTRY.

remainder of the outside is painted—coated with an indelible or a good permanent lime wash—its appearance is greatly improved. If there is a risk of chickens being drowned, the body of the tin can be cut much lower, or, if preferred, a stone or half a brick can remain in the vessel, thus giving the chickens a means of jumping out of the tin. But the careful poltry-keeper does not, as a rule, allow young chickens and adult fowls to run together.

Although this drinking vessel is made to shade the water from the sun, still that must not be depended on in hot weather; it should be kept under shelter of some sort—the best is under the shade of a tree. To leave it standing out quite unprotected in an open yard would result in the water getting very warm, but if placed under a shady growing bush the wind blows over the water and is the best way of keeping it cool.

Illustration No. 2 shows another mode of cutting a kerosene tin, forming a V-shaped drinking trough. The fowls can drink only from the front; the openings at the back and sides are made to allow a current of air over the water to keep it cool. Bricks or blocks of wood must be placed at each side to enable it to stand upright. The advantages of this trough over the square-cut one are that the sloping sides make it safer for chickens, and in districts where water is a consideration the fowls can empty it to almost the last drop.

---

## EGG-PRODUCTION—BREEDING GOOD LAYERS.

By W. HINDES, Poultry Expert, Queensland Agricultural College.

If the best results are to be obtained, fowls must be bred to lay, and only the individual best should be used for breeding from. The "trap nest" is a sure means of finding out the best layers, but, as it means a certain amount of labour to attend to these, single-test pens or houses would be best for the purpose. A row of small houses, 4 ft. square for each bird, would make ideal places. Litter or stable manure should be put on the floors to a depth of 3 or 4 in., and all grain buried in this to give the birds plenty of exercise and keep them in good healthy condition. If, say, twenty of the most likely pullets are tested for twelve months, and their individual records kept, the best can then be used for breeding from in the following year. It is only by this individual selection that the best results can be obtained. The selection of the male bird is just as essential (perhaps more so) as that of the females. It is a fact well known to our best breeders that a good laying hen transmits her qualities to her sons, and therefore the greatest care should be taken in selecting the male bird for the breeding pen, as he will transmit his qualities to his daughters. His ancestors should have good laying records for several generations—the longer the better. Only healthy birds with good strong constitutions should be used for breeding purposes. Quick maturity is a good sign in this respect, also width between the legs. Never breed from narrow knock-kneed birds, as there is a weakness somewhere. It will be best for the beginner to go to some reliable breeder and purchase a pair or trio of birds, properly mated, the best procurable. It is better to buy a first-class pair or trio than to pay the same amount of money for a larger pen of inferior quality, as the former will always pay best in the end. The best months for hatching chickens are August and September for the heavy breeds, and September and October for the light breeds. Chickens hatched at these times should, if properly fed, commence to lay in the following March, and continue throughout the autumn and winter months, when eggs are at their highest price. This fact should be kept in mind if the most profit is to be made. A few chickens could be hatched in March and April, if desired; these would commence to lay about October and keep up the supply of eggs at Christmas time, when the other fowls are commencing to fall off in their laying. Care should be taken never to overcrowd the birds, especially the chickens, which double in size in a very short time, but if overcrowded they never make fine birds.

# State Farms.

## NOTES ON THE STATE FARM, HERMITAGE.

### MAKING PROVISIONS OF SILAGE FOR WINTER FEED.

Near the end of October, 12 acres were seed for silage material in drills 4 ft. apart, the ground being ploughed and harrowed twice before planting, and with one harrowing after planting, after appearing above the ground, it has been twice cultivated; 6 acres were planted with Golden Nugget maize, the balance with maize, sorghum, and cowpea owing to the continued dry, hot weather during the month of December. The portion planted with maize alone should rain of a beneficial nature fall in the near future, only a poor yield of material can be expected. In the mixed portion, the sorghum being a little more backward than the corn, with suitable rains the cowpeas and sorghums will give a fair return of silage material.

The continued dry weather is making its presence felt very much, and it behoves every dairyman and farmer to plant material for autumn feed at the first available opportunity, now that the season has advanced into that period when, under the general course of events, rain can reasonably be expected. With that object in view, a piece of ground is kept in good tilth for the purpose of planting with material that can yet be grown for silage and hay purposes. Panicums, Japan and French millets for hay or green feed, sorghum, and corn can yet be sown for silage purposes, and, under favourable weather conditions, can yet give a good return of silage material. Sorghums have been planted at this farm under favourable weather conditions during this month, giving a yield of 20 tons per acre, and harvested early in the month of April. During such a season with sufficient silos, from a small area of ground, a large amount of silage could be made and held in reserve, and would be found very useful during a season such as the one we are experiencing.

---

## WHEAT—VARIETY TESTS AT ROMA STATE FARM.

The numbers of varieties tested this season show a great reduction on former years, due to the discarding of those which have proved wholly unsuitable, chiefly in respect to degree of rust resistance or inability to withstand droughty conditions.

The season, on the whole, was rather dry, as from April to the 14th October—a period of 28 weeks—only 3.73 in. of rain were registered. These conditions were suitable for the determining the value of the varieties grown as dry-season wheats, but not as rust resisters, though some of the more susceptible kinds—such as Federation, Bobs, Reynolds, Discovery No. 2—were found to be infested.

The varieties sown, date of sowing and harvesting, yields, &c., were as follows:—

| Variety. | Area. | Sown. | Harvested. | Yield per Acre. | Remarks. |
|---|---|---|---|---|---|
| | Acre. | | | | |
| Bobs | 1 | 5 April | 6 Nov. | 8.25 | Germinated unevenly, owing to presence of large clay pans; straw short; uneven in length and period ripening; earing, 3rd week August. |
| Bunyip | 1 | ,, | ,, | 7.05 | Germination uneven; crop very thin; uneven ripening; earing, 2nd week August; harvesting delayed by second growth. |
| Federation | 1 | ,, | 4 Nov. | 9.96 | Germination uneven; crop very short, flaggy, and rusty; earing, 4th week August. |
| Hermitage | 1 | ,, | ,, | 12.1 | Soil better; germination fairly even; straw short, clean; crop very thin; earing, 3rd week August. |
| J.C. 157 | 1 | ,, | 3 Nov. | 15.25 | Germination good; crop even, medium late, flaggy, short stout straw, square head; benefited greatly by rains experienced in August, more so than many others, as it would have been a total failure without; earing, 1st week September. |
| Yandilla King | 1 | 6 April | 25 Oct. | 14.0 | Germination good; crop even, short straw, free from rust, very little flag; earing, 3rd week August. |
| Amby | 1 | ,, | 26 Oct. | 18.4 | Germination good; crop very even, 3 ft. high; good dry-season wheat; earing, 3rd week August. |
| Crossbred 349 | 1 | ,, | 28 Oct. | 15.8 | Remarks, as applied to Amby. |
| Crossbred 353 | 1 | ,, | 24 Oct. | 17.7 | Remarks, as applied to Amby. |
| Sussex | $\frac{1}{4}$ | 28 April | 25 Oct. | 28.2 | Germination good; nice, even growth; withstood dry weather exceptionally well; splendid stooler; flaggy; earing, 1st week September. |
| Le Huguenot | $\frac{1}{8}$ | ,, | 3 Nov. | 13.7 | Germination poor; poor stooler; straw and flag coarse; earing, last week August; height, 5 ft. This is considered to be the best wheat for hay in many parts of South Australia. The ear is identical with Bald Medeah, though the latter comes truer to type. |
| Belatourka | $\frac{1}{8}$ | ,, | ,, | 16.5 | Germination poor; fair stooler; bearded; straw and flag beautiful quality; earing, 2nd week September. |
| Warren | $\frac{1}{48}$ | ,, | 26 Oct. | 36.8 | Germination good; splendid stooler; flaggy straw; medium short stool; good head; medium early; earing, 20th August. |
| Ward's Poland | $\frac{1}{48}$ | ,, | ,, | 35.3 | Germination good; splendid stooler; straw medium fine, bright; head long tapered; very difficult to thresh; earing, 3rd week August. |
| Reynold's Discovery No. 2 | $\frac{1}{48}$ | ,, | 16 Nov. | 17.6 | Germination good; good stooler; late earing, 4th week September; medium head; large, heavy, bearded, and tall; 5 ft. 6 in. |
| Ward's Prolific | $\frac{1}{48}$ | 29 April | 26 Oct. | 25.6 | Germination good; magnificent tillerer; straw medium fine and bright; no chaff; head long and tapered; earing, 4th week August. |

| | | | | | |
|---|---|---|---|---|---|
| Florence | 1/48 | ,, | ,, | 28.2 | Germination good; medium stooler; very early; short straw; fairly free flag; inclined to shade; first year grown outside of samples; earing, 1st week August. |
| Cumberland | 1/48 | ,, | ,, | 36.0 | Germination good; good stooler; fine straw; short, erect, light-colour flag; traces rust; rusty in moist seasons; earing, 15th August. |
| Cretan | 1 | 6 May | 3 Nov. | 13.91 | Germination even; crop, 4 ft. high; thin clean straw; bearded |
| J. Brown | 2 | 29 April | 6 Nov. | 9.8 | Germination poor; ground poor; shallow soil; very thin. |
| Bunge No. 2 | 1/4 | 27 April | 17 Oct. | 14.7 | Crop injured by birds, and yield considerably reduced by effects of trees growing in adjacent paddock; germination poor, owing to poor seed; stooled well; 3 ft. 6 in. high; heads large; straw rather too slender. |
| Dattell | 1/4 | ,, | 23 Nov. | 6 | Germination good; crop mixed; very late; just coming into ear when other crops harvested. |
| Emmer | 1/4 | ,, | 16 Nov. | 10.8 | Germination good; good stooler; late; earing uneven; straw thin; stood dry weather well; half crop lost owing to wind storm. |
| Manitoba | 1/4 | ,, | ,, | 15.46 | Germination good; earing, 1st week October; stood dry weather well, but too late for this part. |
| Moulds | 1/4 | ,, | 25 Oct. | 23.5 | Germination good; earing, 25th August; nice bright straw; fairly free flag. |
| New Era | .. | ,, | 23 Nov. | 5.0 | Germination good; rusty, bearded, useless; earing, 1st week October. |
| Rymer | .. | 28 April | 25 Oct. | 27.2 | Germination good; clean straw; erect flag; withstood dry conditions remarkably well; earing, 1st week September. |
| Comeback | 1/48 | ,, | ,, | 37.6 | Germination good; good stooler; fine straw; short, erect, light-coloured flag; inclined to rust wet season; earing, 2nd week August. |
| Bald Medeah | 1/48 | ,, | ,, | 22.4 | Germination good; poor stooler; straw coarse; leaves broad, long; fairly good rust resister; earing, 4th week August; very long straw. |
| Amby | 1/48 | ,, | ,, | 32.5 | Germination good; splendid stooler; long, narrow, erect flag; medium short straw; earing, 3rd week August. |
| Budd's Early | 1/48 | ,, | ,, | 36.8 | Germination good; splendid stooler; not too flaggy; medium late; purple straw, strain red chaff; earing, 1st week September. |
| Marquis | 1/48 | ,, | .. | .. | Failed to germinate. Seed obtained from Guelph College, Ontario, Canada. |
| Huron | 1/48 | ,, | .. | .. | Failed to germinate. Seed obtained from Guelph College, Ontario, Canada. |
| Bishop | 1/48 | ,, | 25 Oct. (Cut with binder) | 30.4 | This wheat is similar to Manitoba, with the exception that it is much earlier, and is a very heavy tillerer. Its rust-resisting capabilities have not yet been ascertained. |

## NOTES ON THE STATE FARM, WARREN.

Droughty conditions still prevail in our locality, which prove that we are in a very dry belt. There are a few lessons which the present drought has already taught or should teach the farmers.

The State Farm is at present subdivided into medium to small paddocks, which are all well watered by either creek or troughs supplied by windmills and tanks, and, although we have had as little rain as anyone in the district, our stock are in splendid condition, which proves the necessity of having water at a convenient distance for all stock. All stockowners know full well that, if their stock have to walk too far for water, they often do not go until they are nearly dead from thirst, when they drink too much and are not able to walk away.

The moving of stock from paddock to paddock every nine days is of inestimable value. This year I have made it a practice of moving the stock every nine or fourteen days. The cattle take the lead, and the horses follow, because horses can graze shorter than cattle.

The summer burning of grass has again been practised with the same detrimental results. It is with great difficulty that I have saved the old grass in our paddocks—in fact, one of ours was burned out some three months ago through a neighbouring fire.

The old dry grass forms a shelter for the little green grass that is present, and also forms a preventive against scours when we do get an occasional green shoot. It is true that the burnt fields look lovely after a shower, but if the ground be hot and the subsoil dry the sun soon burns all the beauty out of it.

I always burn (if I burn at all) after the introduction of the wet season. I can then depend on the fire not injuring the roots of the grass, and there is sufficient moisture in the ground to assure a substantial coating of grass to shelter the roots.

Then it is well not to burn more than one field at a time, making certain all the time that the stock are well catered for. Overstocking is an evil that very few stockowners seem to be able to resist, but I would urge that the property be lightly stocked and the surplus grass made into hay. This would be of material help in a country where the farmer and grazier are bound to suffer periodically from the "dry spell."

## NOTES ON THE STATE FARM, WESTBROOK.

Weather conditions continue particularly unfavourable to agriculturists on the Darling Downs. Beyond scattered thunderstorms, we have had no rain sufficient to moisten the soil, except surface moistening, since the end of February last year. There is evidence that the lessons of past experience have awakened practical attention on the part of the farmers in this district to the conservation of water and well-sinking in the immediate neighbourhood. There is quite a number of wells being put down within the last two years; nearly all have proved successful in giving a supply of good water. Water supply is the most important question, and always is when normal conditions or reduced rainfall overtake the agriculturist. During the last twelve months we have had just sufficient rain to conserve plant life. At the time of writing (15th January) the outlook is discouraging, and should stir enthusiasm through all the States, and especially in Queensland, to push the all-important manifold advantages of conservation and irrigation. There is good water on this farm, and, with slight expenditure, we should be able to demonstrate the application of water in the various phases of cultural operations.

The seedling potatoes raised from imported seed last year are still holding on, and making small tubers; they are showing some very distinct characteristics in the foliage. The plants are receiving every attention, and keen interest will be taken in the selection of tubers, which may require one or two crossings by hybridisation before a desired variety can be obtained. It is very necessary to carry out this work, or constantly import new strains of potatoes, as the best variety ever raised will degenerate and become extinct.

Tomato disease is becoming a problem engaging the attention of the most practical growers. I am constantly asked what to do to prevent the disease. I have about three-quarters of an acre growing this season; so far, the plants are clean and healthy looking. The inclemency of the season is against the plants. If rain should come soon, I expect a fair crop. The land where the plants are growing is not suitable; however, it was the best we had available. Previous to planting, the plants were sprayed with Bordeaux mixture, and again, after they had been planted about three weeks, just as a few were coming into bloom. As a rule, the infection takes place at this period in the growth of the tomato, especially bacterial disease, which is conveyed to the plants by insects, and deposited on the stigma of the flowers. The effect is soon noticed. As the fruit commences to grow, a small black speck appears on the fruit at the base of the stigma, growing externally and internally, until it covers half the tomato before it gets ripe. The only cure is to keep down the insect by spraying. There are other diseases that affect the tomato, often caused by the condition of soil, which should be virgin to ensure success. Bacteria is often taken for black rot or black stripe (*Macrosporium solani*), sleeping disease (*Fusarium lycoperici*), and leaf rust (*Cladosporium fulvum*), which is a fungoid often conveyed in the seed.

# The Orchard.

## THE BANANA IN QUEENSLAND.

### DISEASES OF THE BANANA.

We have lately received so many inquiries by actual and intending banana-growers concerning the disease to which the banana is subject, especially with respect to the newly introduced Gros Michel variety, that we consider it advisable, before continuing our instructions for the cultivation of the plant and harvesting the fruit, to first publish Mr. Tryon's exhaustive paper on the "Natural Enemies of the Banana occurring in Queensland."

The banana in Queensland is, happily, one of the plants which suffers very little from disease of any serious kind, and in this respect other banana-growing countries are in the same fortunate position. Still, even the banana has some enemies in the shape of insects and fungi, as will be seen by the following notes on "Diseases and Insect Pest of Bananas," by Mr. H. Tryon, Entomologist and Vegetable Pathologist to the Department of Agriculture and Stock:—

## NATURAL ENEMIES OF THE BANANA OCCURRING IN QUEENSLAND.

BY HENRY TRYON, Entomologist and Vegetable Pathologist.

### DISEASES.

#### No. 1.—ROOT DISEASE.

This disease is one that primarily attacks the roots; but in its case the Cavendish Banana either escapes its onslaught altogether or is highly resistent thereto.

It has long been prevalent in Southern Queensland. The late Dr. Joseph Bancroft investigated it in 1874-6, when it already attacked the Sugar Banana and "the old large Banana"—then considered to be *Musa maculata*—that is actually killed; but it also affected, in 1876, "many of the new kinds of Banana introduced." At the present time it is still with us, proving very prejudicial to the Sugar Banana as well as to the Plantain (*M. paradisiaca*) in the southern parts of the State.

When affecting a Banana plant, we find the roots under its influence being gradually destroyed, dying back gradually from their extremities. When they are traced to the corm, whence they originate, it will be seen also that where they emerge there occur dark-reddish-purple or red spots —the central bundles of the disease-smitten roots cut across. At first, when the roots are commencing to perish, those spots are orange-yellow but as it progresses they soon darken. Meanwhile brown patches of greater or less extent are developed, and these are revealed also on sectioning the part of the plant referred to.

The effects of this injury or destruction of the roots are soon gradually realised in the parts of the plant above ground, and appear to result from a transference of morbid products through the vessels or the passage of specific organisms, and not only from the cutting off of the rising sap and its contained nutrients that it involves. The leaves turn yellowish-green, and then yellow, and drooping die—first the older, then the younger. Again, the stems after a while topple over or can be readily pushed over. If this do not happen the sick plants acquire a ragged stunted habit and are unprolific. These effects are, as a rule, witnessed during January, February, and March, the period of the year in which Bananas in Southern Queensland usually ripen. No situation or particular class of soil appears to save the plant from being attacked where the disease is already established; but when Bananas liable to it are grown on dry hillsides it appears to assume a more chronic form, and it seems to occasion a peculiar change in the fruit, the flesh or starch-containing tissue becoming persistently dense and compact and clouded with a brownish colour, being evidently infiltrated with gum. Banana-growers here have observed that when once the disease is in a field it never leaves it; also, that it spreads through the ground during wet weather. Again, it is commonly remarked that "suckers" or shoots, although apparently sound and healthy, give rise to a disease-affected plant, if derived from a Banana that has been already attacked. However, they have, in the coloured points and fibres brought to light in slicing off pieces from the base of the sucker, a guide to indicate to them—when the history of the sucker is not known—whether the young plant is affected or is not.

From the foregoing statements it may be concluded that this Banana trouble is brought about by some organism that can live in the soil and assume parasitic habits in relation to the plant mentioned, and that is disseminated by plants in which such parasitism has been established.

With regard to this question regarding the cause of the disease, it may be mentioned that Dr. J. Bancroft, when in 1876 recording his observations, spoke of a fungus that invaded the tissue, using the discoloured vessels as the channels through which it effected its passage. Thus referring to these vessels, he wrote:—"This spiral thread, which forms the wall of the air-vessel, is the part first to suffer by the invasion of the mycelium, which, passing through the interior of the stool, attacks the new buds"; and again: "Passing down the inner face of the sheath may be seen ruby-red spots and streaks traceable to the attachments to the stool."* The invasion of the vessels passing from the roots into the stool by the spawn-threads or mycelium of a fungus is illustrated by E. Essed, who prosecuted investigations similar to the local inquiries of the Brisbane savant, but in Surinam twenty-five years afterwards. These observations of Essed are alluded to later on. The root disease—described in the preceding paragraphs—as may be concluded from a consideration of its symptoms—is evidently identical with, or is closely

* Bancroft (Dr. J.). "Report (First) of the Board appointed to Inquire into the Causes of Disease affecting Live Stock and Animals," p. 22. Brisbane, by Authority, 1876.

related to, the malady that attacks with special virulence the Gros Michel variety [*Musa sapientum var.*], in Central America, and in some of the West Indian islands (Cuba, Jamaica, Surinam), and is known generally as the "Panama Disease."

Dr. Erwin F. Smith, from evidence before him in 1904, suggested that this latter malady was probably caused by a parasitic fungus belonging to the genus *Fusarium* growing in the tissue.*

E. Essed, a more recent writer, working in Surinam, has arrived at approximately the same conclusion, identifying the organism as *Ustilaginaidella musæperda,* related to *Ustilaginoidea,* one of the *Hypocreales.*†

A Banana malady, apparently caused by a *Fusarium*-like fungus has been reported as existing in Hawaii.

The cure of the disease is obviously beyond attainment; its prevention may be effected by avoiding the use of land in which affected plants have grown, and of suckers derived from such plants, when establishing the banana plantation.

### No. 2.—ROOT DISEASE.

In this disease we find, as a characteristic symptom, a conspicuous reddish-brown colouration of the interior of the fruit in part, especially brought into view on cutting it across, when blotches of this altered tissue are revealed, a brown band on each side just beneath the peel, corresponding to these, being present, when the Banana is split longitudinally.

These appearances are developed when the fruit is still green.

In addition to the internal features, obscure external ones may also be remarked. However, they will not escape the notice of the "trained eye"; affected fruit having, in fact, its angular edges well defined and its faces somewhat flat instead of lowly convex—symptoms that suggest arrested development.

The mode in which the internal browning progresses is as follows:—It is first manifested by the loose convolute walls of the 3-rayed space that exists in the interior of the elongated expanded portion of the central axis, and that is continuous with the channel in the style from the stigma downwards. It then extends outwards along the dissepiments of the united carpels to their outer walls, where blotches are produced. With its further progress the chemical changes thus inaugurated are communicated to the compact starch-containing tissue, that develops in the inner cells of the carpellary walls filling the ovarian cavities. This tissue—the fruit substance proper—is then transformed into a transparent gelatinous substance; or—it may be—the original jelly-like substance contained within cell walls of extreme tenurity does not change as is usual to starch-containing tissue as the outcome of the influences in operation. The fibro-vascular bundles do not appear to be availed of for the passage of any morbid products.

Frequently these changes do not proceed further than is denoted by the earliest internal alteration, especially should the weather continue to be dry.

---

* Science, xxxi., p. 754 55, 1904.

† "Annals of Botany," xxiv., p. 488, 1910; and "Agricultural News," Imp. Dep. Agr., Pt. I., No. 233, p. 110, April, 1911.

This internal browning of the fruit is not the sole abnormal feature that the sick plant presents. It commonly, too, has an unusual development of dark, almost black, pigment on the ordinarily green leaf stalks, towards their bases where they unite to form the false stem.

Again, its older or lower leaves exhibit reduced vitality, turning yellow and then brown, and meanwhile gradually drooping and dying—in fact, fail to thrive.

In the case of neither fruit nor foliage do we find any parasite capable of occasioning the alternations described; but accompanying them in the same plant there is an abnormal condition of the cord-like roots radiating from the root-stock. Along the course of these we find patches of black, sometimes extending continuously for several inches, but commonly shorter than this. At first these affected parts are of the ordinary calibre, but soon there is a general collapse, and the surface involved may exhibit fissured wounds developed with shrinkage. The injury denoted by these dark blotches is deep-seated, but is for the most part confined to the parenchyma that surrounds the central cylinder or stele, although it may occasionally travel along it. This tissue is first purple, and then darkens with time. The rootlets that spring from the affected areas, as well often as those derived from healthy root sections, will be found generally to have earlier died-off, being in the first place discoloured in manner described. In some cases affected roots have quite succumbed and decayed. Where they merge with the root-stock or corm, their central cylinders as seen on section are often pale-brown coloured.

The extent to which the roots of an affected plant suffer injury in this manner may be concluded from the fact that in one instance out of thirty-seven long cord-like roots present, only six were met with that for the time being were perfectly healthy.

No parasites are constantly present in the blackened root-tissue. A few one-septate obtuse-ended elongate large spores containing conspicuous vacuoles may be met with in this—more commonly nematodes distinct from the gall-producing *Heterodera radicola*. Seeing the frequency with which soil-frequenting nematodes resort to altering and decaying plant-tissue, their occurrence in this connection is not of much significance in deciding the cause of the trouble. This, therefore, must be left for the present an open question.

The disease is more apparent during the wet months (February and March) than at any other time of the year; and it is not equally pronounced every season.

It has been met with in the Cairns district, and affecting the Cavendish variety of Banana (*Musa chinensis*)—the one whose cultivation predominates there—and has been responsible for great loss. It is the malady that the local growers (Chinese) name "Colour."

It is commonly stated that it is perpetuated by the employment of "suckers" derived from affected plants, even although these suckers evince no evident sign of disease themselves.

9

## MORE ABOUT THE PAPAW.

Mr. J. C. Harrington writes:—" Herewith is a photograph of a one-year-old papaw-tree (first bearing) raised by me from a pistillate predominating flowering tree of the Cowley type and the sweet-scented Mamila (stamenate flowers predominating). This hybrid variety far exceeds in quantity and quality that produced by the parent stock under similar conditions. Speaking of mono-sexual varieties, it is admittedly unremunerative to have more than one stamenate to twenty pistillate flowering papaws. Most growers, unfortunately, find that the reverse is often the case, and some get discouraged in consequence. I have been growing a few trees for the last twenty years. The first year I planted out a dozen, and, after waiting six months for the results, they turned out eleven males and one female. The second year there were two females out of a dozen. I naturally felt disappointed; so I commenced experimenting with the seeds, sorting out the black from the grey, &c., the elongated from the globular, &c., and labelling each, but after waiting six months, the result was valueless. Neither does microscopical examination of both in all stages of development reveal anything. Sometimes I have

PLATE 20.—MR. HARRINGTON'S ONE-YEAR-OLD PAPAW TREE—FIRST BEARING.

found with intense delight, little coruscations on the roots of the male and absent on the female, but on the next investigation the order was reversed. I noticed, however, that, in those early and green years of my experience, I chose the strongest and best-looking plants from the nursery for planting out; result, nearly all males. Latterly I have been choosing the smallest from the seed bed; result, nearly all females. I have phenomenal results in this way, and, therefore, I have no hesitation in saying that the male papaw germinates in the soil quicker than the female papaw. It only requires a little judgment and close observation, and it will solve this problem in an indirect way, and save years of precious time being wasted by average growers. This special hybrid type of papaw is connected to the trunk of the tree with little stems from 1 to 2 in. long (characteristic of the Cowley), affording plenty of room for the fruit to develop without overcrowding. This little stem is also of great advantage, as it ensures the removal of the ripe fruit from the tree without injuring the remainder. It is delicious when allowed to ripen on the tree, and then, when cut open, it fills the room with a fragrance pleasanter than the attar of roses. It is a mistake to treat the papaw as an article of trade and commerce, because, when plucked green to ripen and to rot in the fruit case, it loses flavour and its great medicinal property—the vegetable pepsin—becomes almost non-existent. Every occupier of a plot of land, from a 16-perch allotment upwards, should grow his own. The papaw can be grown in almost any soil capable of drainage; it likes plenty of water, but it must not stagnate around the roots. Some say they have tried to grow papaws and failed; if these will follow more closely the instructions given them by any of our seed merchants—all reliable men—they will eventually succeed. Others say they don't like the fruit. Of these latter I would ask: Have you ever partaken of a sweet-scented papaw which was allowed to ripen naturally on the tree? If not, then lose no time in doing so." There is not one in a thousand who, when the last slice was gone, would not feel sorry there was not another ripe one in the garden. During the month of August last most of the horses around Brisbane were suffering from colds; mine had a very bad one, so bad that the usual Saturday afternoon drive could not take place, the animal being off its food. It was allowed to graze upon the sweet grass growing on the borders in the papaw garden; it soon commenced to eat the dried papaw leaves which, at this time of the year, are found in abundance around the trees. I noticed it was instantly relieved, and next day it was completely cured. Whenever this horse got the chance afterwards, it rushed at these withered leaves, instinct compelling it to do what the human physician does when he doses himself with quinine to ward off possible future attacks."

We have been grinding up the dried papaw seeds in a little coffee mill, and find it an excellent substitute for pepper; it is more agreeable than the real thing, and there is no risk of adulteration.

One Sunday afternoon, a few months since, my tobacco ran out, and not knowing what to do for a smoke, I tried a fill from the pepper-pot; it was glorious and free from nicotine. Mixed half and half with tobacco, it adds flavour and both make a delightful smoke—the best I have met with.

Last year a well-known citizen of Brisbane sent home to his brother (a doctor of medicine practising in New York) a large quantity of dried papaw leaves. This doctor is troubled with asthma, and gets great relief from smoking the dried papaw leaves.

It is well known that fowl, wild game, or meat of any kind is extremely tough when cooked immediately after being killed. The usual way is to let it stand for a day or so before cooking—in other words, until decomposition has well set in. The race would be better as vegetarians than meat-eaters under such abominable conditions. The papaw again comes to the rescue. When the fowl, &c., is picked and cleaned in the usual way, take a half-ripe papaw off the tree, cut it in slices, rub it gently over the carcass of the innocent. One application is sufficient; leave for five minutes, and then cook. By doing this, there will be no necessity for waiting for the half-tone process of ripening, and it will be good food and also tender.

Wrapping up the meat in papaw leaves is not efficacious, except by leaving it wrapped up for fully twelve hours; wrapped up in cabbage leaves for that length would be just as good. It is the time that tells in this case. Time is the essence of everything; time will make us all papaw-growers.

Mr. Harrington has received numerous applications for seed of his papaws; but he does not make a business of supplying seed, which can be obtained from any of the Brisbane seedsmen.

## TOBACCO.

A correspondent wishes some information on the early history of tobacco in Europe. The plant was introduced into France by Nicot in the year 1560, and into England by Sir Walter Raleigh in 1586. It was in Wiltshire where tobacco was first smoked, when Sir Walter brought it over from the Spanish Main. Pipes were then made of walnut shells with a straw for a stem. The tobacco was sold for its weight in silver. Within thirty years of the above date, the practice of smoking in England became very common and sums up to £300 and £400 per annum were spent by some devotees on the weed. The celebrated Counterblast of King James was directed against a custom which His Majesty stigmatised as "a custom loathsome to ye eye, hateful to ye nose, harmfull to ye braine, dangerous to ye lungs, and in ye blacke stynking fume thereof, neerest resembling ye horrible Stygian smoake of the pit that is bottomlesse." Notwithstanding this Counterblast, the consumption went on increasing in England; and a writer some years ago in "Blackwood's Edinburgh Magazine" (Professor Johnston) said that "probably, tobacco is now, next to salt, the vegetable product most generally consumed by man, there being no climate in which it is not used, no nationality which has not adopted it. The total annual production [in 1858] is estimated at 2,000,000 tons, and would require half the British tonnage which 'enters inwards' or 'clears outwards' annually to transport the same. The value at 2d. per lb. would amount to £37,000,000 sterling. The comparative magnitude of this 2,000,000 tons will strike the reader more forcibly when we state that the whole of the wheat consumed by the inhabitants of Great Britain—estimating it at 1 quarter (8 bushels) per head, or, in round numbers, at 20,000,000 quarters—weighs only 4⅓ million tons; so that the tobacco yearly raised for the gratification of this one form of the narcotic appetite weighs as much as the wheat consumed by 10,000,000 Englishmen, and reckoning it at only double the market value of wheat, or 2d. and a fraction per lb., it is worth in money as much as all the wheat eaten in Great Britain."

The statistics half a century later—*i.e.*, for 1911—would "stagger humanity."

# Horticulture.

## PELARGONIUM CULTURE.

Propagation by seed is the only way to raise superior varieties. The first and most important of their qualities is *form;* the next is substance; the next, size; and the last, colour. To these may be added habit and truss. Save seed only from such as possess already these points approaching perfection. In all attempts to hybridise, let the one to bear the seed possess the property of form. In order to obtain the other properties wanting, cut off the anthers of the well-formed variety before the pollen-cases shed their contents, and the moment the hybridising is performed, cover the flowers with a close-fitting cap of fine muslin net to prevent insects from carrying strange pollen to the stigma dusted with pollen from such varieties as have the desirable properties. When the seed is ripe, gather it carefully and divest it of its arils or feather-like appendages, wrap it up in paper, and keep it in a dry drawer in a cool room till spring. Sow it early in spring, and, if necessary, place it in gentle heat—a hot bed that has been at work for a few weeks will answer admirably. Sow in wide, shallow pots, well drained, in a light rich compost; press the seed down gently, and cover it about a quarter of an inch. If the seed is good, it will quickly germinate, and should then be removed from the hot bed and placed upon a shelf in the greenhouse near the glass. Water very moderately, or the plants will be apt to damp off. As soon as the seedlings have made their second leaf, pot them off singly into 2-in. pots, in a compost of loam and leaf-mould in equal parts, with a liberal addition of river sand, finely sifted. Replace them on the shelf, and shade for a time from the hot sunshine. The seedlings will soon fill these small pots with roots. They must then be repotted into larger-sized pots, and subsequently be treated in the same way as those which have been propagated by cuttings. Keep them close to the glass, and give them abundance of air on all favourable occasions. As soon as the weather will permit, place them out of doors, upon a bed of ashes of sufficient thickness to prevent worms from entering the pots. The situation should be an open one, the grand object being to ripen the wood, and induce a stocky or bushy habit, so as to ensure their flowering the following season. The size of pots to flower them in need not be more than 4½ in. When there is a fear of autumnal frosts, remove them into the greenhouse, and place them on a shelf at such a distance from the glass as will serve to keep them dwarf and bushy. There is no need to top them in the manner hereinafter recommended for plants raised from cuttings, the object being not to raise fine specimens, but to get them to flower as quickly as possible in the following spring.

## BY CUTTINGS.

Cuttings may be put in and struck from July to September. The general time, however, is when the plants have done flowering, and require cutting down to make bushy plants for the next season. The best place to strike the cuttings is in the bushhouse in a frame set on a spent hot bed, removing the soil and substituting a thick coat of cool ashes, and over this a bed of dry sawdust in which to plunge the cutting pots. This dry sawdust serves to absorb the moisture in the pots and the necessary waterings. The best soil is pure loam mixed with silver sand. The most suitable pot is one 5 in. wide at the top. The pots must be well drained with potsherds, and filled to the top with the prepared loam; it should not be pressed down too hard, but made firm enough to hold the cuttings fast. Another point is to use it in a state neither wet nor dry. The side shoots which have not flowered make the best cuttings. These should be cut off close to the stem. Cut off the bottom leaves of the cutting close to the stem, leaving only two of the uppermost. Place the cuttings in a shady place for about an hour to dry up the wound. Then put them in the prepared pots round the edge, inclining the leaves inward. When a pot is filled, give it a gentle watering. Then plunge the pots into the frame, and shade them from the sun or even from light. Reduce the shade very gradually. The temperature should not much exceed 60 degrees Fahr. As soon as the roots are 1 in. long, pot them off immediately into the smallest 60-pots, which are generally about 2 in. in diameter. A small addition of well-decomposed leaf-mould may with advantage be mixed with the loam. When they are finished potting off, give another gentle watering and replace them in the bushhouse until fresh roots are formed. Renew the shading, but disuse it as soon as it is safe to do so, and then give plenty of air (if in the propagating house) to prevent the plants being drawn up and becoming spindly. To cause them to become bushy plants furnished with branches close to the pot, nip off the top bud; the lower side buds will then break and push forth, and these must be again stopped as soon as they have made thin leaves. The plants will then be ready to receive a second potting, and should be removed into the open air.

The above remarks and directions, so far as cuttings are concerned, relate only to the so-called *show* varieties. There is another class of pelargoniums which are designated *fancy* varieties. These are more difficult to increase by cuttings. Place the cuttings in shallow pans, only 1½ in. deep, with a hole in the centre, in the usual loam and sand, placing them on the shelf or in the frame in the bushhouse on topsy-turned pots. If in the propagating house, place them close to the glass. The cuttings are made very short with a portion of the old wood at the bottom of each. Very little water is given till the callosities are formed, when it is given more freely, and then roots make their appearance, when they must at once be potted off, and the usual treatment followed.

## BY BUDS.

Make a shallow pan ready for them by first putting in a portion of pure loam and sand, then a covering of pure sand alone; give a gentle watering to settle it, and then prepare the buds. Take a shoot of moderate strength, cut off the leaves, but not quite close to the stem; then cut off the two lowest buds, leaving about a quarter of an inch of wood below each bud. After that, split the shoot containing the two buds down the centre. If the two buds are not exactly opposite, but one a little below the other, the upper one must be shortened below the bud to the proper length. The upper cut should be very nearly close to the bud. Make a sufficient number ready at once to fill the pan or pot, and plant them, using a short blunt stick, a degree thicker than the bud cutting. Insert them so as to only leave the bud just above the sand. Plant them close to and round the edge of the pan, placing the cut side close against the pot, which will, of course, place the bud side inwards. Then fill up the holes with a little dry sand, and water gently again. Place them either in a propagating house or in a frame. Shade from bright sunshine in whatever situation they are placed, and water as required. The buds will soon break and show leaves, shortly to be followed by a shoot.

## BY ROOTS.

Some kinds of *Fancy Pelargoniums* and most of the *Cape original species* are difficult to increase by any of the above methods. In such cases there is left the mode of increase by cuttings of the roots. This is almost certain of success. Take an old plant, carefully shake off all the soil and cut the roots into short pieces, retaining as many fibres as possible to each. Put each root cutting singly into as small pots as they can be got into, leaving the top just visible. Place these in the house or frame appropriated to propagation; give a gentle watering, and shade effectually. New roots will soon push forth, and their shoots will appear, generally in clusters. When that takes place, reduce the shade, to give colour to the leaves and strength to the shoots. As these advance in growth, thin them gradually by slipping one or two off at a time, till finally they are reduced to one which is to form the future plant. As soon as this shoot attains the height of 2 or 3 in., nip off the top to cause side shoots to grow, and so form a neat bushy plant.

## CULTURE OF ESTABLISHED PLANTS.

Cut them down in January, and leave them in a cool pit. In eight or ten days after being cut down, and receiving moisture about the tops rather than among the roots, the pots may receive a fair watering—as much as will reach every good root. When the buds break, gradually expose to the air. When 1 in. or so in length, take the plants to the potting-bench; shake the soil from the roots; examine and prune the roots a little; reshift into similar, or what, in general, will answer better, smaller-sized pots; place them again in the cool pit, and keep close until the fresh roots are running in the new soil. Then gradually expose them entirely to the weather, steering clear, however, of cold rains and early frosts. Plants cut down in January will require to be placed in blooming-pots at the end of April or May. Those cut down in February will not want repotting till the spring of the following year, and then different successions of bloom may be expected. During the cold months the temperature of the pelargonium house should seldom be higher than 50 degrees Fahr. In the case of large plants, little stopping will be required after repotting. Thinning instead will often be necessary. Hence old plants generally produce the earliest bloom, as every general stopping of the shoots, as well as every shift given, retards the blooming period.

---

## BRISBANE BOTANIC GARDEN SECTION.

By J. F. BAILEY, Director.

### HIBISCUSES.

During the recent dry spell the various kinds of Hibiscus have flourished and flowered profusely, and their gay-coloured blooms have been very attractive. A very fair collection has been got together in these Gardens, and they are to be strongly recommended for growing either in the borders or as individual specimens in the grass plots. Many fine varieties have been obtained from the common Chinese Rose (*H. rosa-sinensis*), which differs from many other plants that have furnished decorative varieties in that the normal form is of that character to start with. The varieties of this species are somewhat tender, and are, therefore, not suitable for localities within the influence of severe frosts; but the many beautiful single and double varieties of *H. syriacus* thrive in such places; some kinds may be propagated from seed, but the usual method adopted, and which is by far the quicker for flowering purposes, is by cuttings put in during the spring or early summer. So far as our observations go, the plants under cultivation suffer little, if any, from insect or fungus pests, which is a good point in their favour. The following kinds are some which have recently been, or are now, in flower in the Gardens:—

George Harwood, a robust plant, bearing large flowers of a bright pink colour with a dark throat.

General Courtegis is one of the best of the single scarlet varieties, having exceptionally large blooms and large, bright, clean leaves.

Grandiflora has also large blooms, but the texture is not so firm as that of the last-mentioned. There are several other single red varieties, one of which has a dark throat and foliage nicely lobed. The double red variety, with its large blooms well filled to the centre, has made a noble show, as also has the one with double flowers of a creamy colour. Another double variety in the Gardens, with creamy coloured flowers splashed with red, is floriferous, but the blooms, which are small, seldom open well. Several handsome varieties are now flowering with blooms in various shades of pink; one rose-coloured kind with dark throat being

PLATE 21.—HIBISCUS SYRIACUS, LINN. HIBISCUS ROSA-SINENSIS, LINN.

one of the most abundant flowerers of the *rosa-sinensis* type. Among the varieties of *H. syriacus* are single and double whites and a single purple of great beauty. *H. rosa-sinensis var. Cooperi* has variegated foliage which gives it a distinct appearance. Besides forming a handsome plant in the open, it is equally suitable for pot-plant culture, and one often sees fine specimens in pots staged at our horticultural shows. The variety *Coxii* has also nicely variegated foliage, very similar to that of *Cooperi,* but without the more or less pronounced red markings so common in the latter. The variegations are improved in these varieties by frequently pruning, and by the addition of sand and charcoal to the soil in which they are growing.

*H. schizopetalus,* a South African plant of straggling habit, has a curiously formed drooping flower, the edges of the petals being very much cut, and the female organ projecting to a considerable length beyond the petals. It seeds freely.

*H. manihot* is a quick-growing species that furnishes a variety with large yellow flowers of great beauty and harsh deeply-lobed leaves. It seeds freely, and is best treated as an annual.

*H. mutabilis* (the Changing Rose, or, as it is sometimes called, the Rose of Sharon) is a large-growing shrub; the flowers (of which there are single and double varieties) open white, and as the day advances change to shades of pink. To keep it within bounds, pruning soon after the flowering periods should be resorted to—a remark which applies to most of the foregoing.

*H. heterophyllus* (the Native Rosella) and *H. splendens* are indigenous species, forming large tree-like shrubs, and which at times are covered with white and rose-coloured flowers respectively. Among the species forming trees are *H. elatus* (the Cuba Bast), and the indigenous *H. tiliaceus* ("Talwalpin" of the Moreton Bay aborigines); both form handsome shade trees.

## THE FLOWERING OF THE ARROWROOT PLANT.

(*CANNA EDULIS.*)

The accompanying illustration of the arrowroot blossom was unavoidably omitted in the last issue of the journal, when it should have accompanied the article on "The Cultivation and Manufacture of Arrowroot in Queensland."

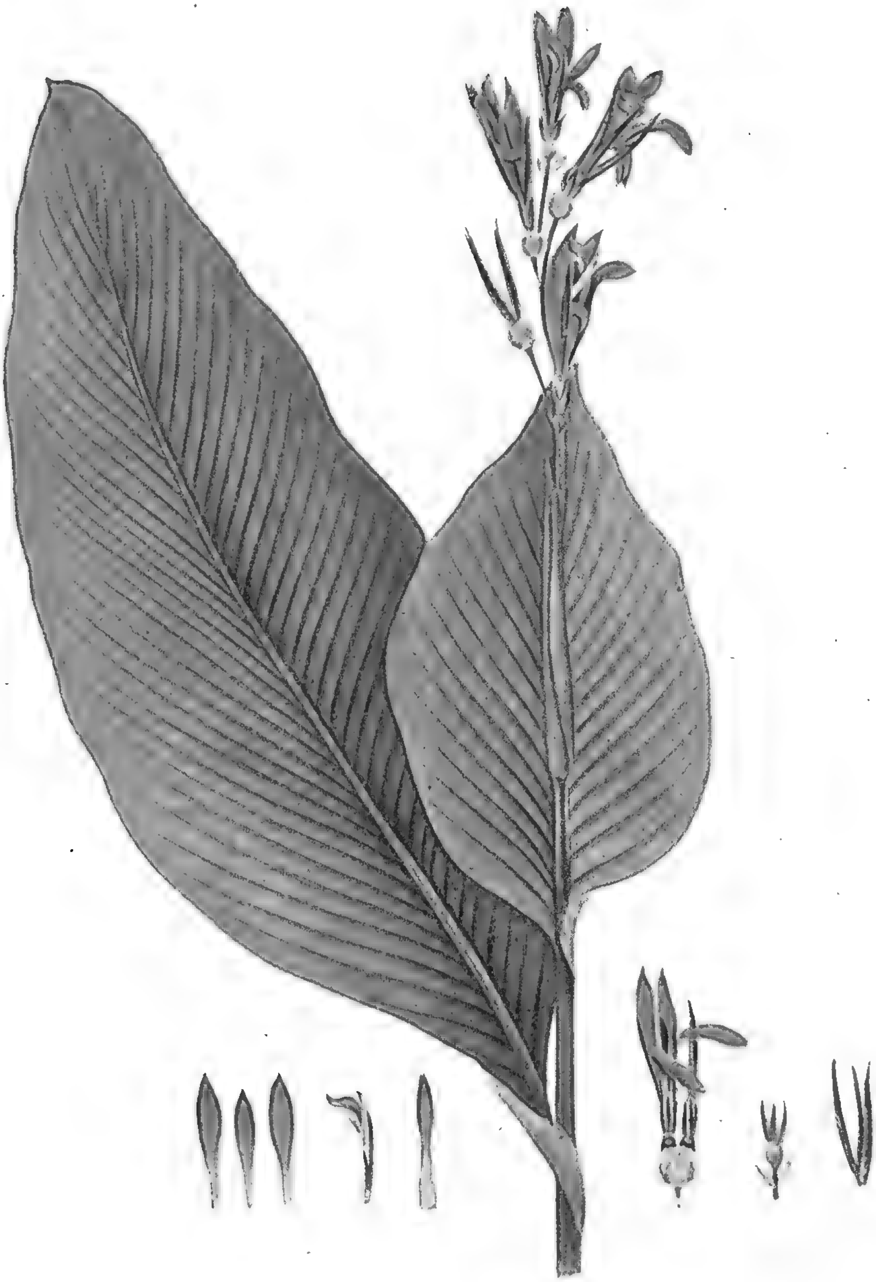


PLATE 22.—FLOWER OF CANNA EDULIS (QUEENSLAND ARROWROOT).
[*See* article *Q.A.J.*, Jan , 1912.]

# Viticulture.

## OBSERVATIONS AND CULTURAL NOTES ON GRAPES—NO. 2.

By CHARLES ROSS, Instructor in Fruit Culture

In my first article I dealt with Alicante, Aramon, Almeria, and Bicane grapes. The leading particulars of the following varieties are here given:—

5. *Black Hamburg* and *Frankenthal* are only mentioned here as being synonymous. This is the grape that everybody has heard of, but that very few consumers really know. It is, however, so well known to growers that it needs no description. The Black Hamburg has a long and interesting history, and it need only be said here that it is essentially a German grape; and is met with everywhere in that country where grapes are grown, under numerous synonyms, the best known being those of "Trollinger" and "Frankenthaler," which of late years have been more adopted in other States and countries. The name "Black Hamburg" owes its origin to the seaport town (Hamburg) from which it was first introduced into England. It is the easiest of all first-class table grapes to cultivate, and the most universal and popular variety known. The celebrated "Hampton Court" vine is of this variety.

6. *Black Monukka.*—This variety was lost at Westbrook three years ago, but I believe is still in existence at Roma. A black, medium-sized, conical-shaped, seedless grape with a very thin skin. The flesh is tender, full of juice and of excellent flavour; still, its texture is so firm, containing not more than one seed, which is more often half-formed and soft, the berry is easily sliced, and on this account it is most suitable for fruit salads. The bunches are large, heavily shouldered, but of regularly tapering form. The vine is a strong grower, of Indian origin, and requires no special cultivation, but succeeds best when pruned on the long-rod system. The hotter the weather, the better the berries seem to set. It is a shy bearer for the first three or four years, but is very fruitful as it becomes aged. Although not a variety to be recommended for general market purposes, it is a decided acquisition to any collection.

7. *Beaune.*—A large, round, amber-coloured, richly flavoured, muscat grape, turning brownish when exposed to the sun. The bunches are large, heavily shouldered, and very compact for a muscat; the skin is tender, and will not stand rain. The bunches should be protected in wet weather, as decay sets in before they ripen. The vine is very robust, and is suitable for trellising. Its bearing habit is regular, but the bunches are not borne in profusion. It is very good in a collection, but not profitable for market on the Darling Downs. The variety is of French origin.

8. *Black Mammoth.*—A large black grape, juicy and briskly flavoured. The bunches are of enormous size, and the berries closely set. Being a late kind, the bunches should be thinned early or they will be spoiled by

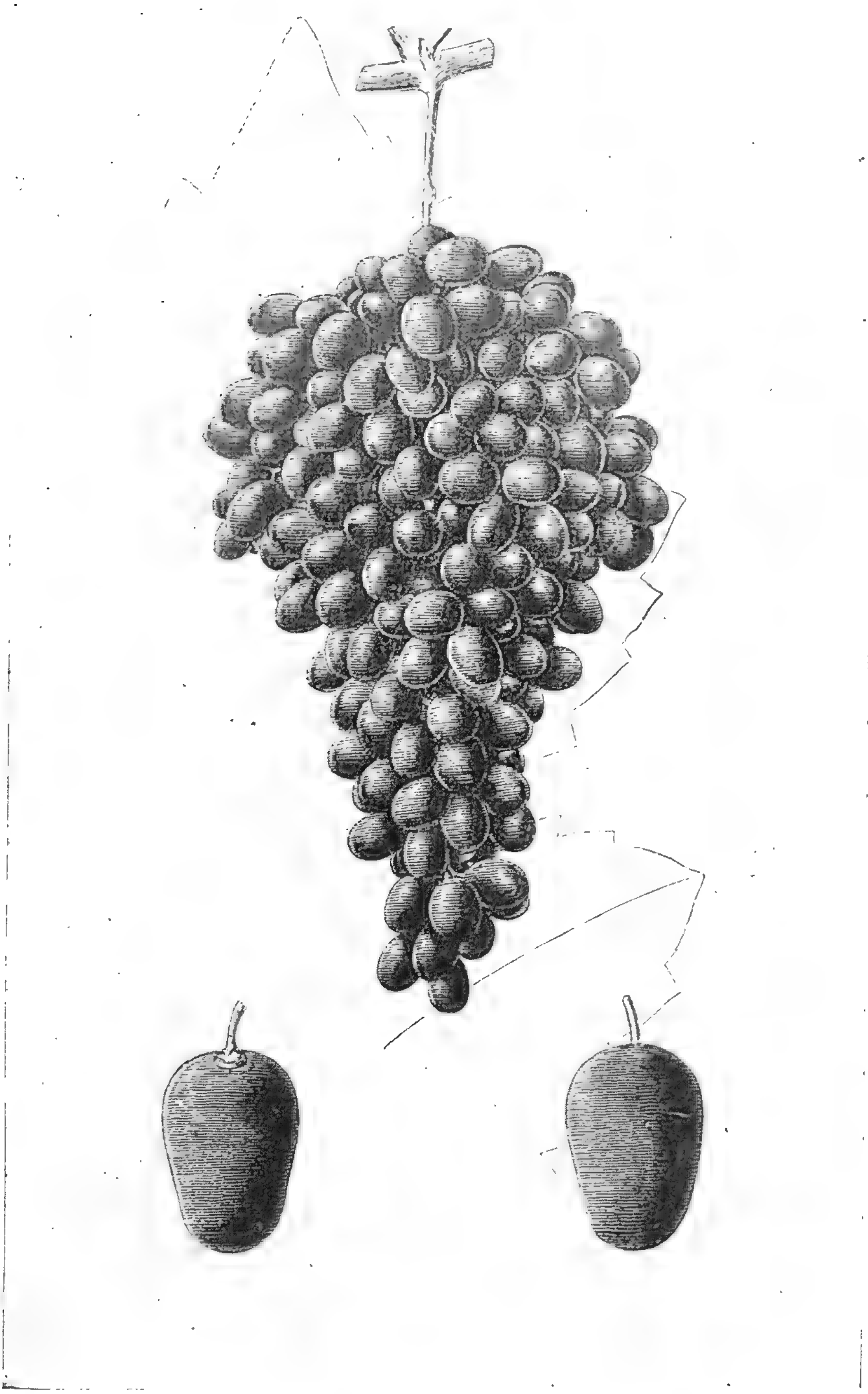


Plate 23.—BLACK MONUKKA. (Bunch, $\frac{1}{3}$; berries, natural size.)

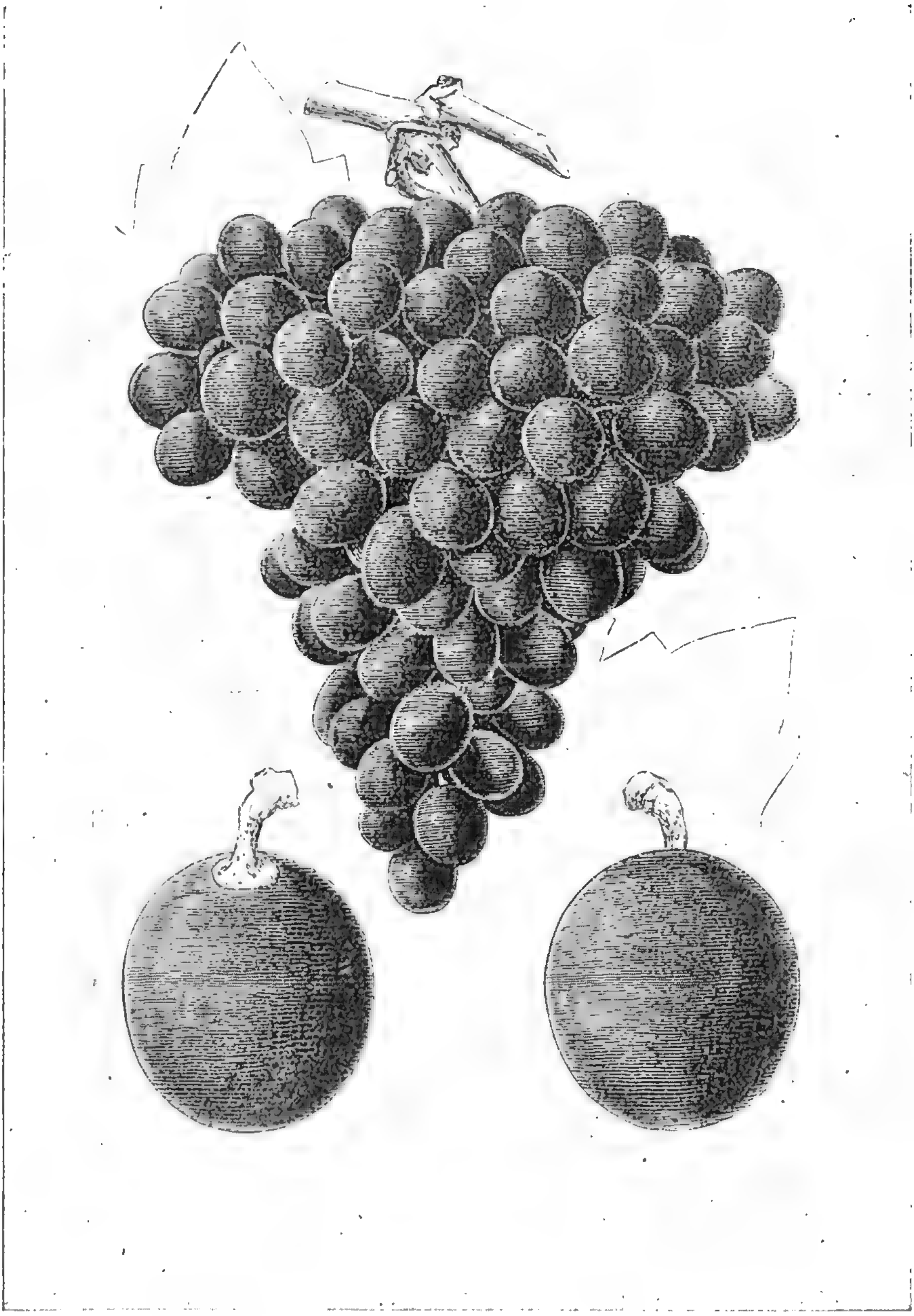


PLATE 24.—ALICANTE. (Bunch, $\frac{1}{3}$; berries, natural size.)

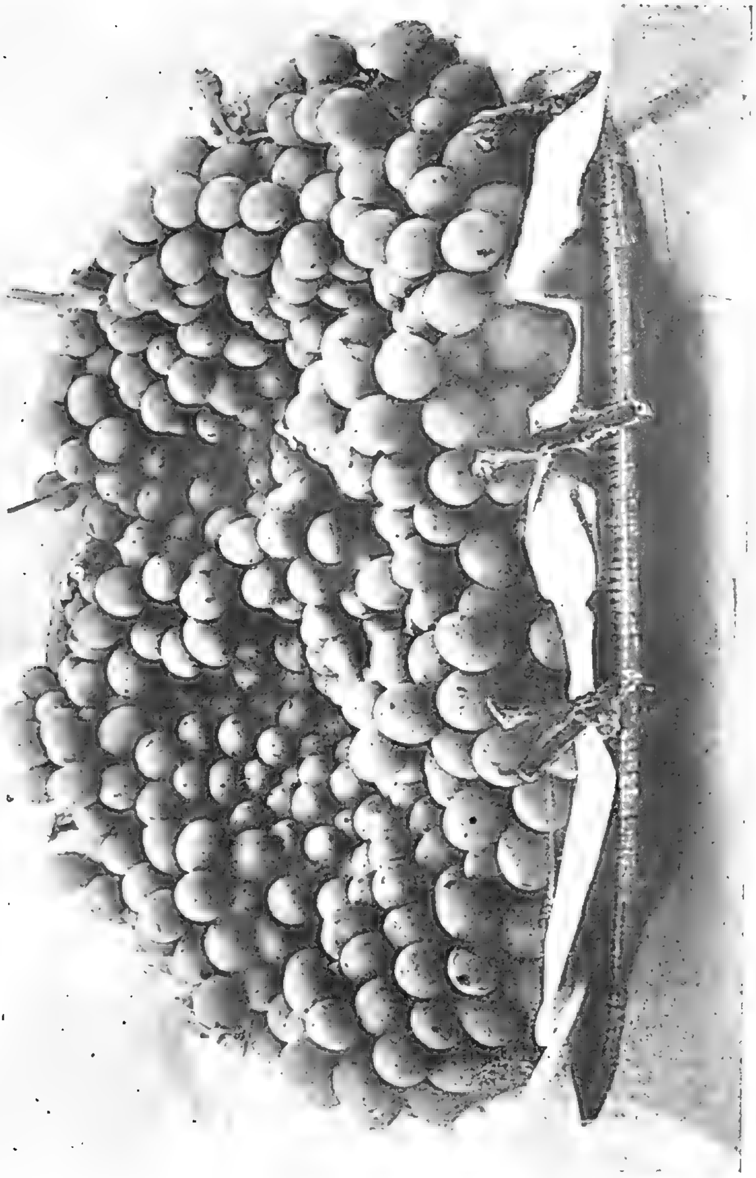


PLATE 25.—BABY BASKET OF ALICANTE GRAPES.

late summer rains. The vine is vigorous and a heavy bearer. This variety is probably an English seedling, and has done well at Westbrook, although February rains usually spoiled the crop; but it is well worth trying in Western and Central Districts.

9. *Canon Hall Muscat.*—A round, white, very large muscat grape of excellent quality. The bunches are fairly large, but require hot weather to set well. The pulp is firm, juicy, and of very rich flavour. This grape is said to be an English seedling raised from "Muscat of Alexandria." The vine is a somewhat gross grower; but the wood, in wet seasons, is often soft and pithy and does not ripen well, causing many spurs to become blank, which is one of the results of an unsatisfactory constitution, as proved at Westbrook.

10. *Chaouch.*—A roundish, early, sweet-water grape with a melting flesh, juicy and pleasant. The skin is very thin and transparent, and should be protected from heavy rains. The bunches are of medium size, and the berries large. In cold districts it has the reputation of not setting well, but at Westbrook it sets freely—in fact, the bunches are more often tight than loose, and to obtain the best results thinning was found necessary. This variety was first introduced to Britain from Turkey or the near East. The vine has a strong and robust constitution, producing very long-jointed canes with large woolly leaves. The internodes of the canes often attain the length of 18 in.—*i.e.*, from bud to bud; and for this reason it is more suitable for a perpendicular than for an overhead trellis. The habit of growth and appearance are so distinct from those of any other variety that a different method of training must be adopted, and very strict attention paid to tying-in the shoots, as the attachment to the spur is so slender that the weight of the leaves and shoot alone will often break them down independent of the effect of wind. It is, however, an easily grown grape and a good bearer.

[TO BE CONTINUED.]

PLATE 26.—ARAMON.

# Tropical Industries.

## CULTIVATION OF THE DATE PALM.

[CONTINUED.]

BY A. J. BOYD.

In the September issue of the journal last year, we gave an account of the method adopted in Egypt by the natives for the cultivation and subsequent treatment of the date palm up to the time when the blossoms have been artificially fertilised, the information having been derived from a paper read by Mr. T. Morris Macknight, F.L.S., read in 1894 before the members of the Natural History Society of Queensland. To this day, as the writer has himself seen, the same methods are adopted as in the past in Egypt. With regard to fertilisation artificially, it seems as if no such necessity exists in this State. My reason for this belief is that, at Helidon, near Toowoomba, Mr. Henry L. Pentecost was very successful in producing heavy crops of dates in 1901 from trees raised from the seed of dates purchased in a shop in Toowoomba. When they first bore, they were 15 years old, and the fertilisation occurred naturally, probably by the agency of bees and other insects. On one of the trees shown in the illustration (*Q.A.J.*, Jan., 1912, Plate 2), there were eight fine bunches, and two other trees bare similar crops. The bunch here depicted weighed, as did the others, 36 lb. The first was of large size, as may be seen in the illustration, which shows the natural size of the dates.

Again, when I was at Barcaldine with Mr. Stead, junr. ("Review of Reviews"), in 1908, I visited a grazing farm belonging to a Mr. Kirby, of Fairview Farm, who had a large area under cultivation, and in the orchard were some very fine date trees, in full bearing. The dates were perfect marvels for size and flavour. These trees bore heavily at 6 to 7 years after planting, and none had been artificially fecundated. From what I saw here and at Longreach, as well as at Emerald, I came to the conclusion that the whole of this portion of Queensland is eminently suited for date-growing, and it would be a very simple thing for young farmers to put in a few hundred date trees, which would require no attention beyond guarding against bush fires and irrigating automatically by bore drains. In 6 years' time the abundant fruit would find a good market anywhere in the State, and would increase in fecundity during the succeeding 25 years, and continue bearing for a further 150 years, thus constituting a valuable legacy from generation to generation.

On Mr. Cronin's farm—once known as the "Hit-or-Miss" Farm—near Barcaldine, there are many date trees, which, at the time of my visit, were laden with fine fruit. These trees bore in 7 years. They had received no attention, and had been naturally pollinated by insects. No use was, however, made of the fruit.

In the town of Barcaldine, where there are many beautiful gardens, all irrigated by the delicious sweet bore water, there are some splendid date trees, notably in the garden belonging to Dr. Cook, then the only medical man in Barcaldine. These trees had a magnificent show of great bunches of fruit, apparently weighing over 50 lb. each. The bunches hung within about 3 ft. of the ground, and could thus easily be gathered. Other gardens in the town and district contain equally fine date trees.

Here we have incontestable proof that the above and many similar portions of this State are specially adapted by all conditions of climate, soil, as well as of cloud moisture and underground water, for the profitable production of a perfect fruit which has, practically, the world for a market, although Queensland would, for many years, find a profitable market within the Commonwealth and New Zealand, to be followed by Fiji, Hawaii, and the United States of America. With, say, 500 trees to an acre, bearing fruit worth, on an average, in Australia, from 8s. to 10s. per tree, possibly far more (seeing that, as we have already shown, individual trees in Egypt yield as much as £2 for a single crop), the annual crop would be worth from £200 to £250, no labour being required beyond picking and drying on mats in the sun. Is such an industry not worth entering upon? There is another advantage in growing date trees, and that is, that, as the young trees cast no dense shade, the land devoted to them can be utilised for growing any other annual crop for which the soil and climate are suitable—melons, for instance. I saw watermelons at Emerald weighing 24 lb. Then cotton would be a suitable catch crop, as also peanuts and many others, which could all be grown by the aid of the bore water, which in the Barcaldine district is of the very best quality for all purposes.

The temperature of the country suitable for the cultivation of the *best* dates—that is, of the regions to the west of Hughenden, Longreach, and Charleville, and from latitude 23 degrees S. to the Southern border of the State—as compared with the temperature of Biskra, was shown in the first part of this paper. This information, as far as Queensland is concerned, was obtained from the Meteorological Reports, which were only available, when Mr. Macknight wrote, from 1st September, 1893, to 31st August, 1894. The winter of the latter year was considered a very cold one throughout the State, and, as the date palm can stand a temperature as low as 26 degrees Fahr., it should be safe, even at Boulia, from being killed by frost. The latitude 20 degrees S. to 29 degrees S. also indicates generally the area in which the suitable temperature is to be met with.

RAINFALL.—In the above possible date-growing belt of Queensland, the rainfall ranges from 5 in. to 24 in., and in the more westerly portion this reaches the minor limit, therefore *improving the quality of the date* on account of the greater dryness of the air, combined with the circumstance that there is greater heat also.

ALTITUDE.—Looking generally at Western Queensland, the rivers and creeks all run to the South-west, showing that the higher ground is to the North and East. Then there are high downs between the Gulf of Carpentaria waters and the Diamantina and Thomson Rivers; so that all this higher ground must vary from 600 to 1,400 feet above sea-level; but to the south-west of Boulia and Windorah, and to the south of Thargomindah and Charleville, the altitude of the country is from sea-level to 600 feet. From these figures it can easily be seen where there is the least likelihood of frost.

SOIL.—The geological formation in the region indicated is Mesozoic, with Desert Sandstone on the higher ground between the various watersheds, and Lower Cretaceous in the plains and downs. As, apparently, the date palm prefers a sandy soil, the conditions in this case seem favourable also.

## VARIETIES OF DATE PALMS.

According to the best botanical authorities, there are in Fezzan 46 varieties. In Northern Arabia there are more than 100 different kinds, each of which is peculiar to a district, has it own special virtues. Many varieties of dates exist, differing in shape, size, and colour of the fruit. Those of Gomera are large, and contain no seed. The Zadie variety produces the heaviest crops, averaging, in full bearing trees, 300 lb. per tree. The "Deglet Nour" is considered the best for keeping.

## TREATMENT OF FRUITS.

Four or five months after the operation of fecundation has been performed, the dates begin to swell; and when they have attained nearly their full size (about the beginning of August, in Egypt), they are carefully tied to the base of the leaves to prevent them from being beaten and bruised by the wind. If meant to be preserved, they are gathered a little before they are ripe, but when they are intended to be eaten fresh they are allowed to ripen perfectly, in which state they are very agreeable and refreshing. Ripe dates cannot be kept for any length of time, or conveyed to any great distance, without fermenting and becoming acid, and, therefore, those which are intended for storing up or for being carried to a distant market are dried in the sun on mats. They are sent in this way from the Levant and Barbary. Each tree is capable of producing only a certain number of good fruit, and on adult trees not more than 12 bunches are left to ripen. The whole cluster of fruit is cut before it is quite ripe, when it is put into a basket made for the purpose, having no other opening than a hole through which the branching extremity or stalk of the cluster projects. In this situation the dates ripen successively.

In the Hedjaz (which is the northern half of Arabia), the new fruit, called *ruteb,* comes in at the end of June, and lasts two months. The people cannot, therefore, depend on the new fruit alone, but, during the ten months of the year when no ripe dates can be procured, principally subsist on date paste, called "*adjoue,*" which is prepared by pressing the fruit, when fully matured, into large baskets.

"When the dates are allowed to remain on the tree until they are quite ripe, and have become soft and of a high red colour," says Burckhardt, "they are formed into a hard solid paste or cake called *adjoue,* obtained, as above stated, by forcibly pressing the ripe dates into baskets containing about 2 cwt. each. In this state the Bedouin export the *adjoue,* and in the market it is cut out of the basket and sold by the pound. During the monsoon, ships from the Persian Gulf bring *adjoue* from the Bussorah to Djidda for sale in small baskets weighing about 10 lb. each; this kind is preferred to every other.

The date seeds, or kernels, are soaked for two days in water, when they become softened and are given to camels, cows, and sheep instead of barley. There are shops in Medina, in Arabia, where nothing else is sold except date kernels, and the beggars are continually employed in all the main streets in picking up those that are thrown away.

The best fruit is that which is gathered just before it is ripe, and is exposed to the sun for several days to mature. The crushed dates exported to England in bulk are inferior and damaged, having ripened on the trees and fallen.

Mr. Macknight, to whose paper on "The Date Palm for Queensland" we are indebted for most of the information here given, goes on to say:—

"I have seen some beautiful dates in London on the stalks. These, in the same way as raisins, have the short pedicels left on them. Then, again, I have seen in Port Said, dates prepared somewhat as we often see them in shops in Brisbane, sold very cheaply, being, I suppose, the refuse of the date groves pressed into a paste or soft mass. This is sold by weight in chunks. In Egypt the dates of Upper Egypt and the oases are those which are the most delicate. The hotter and drier the climate, the richer is the date; and near the coast, the poor fruit is fit only for animals, as mentioned in French Colonies, by Bonwick, 1886.

"From the above data, it will be seen that Western Queensland is generally suited to the cultivation of the best dates. As to the local conditions, they must be ascertained by intending growers themselves, the object of this paper being mainly to give the State the information with regard to the date which is scattered throughout many books, and is not easily obtained, and also to suggest the best places for initiating experiments in date cultivation in this country."

---

## SELECTION OF CANE PLANTS.

By A. J. GIBSON, Ph.D., M.A.,
General Superintendent, Bureau of Sugar Experiment Stations.

It is very important that particular attention be paid to this branch of cane-growing. The highest aim of every canegrower should be to obtain the greatest yield of cane with as large a sugar content as possible.

It must be borne in mind that all varieties of cane are more or less susceptible to deterioration, and the rapidity with which this takes place is dependent to a large extent upon the measures adopted by growers for the prevention of same.

Just as continuous inbreeding of animals leads to the production of a weakly offspring, so, in the growth of cane, the same principle applies if similar measures are adopted.

The question becomes largely one of how the virility of the cane plant is to be maintained and rapid degeneracy avoided.

Much valuable work has been done in other countries in connection with this study, which has led to the establishment of fundamental principles to be observed in successful cane culture in all parts of the world.

There is an enormous number of varieties of cane, which may be classified as those indigenous to different countries and those raised from seed (so-called "seedling canes"). Up to the present, the indigenous canes seem to give the best results in Queensland. A vast number of canes have been produced from seed, but so far have not proved very successful. Nevertheless, this work is only in its infancy, and we may yet be as successful in obtaining varieties of good commercial value as they have been in other countries. Sugar-canes may be further classified according to their peculiarities in the following manner:—

## SUGAR CONTENTS.

Some canes are much richer in sugar than others; and in choosing canes for planting the low sugar producers are to be discarded as much as possible.

## MATURING PROPERTIES.

Some varieties of cane mature early in the season, whilst others do not ripen until well into the season. The canes known as Cheribon, Otamite, and Malabar belong to the latter class. These canes are very hardy, and grow well, but, if too large a percentage of them is grown, it means that the factory has to commence operations with immature cane. For this reason, their growth is restricted in a number of sugar centres. The varieties known as Rappoe, Striped Singapore, Gorus, Badila, B208, Malagache, D1135, B147, and others are early ripening canes. A peculiarity of some canes when ripe is to arrow (or flower). Climatic influences play an important part in connection with this matter. Whilst some canes rarely arrow, others do so frequently. Further, in some seasons, arrowing is more noticeable than in others. Latitude also influences arrowing, being more frequent in warmer than in colder climes. This property of arrowing has made it possible for numbers of varieties of cane to be raised from seed. Arrowing denotes maturity; it is not always considered a desirable thing by growers and manufacturers, for the reason that early arrowing means loss of weight and sugar content of the cane towards the end of the season.

The variety known as Badila very rarely flowers, whilst the Gorus, Malagache, and D1135 particularly arrow freely, more especially in the tropical zone.

## GERMINATING AND RATOONING PROPERTIES.

A very essential feature is to obtain a good strike, so that there are few failures of plants to germinate and the crop grows evenly. It is a frequent occurrence to see numbers of bare spaces in fields, and this is often due to the use of faulty plants in the first place. It is not advisable

PLATE 27.—CANE GROWN NEAR GOODWOOD. (Two men cut 82 tons per week, earning £1 per day per man throughout the season.)

to use matured cane for plants, nor should hard fibrous stubble be selected for the same purpose. The top portion of the cane is considered the best for plants; but, as it is not practicable—and more especially outside of the harvesting period—to waste the other portion of the cane, care should be exercised to get the best available plants, which are not too rich in sugar and free from all disease. The quick germinating cane is generally favoured, owing to the fact that the crop requires less labour and expense to produce it.

The ratooning properties of cane must also be taken into consideration. After the matured crop has been harvested, the stool throws forth fresh shoots. Certain canes respond quicker than others, and are much favoured on that account. On the other hand, some canes if cut too early in the year do not ratoon well; others show a tendency to become spindly and fibrous in the ratoons. It is well, therefore, to know something of the properties of canes before planting any one variety too extensively. The farmer should ever be on the alert to obtain the very best varieties of cane, and not pin his faith too much to any one particular kind. The soil, like human beings, needs a change occasionally; and whilst one variety of cane grown continuously on the same soil may not do well, other varieties thrive, and thus save the farmer great losses.

This point cannot be too strongly emphasised, and the successful farmer must be watchful and observant to detect the first signs of deterioration setting in, and make preparations accordingly. The introduction of canes, even of the same variety, from other localities of different soil, will serve a good purpose. A change of plant, from virgin scrub to forest, and *vice versâ*, does a great deal of good and serves to preserve, in a great measure, the stamina of the cane plant.

## CLIMATIC INFLUENCES AND SOIL.

The cane plant is a surface rooter, and requires good soil to nourish it. In previous articles this matter has been dealt with. Both features have a marked bearing upon the variety of cane. It is not an uncommon occurrence to note that canes develop different characteristics in varying latitudes. Further, one cane may thrive well in certain districts, whilst only partial success is obtained in others. Most noticeable in this respect are the New Guinea canes, which thrive well in North Queensland and only partially so in Southern Queensland, due entirely to the different climatic conditions. Further, canes are selected for their drought and frost-resisting capacities. In Southern districts, in particular, care must be exercised in this direction. The D1135 cane seems a most suitable cane to meet these requirements. However, care should be exercised in the choice of the plants of this variety. Unhealthy plants may be detected by a discolouration of the foliage and punctures in the eyes or on the internodes; further, on cutting the cane for plants, if the sets on exposure for a few minutes show any traces of discolouration, or exude a yellow gummy substance, such sets should on no account be planted.

## SUSCEPTIBILITY TO ATTACKS OF INSECT PESTS AND DISEASES.

The constitution of the cane plant must also be taken into consideration. Some varieties are of delicate constitution, and develop disease quicker than others. The gumming disease is prevalent amongst some canes, and care should be taken to see that only plants free from this disease are used. Canes grown upon wet and badly drained lands are most liable to gumming.

## SUMMARY.

To summarise, the main and chief points to be observed in cane-planting are as follows:—

Careful selection of healthy varieties of cane of approved qualities, containing sound eyes. Frequent changes of canes from soils of different types. It is preferable to obtain cane grown on new lands, and to discard the practice of obtaining plants grown continuously on one's own field or upon soil similar to that of the home farm. In the choice of cane, to pay particular attention to general habits of cane with regard to lodging or erect habits, striking and ratooning properties, drought and frost-resisting qualities, arrowing, &c.

To use diseased plants means extra labour and expense, liability to contaminate other healthy canes on the farm, the result being loss and failure to the farmer.

The Mackay Sugar Experiment Station is engaged largely in raising new varieties of cane and testing them for their commercial value; and approved varieties are distributed annually, free of charge, to *bonâ fide* cane-growers.

The following is a list of approved canes:—New Guineas, Nos. 8A, 15 (Badila), 24, 24A, 24B (Gorus), 26, 40, 47, 48, 54; Barbados Seedlings, Nos. 147, 208; Hambledons, 5, 10, 114, D1135. Mauritius Malagache; and 1900 Seedling. In addition, some of the older standard varieties, such as Rappoe and Striped Singapore, are grown when healthy plants can be obtained. Others are now under observation, and the results will be made known when available.

---

## FIBRE-EXTRACTING MACHINERY.

### BOCKEN'S NEW CORONA AND RASPADORS.

We have had lately some inquiry as to the best kind of machine for the extraction of sisal fibre. There are a few plantations in Queensland on which the first crop will, ere long, be ready for harvesting. On none of them, however, is the area planted sufficient to justify the installation of such expensive machinery as that on Mr. T. H. Wells's plantation, Farnbro', Childers. For large plantations from 200 to 500 acres, a large automatic machine is necessary. There are several such on the market, which we have described and illustrated in previous issues of the journal; whilst amongst those described in "The Sisal Hemp Industry in Queensland," a pamphlet issued by the Department of Agriculture and Stock, although mention was made of a machine made by F. Krupp, Grusonwerk, Magdeburg-Buckau, Germany, no particulars could be given concerning it.

We have now received from the agents in Sydney (Messrs. Noyes Bros.) an illustrated catalogue of "Fibre Extracting and Treating Machines" (Bocken's "New Corona" and others).

It is there stated that "in July, 1911, in connection with the Fibre Congress, which was held in Soerabaya (Java), various decorticating

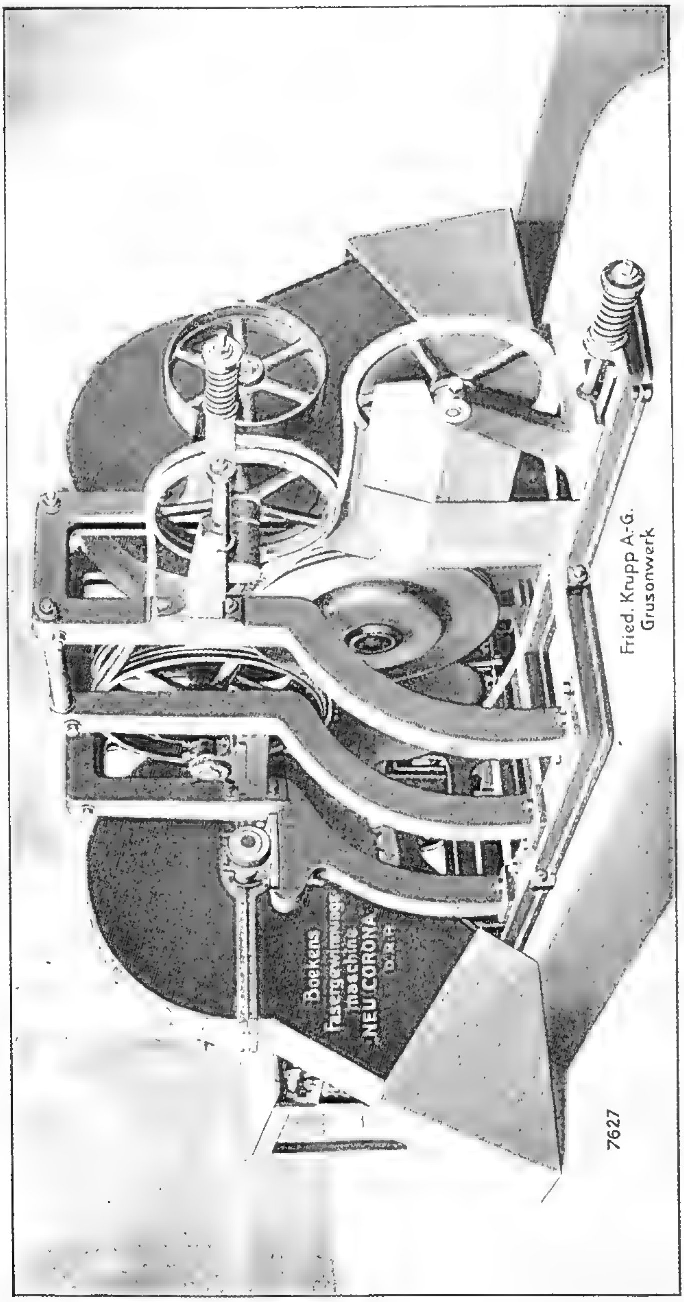



PLATE 28.—NEW CORONA FIBRE-EXTRACTING MACHINE, IN WORKING POSITION.

machines were thoroughly tested, and the 'New Corona Machine' worked so well that the jury of judges gave to that machine the highest possible testimonial by means of a 'certificate of honour for excellent construction, output, and quality of the material produced.' No other certificate of this kind was awarded there for decorticating machinery."

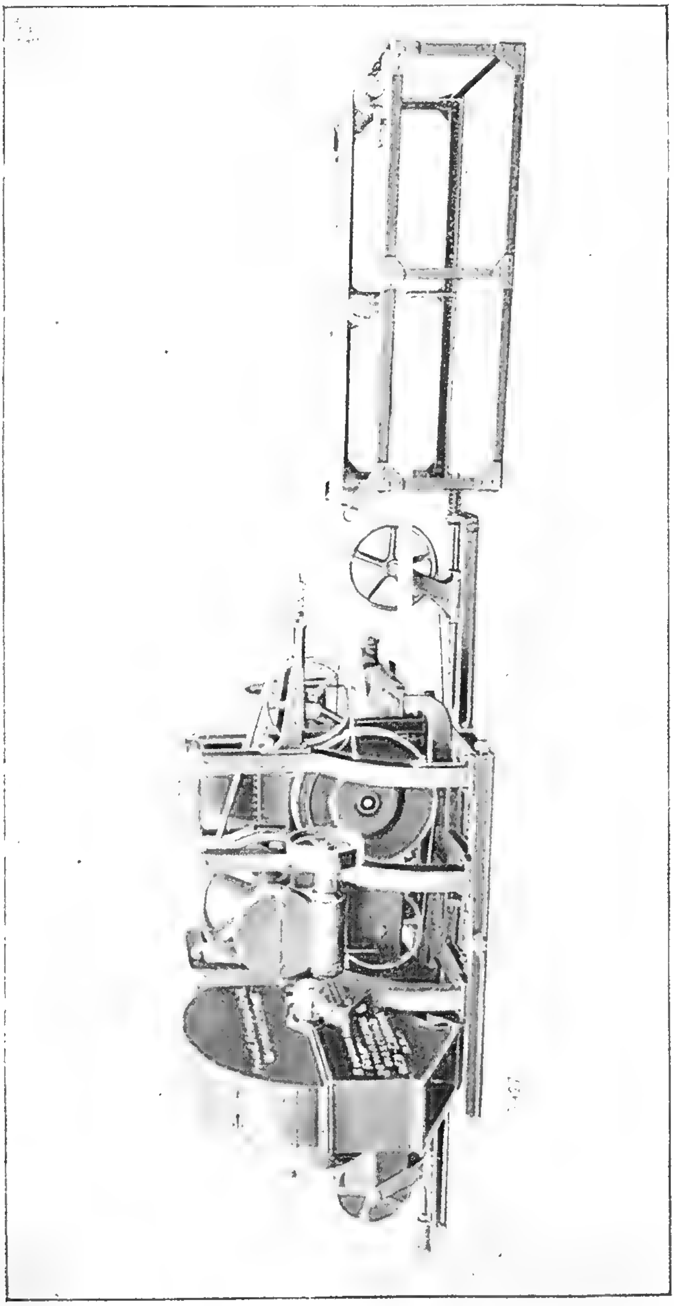


Plate 29.—New Corona Fibre-extracting Machine, with Band Conveyors.

This machine also received a gold medal at the exhibition held in Allahabad (India) in January, 1911, when it competed in operation with fibre-extracting machines exhibited by other firms in the presence of a number of experts. Bocken's "New Corona" is claimed to be adapted for the treatment of Agaves, Sansivieria, and Fourcroya.

The power to drive the No. 1 machine is about 30-h.p., while the No. 2 machine requires 40-h.p. The machines are capable of working up from 100,000 to 150,000 leaves per day of 10 hours; and the loss of fibre, usually from 15 to 20 per cent. in other machines, is said to be very much less in the "New Corona." The system is completely automatic, as the leaves, on leaving the conveyor, are carried first through one beater and pass on to a second beater, whence the completely extracted fibre is discharged at the rear end of the machine, the pulpy matter dropping into trucks below the beater drums.

## RASPADORS.

The firm also manufacture the so-called "Raspadors," smaller machines, in which the work is not done automatically; but the leaves are held by hand, first one-half of the leaf being denuded of pulp, after which the leaf is reversed, and the other half treated in the machine in the same way. These Raspadors are fitted with one or two beating cylinders, and are described as "Single" and "Double Raspadors."

The single machine will treat 4,000 leaves in a day of ten hours, yielding from 250 to 300 lb. of fibre in that time. The double Raspador will treat from 7,000 to 8,000 leaves in ten hours, equal to from 500 to 600 lb. of clean fibre, and requires about 6-h.p. to drive it.

The yield of fibre should be about 4 per cent. of the weight of leaves, so that, theoretically, 4,000 leaves, 2 lb. weight each, should yield 320 lb. of fibre; but allowance must be made for inevitable loss in the shape of tow. This, in most machines, amounts to about 15 per cent. of the fibre, thus reducing the actual amount of marketable fibre to 272 lb.

The tow, however, does not represent a total loss, as it is readily saleable at prices varying, according to the market and the grade of the tow, from £6 to even £20 per ton.

The single Raspador has a beating drum 43¼ in. in diameter and 11¾ in. wide, weighs 25 cwt., requires a 3-h.p. engine and two attendants—one to handle the leaves, the other to remove, wash, and hang up the fibre on the drying-ground. The price amounts to from £81 10s. to £91 10s. Such a machine is adapted for small plantations up to 200 acres.

The "New Corona," on the other hand, treating 150,000 leaves daily, is intended for larger plantations, and is more costly, the prices ranging from £709 to £818, and requires 30 to 40 h.p.

The latter machine is highly spoken of by a planter in British East Africa, who considers it the best machine extant; and he stated that with it he had decorticated over 2 tons of good fibre in 8½ hours with native labour.

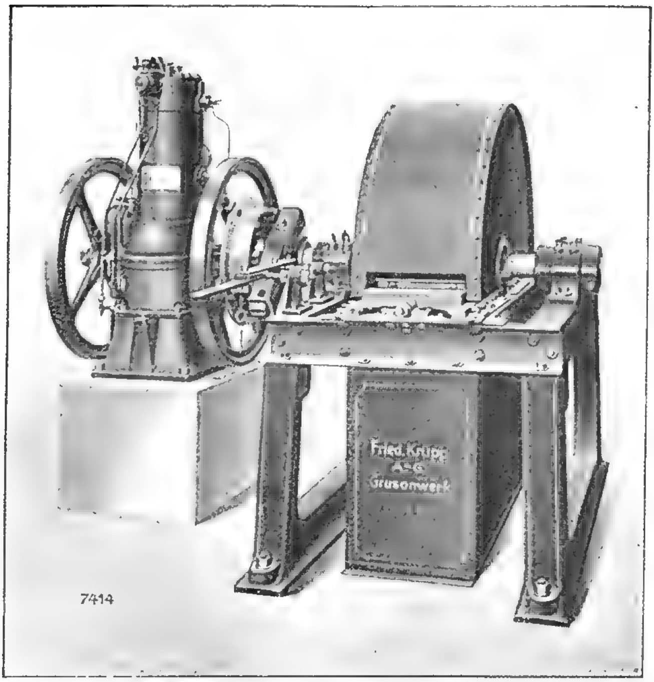



PLATE 30.—SINGLE RASPADOR COUPLED TO MOTOR.

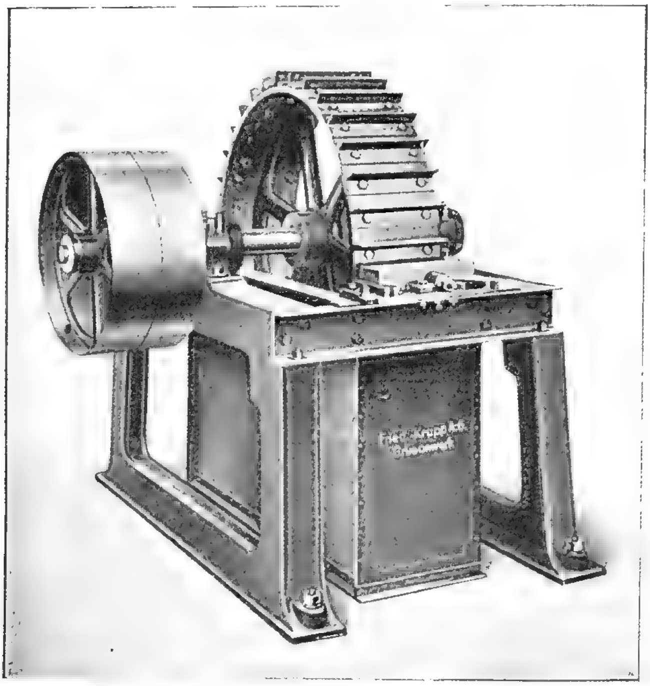


PLATE 31.—SINGLE RASPADOR, BELT-DRIVEN.

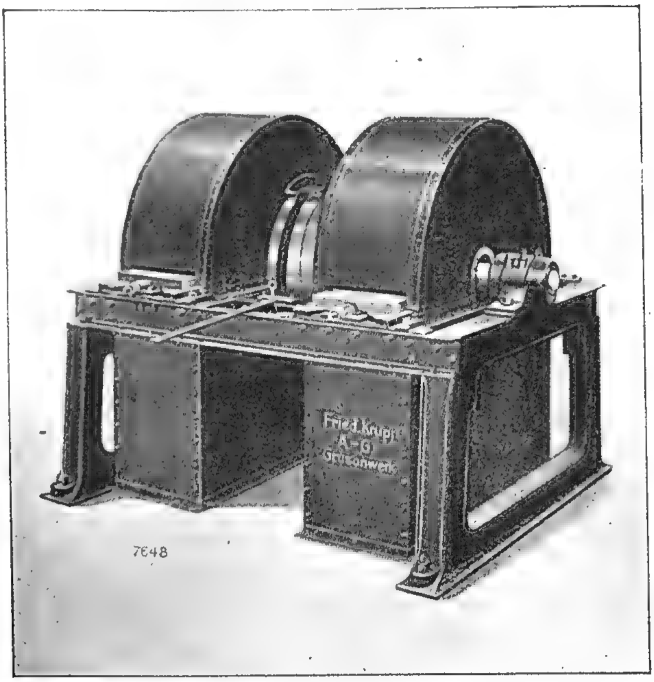



PLATE 32.—DOUBLE RASPADOR.

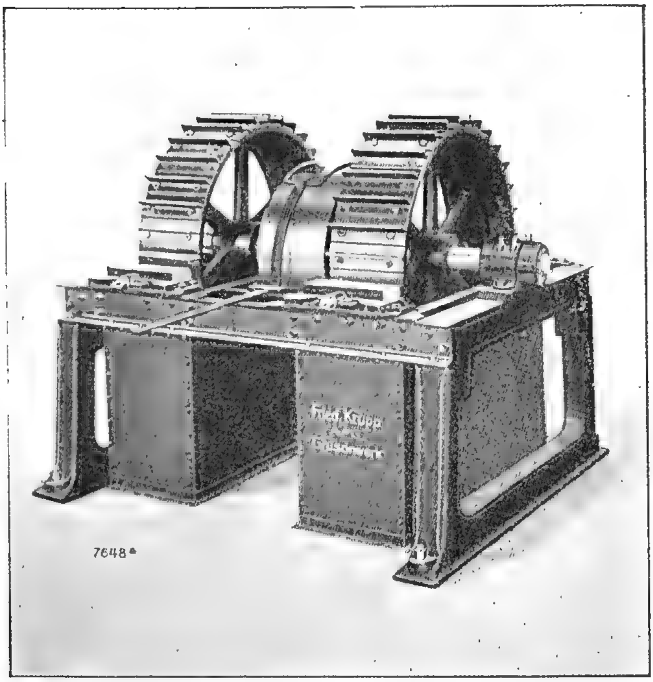



PLATE 33.—DOUBLE RASPADOR, THE HOODS BEING REMOVED.

## CULTIVATION OF THE PAPAW.

BY C. E. WOOD, Manager, Kamerunga State Nursery, Cairns.

In the November issue of the journal, Mr. Steele, writing on the papaw, expresses a hope that others will write on the cultivation of this useful fruit.

Owing to the ease with which the papaw could be produced in the North, very few ever thought it necessary to do more than stick a plant or seed in the ground, feeling certain that in a few months they would have fruit, provided the tree did not turn out to be a "male," and, as a result of this method, papaw trees could be seen growing almost anywhere, but, unless the seed had fallen on naturally rich soil, the resultant crop was of poor quality; and where, a few years ago, the papaw could be seen growing "wild," to-day it has either disappeared or is represented by a lanky stem with two or three poor little fruit and a small tuft of small leaves on top. The papaw, like any other fruit, needs cultivation and attention, if the best results are to be obtained.

When planted on new scrub land, in holes 18 in. in diameter by 18 in. deep, little beyond keeping the ground clean is necessary for the first year or two, provided there is good drainage. If this is lacking, the soft roots will rot and the tree fall.

The soil I have found best suited to the papaw is a light sandy loam, but it will do well on a variety of soils, provided the drainage is good and the ground kept worked.

### SEED BED.

Seed can be set in a box or bed—perhaps the latter is best, as, when planted in a box, a good many growers are apt to overwater, thus either causing the seed to rot without germinating or killing the young plant when it is up. If the seedlings come up too close together, either thin out or, better still, transplant to another bed, setting them about 6 in. apart; the slight check thus received to the plant results in a sturdier growth.

Papaw plants do not carry well, and I should always advise growing from seed.

Here, in the North, seed can be raised during most of the year, though I would omit May, June, July, and most of August, as germination during these months is generally slow. Seed set during the last week in August, and seedlings transplanted as before mentioned, will give good young plants for putting out in December; these plants, if well cared for, will give fruit the following October. On the other hand, seed set at the end of March or beginning of April will give good plants for putting out in the early part of September. These plants, if watered during the succeeding more or less dry months, will yield good fruit during the following September, October, and November—the months when the papaw is at its best as regards flavour.

In planting out, a protected situation should be chosen, as the tree, being brittle, is easily broken by high wind. There does not appear, at present, to be any inducement to grow the papaw on a large scale for

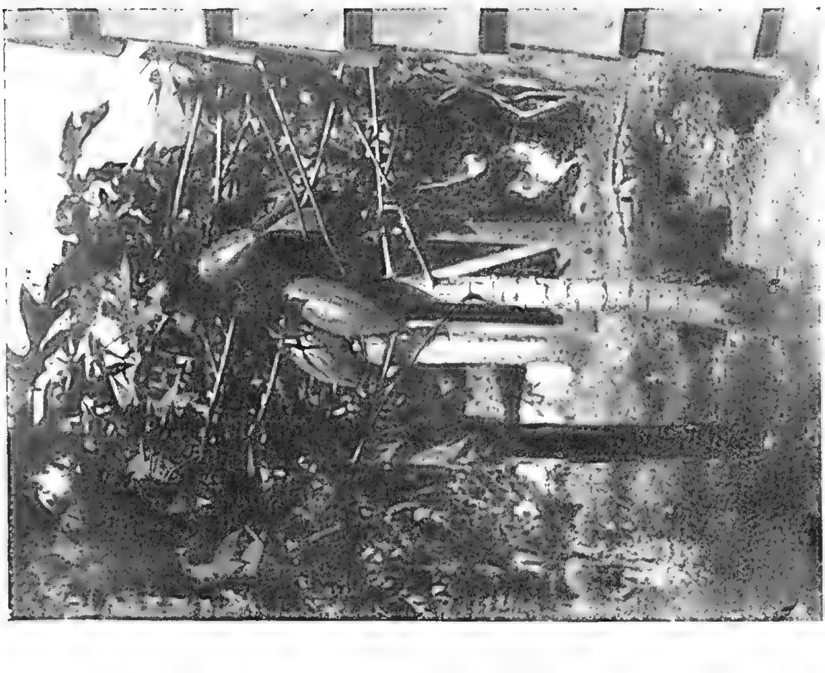


PLATE 34.—LONG PAPAW AT KAMERUNGA STATE NURSERY.

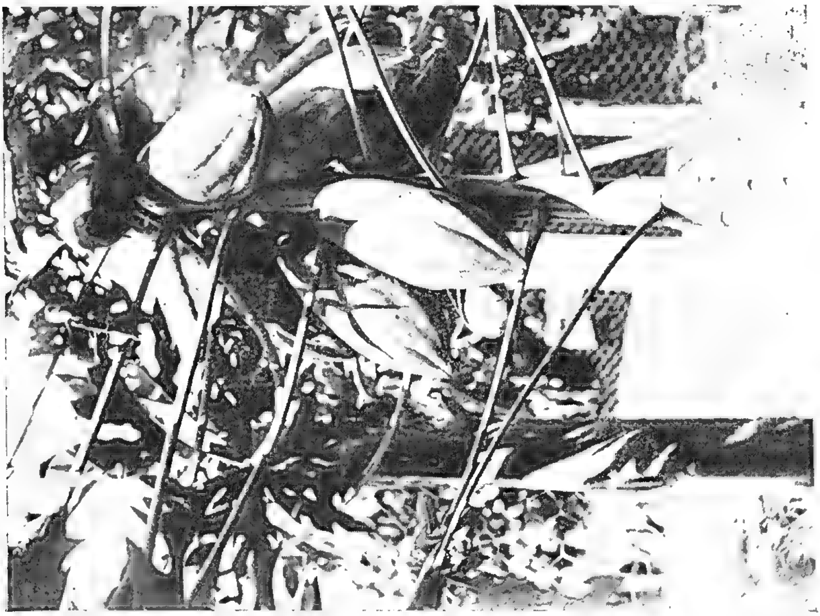


PLATE 35.—LONG PAPAW TYPE, GROWN AT KAMERUNGA STATE NURSERY.

export, but it would be easy for those growing for the local market or for private use to choose a good sheltered spot, and, by attention to manuring, cultivating, and watering when necessary, to produce fruit of good size and delicious flavour.

With regard to the best variety of papaw to grow, I am unable to give the country of origin; but the ones known here as Long Papaw and New Era have proved the best in the North, both for size and flavour if grown under proper conditions, also they appear to carry better. I believe both of these have originated from the one stock, the Long Papaw being the true type, whilst the various shapes met with in the New Era are the result of hybridisation with what is known as the common or round papaw. In 1901 I heard of a new papaw growing in Geraldton (Innisfail) far superior to the common papaw. On inquiry, I found the original tree had been growing at Mr. Jodrell's farm. I managed to procure some seed from a long-shaped fruit, which I planted in September, and later I planted out thirty young trees. When these fruited, I found all bore fruit (the male and female flower being on the same tree), with the exception of two, which turned out to be male trees, and were promptly destroyed. There were five distinct shaped fruits, but the long appeared to be the only one true to type; and, after two years of selection from the best long fruit, I began to distribute seed, but it took some years before all the seed came true to type, and I am sorry to say that all my best selected trees were carried away during the floods last April, thus, in great part, doing away with the careful work of selection during ten years. There is, however, one fault with the Long Papaw. Owing to its shape, the point generally stands out some way from the stem, and, the sun finding its way through the incisions in the leaves, a portion near the tip begins to colour considerably in advance of the rest of the fruit; so that, just when the whole fruit is ready for eating, the early coloured portion is apt to be over-ripe. This premature colouring, can, however, be avoided or minimised by choice of situation when planting. I might mention that in testing a papaw for flavour always select the lower half, as I have invariably found the flavour superior to that of the upper or stalk half. With regard to feeding papaws with a solution of sugar and drops of tincture of iron, as recently mentioned in the Journal, I will say nothing. If fruit of good size and flavour are required, well-prepared soil, mulching, watering when necessary, and a good application of farmyard manure, or even nightsoil, put in a trench about 12 in. deep at a distance of 3 to 5 ft. from the stem, will give the required results. I have found nightsoil most effective. Some mention has been made with regard to topping the tree. Personally, when growing my special trees, I invariably topped, but not for the reason generally put forward—viz., that of getting a branched tree. As I was growing trees for special selection of seed, I did not wish to run risks of losing them, so I pinched off the terminal bud when about 18 in. high; if more than one shoot came later, I took them off, keeping the one going straight up. I repeated this operation at about 5 ft. high. My reasons for thus topping or pinching back were twofold—first, to get as sturdy a stem as possible; secondly, in case of a tree being broken I had two places to cut back to which would give me a smooth solid surface, thus preventing water getting into the stem (which is naturally hollow) and causing the tree to rot.

For ordinary purposes there is no necessity to top, provided your young plants are strong and healthy. If a tree gets broken and it is worth saving, put a small tin over the top to keep moisture out of the broken stem.

### LIFE OF THE PAPAW TREE.

Unless a tree is required for some special purpose, it will be found most profitable to replant every three years, though in the case of particular trees I have had good crops at five years old. If very fine fruit are aimed at, thinning out must be done as soon as possible after young fruit has formed and plenty of room allowed for each fruit to develop.

The accompanying photograph shows one of the trees from specially selected seed, and, as will be seen, the fruit is fairly even both as regards shape and size. The average weight of ten fruit was 6 lb. each, but this tree only received what I should call good ordinary treatment, and the soil was of a very sandy nature. Although this tree was by no means the finest specimen as a tree, nor the heaviest bearer, owing to its situation, it made the best photograph for showing the type of fruit referred to. Another noticeable point is that in fruit of good quality the number of seeds is comparatively few, and in some cases there are no seeds at all.

Since writing the above, I have had a conversation with a man from Townsville who is growing and exporting the type of fruit referred to above. He tells me the price in Sydney for a double fruit-case holding about twelve papaws, weighing from 5 to 8 lb. each, is from 7s. to 10s. per case; he informed me that he was only waiting for rain to plant out more trees. Papaws may prove profitable as a fruit for export if these prices can be maintained.

---

## BEET SUGAR INDUSTRY IN VICTORIA.

Some facts about the beet sugar industry in Victoria are now available. This season the farmers received 16s. a ton for roots analysing 13.34 per cent. of sugar. Out of 5,969½ tons of clean beets, it is expected that the total return will be 554¼ tons of sugar. The quality of the sugar (the manager of Maffra says) will compare with any on sale in the Commonwealth. It certainly should, for we find that, "omitting the items of repairs, construction, maintenance, interest, taxes, insurance, management, and the Agricultural Department," the expenditure comes to £12,063 10s. 4d., or £21 5s. per ton of sugar. The estimated cost of next season adds nearly £5 a ton to the above cost. Next year the farmers are to receive £1 a ton for their beets, clearly showing that they will not grow at 16s. The sum of £13,000 was spent on the factory last year, and it is estimated that during this year, ending 30th June next, the expenditure will be £43,000. Of course, the output last year was ridiculously small; but the Nerang Mill, in Queensland, with an average output no larger, succeeds in keeping itself going without incurring tens of thousands of pounds sterling of debt.—"Australian Sugar Journal."

# NEGLECTED INDUSTRIES.

BY HOWARD NEWPORT, Instructor in Tropical Agriculture, Cairns.

## DRIED MANGO.

The regrettable waste of good food material in the North Queensland mango crops cannot but be noticed by almost every visitor during the fruiting season, and seldom escapes comment.

The turning to account of the excess production of a fruit of this nature, that almost defies efforts to transport it, and which is in comparatively little demand in the most popular methods of surplus fruit utilisation—viz., as jam or pulp—presents somewhat of a problem; and the successful utilisation of the oftentimes heavy crops of mangoes that are produced in the tropical parts of Queensland is a matter that has exercised the minds of many.

The best of this fruit only can be utilised for the table. A ripe mango cannot be packed or transported, and mangoes picked green (and hard) enough to be packed in ordinary fruit cases and shipped to the larger markets of the Southern towns and cities never attain the lusciousness of the properly ripened fruit. Hence the mango as retailed on the fruit stalls of the South is often but a travesty, and certainly no criterion, of the real article.

In any case, from an average crop it is necessary to carefully select those in just the right condition to pack for export, and those discarded are not only the finest fruit, but are practically entirely wasted. Ripe mangoes in season are fed to pigs in dray loads on many up-country farms, and the ordinary farm horse or cow soon learns to be very fond of all it can pick up or reach. Other uses of the mango are for chutney-making, for which condiment the demand appears to be steadily increasing. For this purpose many tons of mangoes are cut up and converted into "pulp" and sent to the Southern factories. A small quantity is preserved in sugar or as jam, but very little demand exists for this—at least in the North.

Another method I have not seen any published references to, and which I found some settlers in the Cooktown district successfully carrying out, would seem to have considerable possibilities. The mango is picked just before turning colour. On being peeled, the flesh is found to be firm and a pale-yellow colour. This is cut off with a large knife in chips or small slices some 2 in. in length, 1 in. or so wide, and perhaps $\frac{1}{3}$-in. thick. These slices are laid in the sun to dry, and become dry enough to store in three or four days. Sheets of galvanised iron (roofing) were used with sheets of paper laid on them. Cloth was not found satisfactory, and the paper could not be dispensed with, as the acid juice of the fruit turned the product a dark colour if in direct contact with the iron. I observed various stages of drying, but was unable to see any one batch through from peeling and paring to packing. I was, however, informed that if laid out in full sunlight in the day, and covered at night, it is dry enough to pack in three to four days. One turning is required. The fully dried "chips" are of a very pale-yellow or brownish-white colour, and if only cut into similar shapes could hardly be distinguished in appearance from the best dried apples. Sometimes when half-dried the chips are threaded on to string or hemp twine for convenience, as is done with apple chips in some countries and with meat in others, as such strings are more easily exposed to the sun and air, as well as brought under cover again, than are trays. I have even seen these strings, 5 or 6 yards in length, draped over the clothes-lines for final drying.

These chips, when thoroughly dry, are stored in airtight receptacles, and may be packed quite tightly in them. Large glass jars and wide-mouthed bottles are used, but the best receptacles are the large earthenware jars in which the Chinese import liquor, preserves, or sauces. Hermetical sealing is very necessary, and is generally done with ordinary beeswax.

In this manner the mango keeps perfectly, and apparently indefinitely, without any preservative whatever.

When cooked, the dried fruit darkens in colour a little, and is not so decided in flavour as is the typical fresh mango—in fact, to one who did not know what it was it tastes somewhat like a mixture of dried apples and apricots. It makes excellent tarts and pies, and could equally be used for jams or chutneys.

Here in the North there is quite a considerable demand for dried fruit of this nature, mostly apples and apricots, the cost retail of which is about 1s. per lb. With many the particular kind of fruit is immaterial, and dried mangoes would be welcomed—in fact, one or two local grocers who have had dried mango put before them have not only found a ready sale, but a demand for all they could procure.

Prepared in the way described, no doubt it would be expensive on a large and commercial scale, but properly taken up by a small company with a little capital, and American machinery and appliances (such as rotary peelers, slicers, evaporating ovens, &c.) used, it looks as though a fair share of the market for dried fruit might be captured with a distinctly enticing new commodity, the preparation of which would leave a good margin of profit between cost of producing or procuring and retailing at 1s. or even less per lb.

The raw article is certainly cheap enough at any season, and especially so in a season such as has this year been experienced in North Queensland; and, scientifically evaporated and packed in substantial barrels, the commodity would keep well, and also very probably be readily popularised in those portions of the Commonwealth where the pleasure of a really luscious mango of good quality can seldom, if ever, be experienced and enjoyed.

## OLIVE TREE CULTIVATION AND PREPARATION OF OLIVE OIL.

The "Deltion" for September, 1911, contains a useful account by Mr. Alex. N. Yeorgagopoulos, Professor of Oil Manufacture to the Industrial and Commercial Academy, Athens, on the methods of cultivating the olive tree and preparing olive oil, and he also puts forward certain suggestions for the better cultivation of the tree and production of olive oil in Greece.

He points out, in the first instance, that in the localities visited by him the olive tree cannot be said to be cultivated on its own account, but rather incidentally by the cultivation bestowed upon the cereals or vines which are grown among the olive groves—a practice which he condemns on account of the exhaustion of the soil which is thereby brought about. This exhaustion is all the greater as the land is manured but little if at all. Where this practice does not obtain, the olive tree is regarded as a forest tree. In some parts he found that liberal pruning took place by cutting off all the branches at their junctions with the trunk—pollarding, in fact. In the case of young trees he regards this course as undesirable and causing a loss of crop. Elsewhere he found better pruning methods adopted. Occasionally he found that involuntary pruning, caused by the breaking of branches by the wind, had temporarily reduced the production of oil, but in the long run it was beneficial as subjecting the tree to a severe pruning, which it would not otherwise have received.

The professor recommends owners—(1) to plough or dig their olive groves in February after rainfall, and to harrow or hoe the surface so that it may retain its moisture during the dry months of summer; (2) the formation of sloping land into terraces by the erection of stone dams to prevent the soil from being washed away and exposing the roots; (3) the manuring of the trees, for which purpose seaweed, where obtainable, is good, or olive kernels treated with bisulphate of carbon, lime, murks, town sweepings, refuse from shoemaker shops, hair from barbers' shops, rags, and, of course, stable manure. Some experiments made with chemical manures were encouraging. In several places frequented by villagers trees were marked with paint, showing the places where the branches should be cut the following year. In the demos of Chalcis and in nearly the whole of Euboia, olive trees of 200 years old and upward had never been pruned systematically, and were consequently over 20 metres high and bore but few fruit-bearing spurs, and those that were found were exhausted and weakened. These he recommended to be removed in order to induce the formation of others. In many cases trees had been injured by frost, and the branches had died down as far as the main trunk. These had to be cut away, and a period of five years will elapse before they again become fully fruit-bearing. Then, again, through want of proper pruning and insufficient circulation of air, the trees had become a prey to fungus and insect pests.

Owing to the foregoing causes and to the practice of gathering the fruit by beating the branches, thus injuring the two-year-old fruit-spurs, there is a steady decline in the olive yield. In order to educate owners in the art of pruning, the writer advocates expert pruners being sent at the right season to every olive-producing district either at the expense of the village communities or of the Ministry of Agriculture; they should be supervised by professional agriculturists, who would give general instructions to the people on the subject.

To prevent the harmful effect of beating the trees in gathering the fruit, and to avoid quarrels between adjoining owners, he recommends police prohibition of this practice, except in the case of specially tall trees. This would lead to more severe pruning, so as to lower the height of the trees.

Mr. Yeorgagopoulos attributes the inferior quality of the oil largely to the custom of keeping the olives for months until they become unsound and putrescent. He considers that this evil might be restricted by not allowing the simultaneous gathering of all olives, but by fixing the date of collection within stated areas, these being made to bear some relation to the extent of the crop, the duration of the gathering, and to the number of olive presses within a specified radius; such procedure to be authorised by police regulations.

He concludes with a practical suggestion for the establishment of a public nursery garden for olive trees, or a special farm equipped with a model olive press, for the production of healthy young olive trees for issue at low cost to landowners, and of a model olive-oil factory.

The Agricultural Department here is this year raising a large number of olive-tree seedlings for the very purpose above stated. The model oil factory may follow perhaps in time.—" The Cyprus Journal."

---

## TIMES OF SUNRISE AND SUNSET AT BRISBANE, 1912.

| Date. | January. | | February. | | March. | | April. | |
|---|---|---|---|---|---|---|---|---|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. |
| 1 | 4·57 | 6·45 | 5·21 | 6·12 | 5·42 | 6 19 | 5·58 | 5·46 |
| 2 | 4 58 | 6 46 | 5 22 | 6 12 | 5·42 | 6 18 | 6·59 | 5 45 |
| 3 | 4·58 | 6·46 | 5 22 | 6 42 | 5·43 | 6·17 | 6·0 | 5 44 |
| 4 | 4·59 | 6 46 | 5·23 | 6 41 | 5·44 | 6 16 | 6 0 | 5 43 |
| 5 | 5·0 | 6 46 | 5 24 | 6·40 | 5·44 | 6·15 | 6 0 | 5 42 |
| 6 | 5·0 | 6·46 | 5 24 | 6·40 | 5·44 | 6·14 | 6·1 | 5 40 |
| 7 | 5·1 | 6·47 | 5 25 | 6 39 | 5·45 | 6·13 | 6·1 | 5 39 |
| 8 | 5·2 | 6 47 | 5 26 | 6·38 | 5·45 | 6 12 | 6·1 | 5·38 |
| 9 | 5·3 | 6 47 | 5·27 | 6·37 | 5 46 | 6·11 | 6·2 | 5·37 |
| 10 | 5·3 | 6·47 | 5 28 | 6·36 | 5 47 | 6 10 | 6 2 | 5·36 |
| 11 | 5·4 | 6·47 | 5·29 | 6·35 | 5·47 | 6 9 | 6·3 | 5·35 |
| 12 | 5·4 | 6 48 | 5·29 | 6·35 | 5·48 | 6·8 | 6·4 | 5 34 |
| 13 | 5·5 | 6·47 | 5·30 | 6·34 | 5·49 | 6·7 | 6·4 | 5·33 |
| 14 | 5·6 | 6 47 | 5·30 | 6·34 | 5 50 | 6·6 | 6·5 | 5·32 |
| 15 | 5·7 | 6·47 | 5·31 | 6 33 | 5 50 | 6·4 | 6 5 | 5 31 |
| 16 | 5·8 | 6·47 | 5 32 | 6·32 | 5·51 | 6·3 | 6·6 | 5·30 |
| 17 | 5 9 | 6·46 | 5·32 | 6·32 | 5·51 | 6 2 | 6·7 | 5 29 |
| 18 | 5·10 | 6·46 | 5·33 | 6 31 | 5·51 | 6·1 | 6·7 | 5·28 |
| 19 | 5·11 | 6·46 | 5·34 | 6·30 | 5·52 | 6 0 | 6 7 | 5 27 |
| 20 | 5·11 | 6·46 | 5·35 | 6 29 | 5·52 | 5·59 | 6 8 | 5·26 |
| 21 | 5·12 | 6·46 | 5·35 | 6·28 | 5·52 | 6·58 | 6 9 | 5·25 |
| 22 | 5·12 | 6·46 | 5·36 | 6 27 | 5·53 | 5·57 | 6 9 | 5·24 |
| 23 | 5 13 | 6 46 | 5·37 | 6·26 | 5 54 | 5·56 | 6·10 | 5·23 |
| 24 | 5·14 | 6·45 | 5·38 | 6·25 | 5·54 | 5·55 | 6·10 | 5·22 |
| 25 | 5·15 | 6·45 | 5·39 | 6·24 | 5·55 | 5·54 | 6 11 | 5·21 |
| 26 | 5·16 | 6·44 | 5·40 | 6 23 | 5·55 | 5·53 | 6 11 | 5 21 |
| 27 | 5·17 | 6·44 | 5·40 | 6 22 | 5·55 | 5 52 | 6 12 | 5·20 |
| 28 | 5·18 | 6·44 | 5·41 | 6·21 | 5 56 | 5·50 | 6·12 | 5·19 |
| 29 | 5·19 | 6·43 | 5·41 | 6·20 | 5·57 | 6·49 | 6·13 | 5·18 |
| 30 | 5·19 | 6·43 | ... | ... | 5·57 | 5·48 | 6·13 | 5·17 |
| 31 | 5·20 | 6·42 | ... | ... | 5·58 | 5·47 | ... | ... |

### Phases of the Moon.

| | | | H. M. |
|---|---|---|---|
| 4 Jan. | ○ | Full Moon | 11 30 p.m. |
| 11 ,, | ☽ | Last Quarter | 5 43 ,, |
| 19 ,, | ● | New Moon | 9 10 ,, |
| 27 ,, | ☾ | First Quarter | 6 51 ,, |
| 3 Feb. | ○ | Full Moon | 9 58 a.m. |
| 10 ,, | ☽ | Last Quarter | 10 51 ,, |
| 18 ,, | ● | New Moon | 3 44 p.m. |
| 26 ,, | ☾ | First Quarter | 5 27 a.m. |
| 3 Mar. | ○ | Full Moon | 8 42 p.m. |
| 11 ,, | ☽ | Last Quarter | 5 56 a.m. |
| 19 ,, | ● | New Moon | 8 9 ,, |
| 26 ,, | ☾ | First Quarter | 1 2 p.m. |
| 2 April | ○ | Full Moon | 8 5 a.m. |
| 10 ,, | ☽ | Last Quarter | 1 24 ,, |
| 17 ,, | ● | New Moon | 9 40 p.m. |
| 24 ,, | ☾ | First Quarter | 6 47 ,, |

# General Notes.

## SINGULAR INJURY TO A COW.

We have received from Mr. J. Giddins, of Forest Farm, Yeulba, the accompanying illustration of the result of a cow belonging to Mr. Ryan, of Wingfield Park, being horned by a bullock in front of the shoulder-blade.

PLATE 36.—COW HORNED BY A BULLOCK.

The bullock, when it attempted to withdraw the horn, left the whole shell in the wound. It was three days before the horn was extracted. We are not informed as to the subsequent condition of the wounded animal.

## TO PROTECT PEAS AND BEANS FROM RATS, MICE, AND BIRDS.

Damp the seeds slightly; then place them in a shallow pan, and sprinkle them lightly with red lead in powder. Stir with a stick until all the peas are coated with the powder. Then sow in the ordinary way. When the succulent shoots are attacked above ground by birds, string black cotton along the rows several inches above the growths; five or six lines of cotton will be ample, and should be supported at intervals by means of short sticks. We have found that black cotton affords an absolute protection from the flocks of sparrows which previous to its adoption played havoc with peas, lettuce, &c.

## SILKWORMS.

Twenty-four thousand eggs of the silkworm weigh a quarter of an ounce; the worm lives from 45 to 53 days; it increases in weight, in 30 days, 9,500 fold, and during the last 28 days of its life eats nothing. For 739 lb. of mulberry leaves, 70 lb. of cocoons are obtained; 10,000 cocoons give 8½ lb. of silk, and 1 lb. of cocoons will produce a single thread 88,000 fathoms or 100 miles in length.

## CHEMICAL FERTILISERS.

Chemical fertilisers are variously supposed to enrich the soil or to impoverish it. As a matter of fact, they do neither. The chemical fertiliser is a plant food—a necessary constituent of plant growth. Some farmers believe that artificial chemical manures act as a stimulant to force the soil to deliver up its store of plant food. This is again incorrect—they are not stimulants. On the other hand, gypsum and lime, when added to cold, water-logged soil, act both as manure and stimulants. In such cases, part of the material is used as plant food, and at the same time the soil, being naturally cold and deficient in lime, is warmed, sweetened, and stimulated into action by the lime or gypsum.

# Answers to Correspondents.

## THE JERUSALEM ARTICHOKE.

"GARDENER," Ipswich—

The name "Jerusalem" artichoke has no reference to the city of Jerusalem. It is a corruption of the Italian name, *Girasole Articiocco,* the sunflower artichoke. It was originally brought from Peru to Italy, and thence propagated throughout Europe and other continents.

## CORDON PEARS AND APPLES.

"NAT SINE," Tambourine—

Mr. C. Ross, Instructor in Fruit Culture, in reply to your question, says :—

"Pears to be grown as 'cordons' must be grafted upon quince stocks, and apples on paradise stocks. The writer grew Williams' Bon Chrétien pears on quince stocks as oblique cordons, with success at Dalveen. They were trained on a light wooden trellis 7 ft. high ; also, apples on paradise stocks as horizontal cordons, trained along a single wire, 20 in. from the ground. They were all planted 8 ft. apart on light, rather thin land. The most important operation is summer pruning, which must be most assiduously attended to. The coolest situations must be chosen for the horizontal cordons, as the reflection of heat is very great. Higher cordons, say 2 ft. 6 in., would probably be more suitable for Tambourine Mountain."

## PELARGONIUMS.

"HORTICULTURIST," Mount Gravatt—

The cultivation and propagation of pelargoniums is somewhat more difficult than in the case of geraniums. Simple directions for the culture of the former are given in "Flower Gardening for Amateurs," issued by the Department of Agriculture and Stock. In this issue we publish a paper on the subject adapted from "Johnson's Gardeners' Dictionary," which treats very fully on the treatment and propagation of the plant.

# The Markets.

## PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JANUARY.

| Article. | | January. Prices. |
|---|---|---|
| Bacon, Pineapple | lb. | 7½d. to 9d. |
| Bran | ton | £6 5s. to £6 10s. |
| Butter | lb. | 1s. to 1s. 1d. |
| Chaff, Mixed | ton | £6 15s. to £7 |
| Chaff, Oaten (Victorian) | ,, | £7 |
| Chaff, Lucerne | ,, | £7 to £8 |
| Chaff, Wheaten | ,, | ... |
| Cheese | lb. | 6d. to 9d. |
| Flour | ton | £9 5s. |
| Hay Oaten (Victorian) | ,, | £7 to £7 10s. |
| Hay, Lucerne | ,, | £7 to £8 10s. |
| Honey | lb. | 2d. to 2¾d. |
| Maize | bush. | 4s. 4d. to 4s. 6d. |
| Oats | ,, | 3s. 6d. to 3s. 9d. |
| Pollard | ton | £6 10s. |
| Potatoes | ,, | £13 to £15 |
| Potatoes, Sweet | cwt. | 9s. |
| Pumpkins | ton | £9 15s. |
| Wheat, Milling | bush. | 4s. 6d. |
| Onions | ton | £11 10s. |
| Hams | lb. | 1s. 1½d. |
| Eggs | doz. | 1s. to 1s. 7d. |
| Fowls | pair | 3s. to 6s. 6d. |
| Geese | ,, | 6s. to 7s. 6d. |
| Ducks, English | ,, | 3s. 9d. to 4s. 8d. |
| Ducks, Muscovy | ,, | 4s. 6d to 6s. 11d. |
| Turkeys (Hens) | ,, | 8s. to 11s. 6d. |
| Turkeys (Gobblers) | ,, | 15s. to 21s. |

## SOUTHERN FRUIT MARKET.

| | |
|---|---|
| Apples (Choice), per case | 7s. to 18s. |
| Apples (Cooking), per case | 5s. to 8s. |
| Apricots, half case | 2s. 6d. to 5s. |
| Bananas (Queensland), per bunch | ... |
| Bananas (Queensland), per case | ... |
| Bananas (Fiji), G.M., per bunch | 4s. 6d. to 12s. |
| Bananas (Fiji), G.M., per case | 13s. to 19s. |
| Cherries, per 12-lb. box | 7s. to 8s. |
| Cocoanuts, per dozen | 2s. 6d. to 3s. |
| Lemons (local), per gin case | 5s. to 6s. 6d. |
| Mandarins (local Emperors), per case | 10s. to 12s. |
| Mangoes (Queensland), per bushel case | 8s. to 15s. |
| Passion Fruit (Queensland), per quarter-case | 2s. to 3s. |
| Papaw Apples, per bushel case | 4s. to 6s. |
| Peaches, per half-case | 2s. 6d. to 9s. |
| Peanuts, per lb. | 5½d. |
| Pineapples (Queensland), common, per case | 10s. to 12s. |
| Pineapples (Queensland), Ripley's, per case | 10s. to 12s. |
| Pineapples (Queensland), Queen's, per case | 10s. to 12s. |
| Plums, per half-case | 4s. to 5s. 6d. |
| Rockmelons (Queensland), per double case | 5s. to 7s. |
| Strawberries, (Queensland), per 3-quart tray | ... |
| Tomatoes (Queensland), per quarter-case | 1s. 6d. to 2s. 6d. |
| Watermelons (Queensland), per dozen | 12s. to 18s. |

## PRICES OF FRUIT—TURBOT-STREET MARKETS.

| Article. | JANUARY. Prices. |
|---|---|
| Apples (Eating), per case | 2s. 6d. to 6s. |
| Apples (Cooking), per case | 3s. to 6s. |
| Apricots, per quarter-case | 3s. to 4s. 9d. |
| Bananas (Cavendish), per dozen | 1½d. to 2½d. |
| Bananas (Sugar), per dozen | 1½d. to 2d. |
| Cape Gooseberries, per case | ... |
| Cherries, per quarter-case | ... |
| Citrons, per cwt. | ... |
| Custard Apples, per quarter-case | ... |
| Grapes, per lb. | 2d. to 3d. |
| Lemons, per case | ... |
| Mandarins, per case | ... |
| Melons (Rock), per dozen | 4s. to 10s. |
| Melons (Water), per dozen | 2s. 6d. to 7s. 6d. |
| Mangoes, per case | 1s. 6d. to 3s. |
| Nectarines, per case | ... |
| Oranges (Navel), per case | ... |
| Oranges (Other), per case | ... |
| Papaw Apples, per quarter-case | 1s. to 1s. 3d. |
| Passion Fruit, per quarter case | 1s. 6d. to 3s. |
| Peaches, per case | 3s. to 5s. |
| Peanuts, per lb. | 3½d. |
| Pears, per case | ... |
| Persimmons, per quarter-case | ... |
| Plums, per case | 2s. to 5s. |
| Pineapples (Ripley), per dozen | 8d. to 2s. 9d. |
| Pineapples (Rough), per dozen | 6d. to 2s. 9d. |
| Pineapples (Smooth), per dozen | 7d. to 2s. |
| Strawberries, per dozen boxes | ... |
| Tomatoes, per quarter-case | 1s. 6d. to 3s. |

## TOP PRICES, ENOGGERA YARDS, DECEMBER, 1911.

| Animal. | DECEMBER. Prices. |
|---|---|
| Bullocks | £9 to £10 17s. 6d. |
| Cows | £6 17s. 6d. to £8 7s. 6d. |
| Merino Wethers | 21s. 6d. |
| Crossbred Wethers | 26s. |
| Merino Ewes | 19s. |
| Crossbred Ewes | 20s. 3d. |
| Lambs | 15s. 9d. |
| Pigs (Baconers) | 41s. 6d. |
| Pigs (Porkers) | 32s. |

# Orchard Notes for March.

## THE SOUTHERN COAST DISTRICTS.

The marketing of the main crop of pineapples will continue to occupy the attention of growers; and as it is probable that the plantations have been allowed to get somewhat dirty during the previous month, they should be cleaned up as soon as ever the crop has been got off. The fruit of the new crop of citrus fruit will be showing signs of ripening towards the end of the month; and as the fruit during this period of its growth is very liable to the attack of insect pests of various kinds, it is important that steps should be taken to prevent loss arising from this cause as far as possible.

Large sucking moths of several kinds attack the fruit as soon as it shows signs of ripening; and as they always select the first fruit that shows signs of colouring, it is a good plan to gather a few forward fruit and to ripen them up quickly by placing them on a barn floor, and covering them up with bags or straw. They will turn colour in a few days, and develop the characteristic scent of the ripening fruit. The fruit so treated should be hung up in conspicuous places in the orchard as trap-fruit, as not only will it attract the moths, but also the fruit flies. The moths will be found clustered round the trap fruits in large numbers, and can then be easily caught and destroyed. Fruit fly will also puncture such fruit; and if the fruit is destroyed before the larvæ reach maturity, a later crop of these insects is prevented from hatching out. Fruit flies may also be caught in large numbers by means of such artificially ripened fruits. The fruits are smeared with tanglefoot, and hung about the orchard. The fly, attracted by the colour, settles on the fruit, and is caught in a similar manner to house flies on specially prepared sticky paper. These simple remedies, if carefully carried out, will result in the destruction of large numbers of sucking moths and fruit flies.

The yellow peach moth that does such damage to peaches in Spring, and that attacks corn, sorghum, cotton bolls, custard apples, and many other plants and fruits, often does a lot of damage to citrus fruits. It acts in a very similar manner to the second and later generations of the Codling moth of pomaceous fruits, in that it lays its eggs where two fruits touch, under the shelter of a leaf on the fruit, at the stem end of the fruit, and, in the case of navel oranges, in the navel itself; in fact, anywhere that there is a likelihood of the egg not being disturbed. The egg hatches out into a small spotted caterpillar, which eats its way into the fruit, causing it to ripen prematurely, and fall off. Where two fruits touch, it often eats into and destroys both, and it frequently leaves one fruit to go and destroy a second. It is a very difficult insect to deal with, owing to the number of fruits and plants on which it lives; but, as far as citrus fruits are concerned, the best remedy is undoubtedly to spray the fruit with a remedy that will destroy the young insect when it starts to eat the skin of the fruit. Bordeaux mixture has been found efficacious, but I am of opinion that spraying with Paris green and lime, Kedzie's mixture, or arsenite of lead will also have good results. The latter poison is, in my opinion, well worth giving a thorough test, as it sticks to the fruit and leaves for a long time. Bordeaux mixture, either alone or in conjunction with Paris green or Kedzie's mixture, is, however, a good remedy, as not only will it destroy the larvæ or prevent the moth from attacking the tree, but it is also the best remedy for black brand or melanose, as well as tending to keep all other fungus pests in check. Fight fruit fly systematically—both by means of the sticky fruit already recommended and by gathering all fly-infested fruit, such as guavas, late mangoes, kumquats, &c., as well as any oranges or mandarins that may have been infested, as if kept in check now there will be little loss throughout the season. A little fruit will be marketed towards the end of the month. See that it is gathered and sweated for seven days before marketing, and don't gather it too immature. Beauty of Glen Retreat mandarins are often gathered and marketed as soon as they show signs of colouring. They are then as sour as a lemon, and anyone who is unlucky enough to buy them will steer off mandarins for some time to come. This variety should not be gathered till thoroughly ripe, as when marketed in an immature state it spoils the market, as it puts people off eating citrus fruit.

Clean up the orchard after the summer rains, and have everything ready for the marketing of the crop. See that there is a good supply of clean, dry, case timber on hand, as one of the greatest sources of loss in shipment is packing fruit in green cases.

Strawberry planting can be done throughout the month. Plant such berries as Federation on the lowest ground, and Aurie, Anetta, Trollop's Victoria, Glenfield Beauty on warm, well-drained soils. Prepare the land thoroughly, so that it is in perfect tilth, and in a fit state to retain moisture well; as on this, as much as anything, the success of the crop depends. Where new orchards are to be planted, get the land ready—not the clearing, which should have been done months ago, but the working of the land, as it is advisable to get it thoroughly sweetened before putting the trees in.

## THE TROPICAL COAST DISTRICTS.

The Notes for February apply equally to March. See that bananas are netted—keep down weed growth, and market any sound citrus fruits. Clean up the orchards as well as possible, and keep pines clean. Get land ready where new orchards are to be set out, as tree-planting can be done during April and May. Pines and bananas can still be planted, as they will become well established before winter.

## THE SOUTHERN AND CENTRAL TABLELANDS.

Finish the gathering of the later varieties of deciduous fruits, as well as grapes. Clean up the orchard, and get ready for winter. Get new land ready for planting; and where there are old, dead, or useless trees to be removed, dig them out, and leave the ground to sweeten, so that when a new tree is planted to replace them the ground will be in good order.

In the drier parts, where citrus trees are grown, keep the land well worked, and water where necessary.

# Farm and Garden Notes for March.

FIELD.—Take every opportunity of turning up the ground in readiness for sowing and planting winter crops. The main crop of potatoes should at once be planted. As the growth of weeds will now be slackening off, lucerne may be sown on deeply cultivated soil. The latter should be rich and friable, with a porous subsoil. The land should be thoroughly pulverised. Do not waste time and money in trying to grow lucerne on land with a stiff clay subsoil. Prepare the land a couple of months before sowing, care being taken to cross plough and harrow before the weeds have gone to seed. This ensures a clean field. Sow either broadcast or in drills. In the former case, 20 lb. of seed will be required ; in the latter, 10 lb. A good stand of lucerne has been obtained with less quantities. Lucerne seed is worth from £2 16s. to £3 5s. per cwt. Should weeds make their appearance before the plants have sent down their tap roots, mow the field. Before they can again make headway enough to do any damage, the lucerne will be strong enough to hold its own against them. Harrow and roll the land after mowing. Gather all ripe corn. It is now too late to sow maize, even 90 Day, with any certainty of harvesting a crop of grain. Rye grass, prairie grass, oats, barley (in some districts, wheat), sorghum, vetches, carrots, mangolds, and Swede turnips may be sown. In Northern Queensland, sow tobacco seed, cowpea, carob beans, sweet potatoes, opium poppy, &c. Sow anatto. jack fruit, and plant kola-nut cuttings. Some temperate-zone vegetables may be planted, such as egg plant, potatoes, &c. Coffee-planting may be continued. Harvest kafir corn and paddy.

FLOWER GARDEN.—Now is the time to plant out bulbs. A complete garden could be furnished with these charming plants, which are to be had in every colour and variety. Amongst the many are—Amaryllis, anemone, arum, babiana, crinum, crocus, freesia, ranunculus, jonquils, iris, ixias, gladiolus, narcissus, Jacobean lilies, tigridia, tritonia.

All bulbs like well-drained, somewhat sandy soil, with a plentiful admixture of leaf mould. Herbaceous plants and annuals which it is intended to raise from seed should be sown this month. Such are Antirrhinums (snapdragon), asters, cornflowers, dianthus, larkspurs, daisies, cosmea, candytuft, lupins, gaillardias, godetia, mignonette, poppies, pansies, phlox, sweet peas. Cannas now planted will require plenty of food in the shape of liquid manure. Put in cuttings of carnations. Chrysanthemums require attention in the way of disbudding, staking, watering with liquid manure, &c. Growers for exhibition will thin out to a few buds and protect the flowers from rain and sun. Dahlias should be looking well. To secure fine blooms, disbudding should be done.

Now, as to climbers which may now be planted. These are—*Allamanda Schotii* (beautiful yellow), *Antigonon leptopus*, a charming cerise-coloured climber ; *Aristolochia elegans*, handsome as an orchid and easily grown ;

*Aristolochia ornithocephala* (Dutchman's Pipe), very curious, large, always attracts attention ; *Asparagus plumosa*, grows in any shady place ; *Beaumontia grandiflora*, splendid white flower, grand for a fence, will grow 50 ft. high ; Bignonias of several kinds ; Bougainvilleas, with their splendid leafy pink and purple flowers, rapidly clothe a fence or unsightly shed with a blaze of blossom ; *Quisqualis indica*, a fine creeper, flowers pink, changing to white ; Wistaria, purple and white. Most beautiful is the *Bauhinia scandens*, rarely seen about Brisbane. We grew a plant of this climber at Nundah, and it soon closed in the front of the veranda for a distance of over 80 ft. The leaves are very small, and in the flowering season it presents almost a solid mass of beautiful round bunches of blossoms, something like the hawthorn bloom—pink and white. It seeds freely, but the seeds are difficult to germinate, and when they have produced a plant it is still more difficult to rear it. A rooted sucker from the main stem will in all probability grow.

KITCHEN GARDEN.—During this month a very large variety of vegetable seeds may be sown in readiness for planting out where necessary in the autumn, which begins on the 20th of March. All unoccupied land should be roughly dug, and, where required, add well-decomposed manure. Transplant cabbage, cauliflower, celery, &c. Sow French beans; beet, carrot, turnips, radish, cabbage, cauliflower, cress, peas, mustard, &c. Former sowings should be thinned out and kept clear of weeds. Mulch round melon and cucumber beds with a good dressing of long stable manure, as it assists in keeping the fruit clean and free from damp. Cucumbers, melons, French beans, and tomatoes should be looked for every day and gathered, whether required or not, for, if left on the vines to perfect their seeds, the plants will soon cease to be productive, or will form inferior, ill-shaped, and hence unsaleable fruit.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXVIII. MARCH, 1912. PART 3.

# Agriculture.

## THE ELEMENTS OF SHEEP CLASSING FOR BEGINNERS.

BY W. G. BROWN, State Sheep and Wool Expert.

It may encourage a beginner to know that there is nothing to stop him from becoming the owner of a flock of first-class sheep, given that he possesses common sense. Of course there must be natural aptitude and liking for the vocation, these factors being essential to success in any business.

On the other hand, there is no royal road to success in the calling; unremitting care and observation, plus hard work, being most necessary. This article contains nothing severely technical, being for beginners. It proposes to give a method by which a selector may, by using his commonsense, bring an indifferent flock up to the level of the best, even if to begin with he have little or no exact knowledge of sheep or wool.

The method is a simple application of the Darwinian theory of "evolution by selection," which is defined thus—"Pure selection, operating on material which is not the direct result of a cross, modifies the animal or plant, and leaves it different from what it was when selection began. . . . . ."

It was by this method that every one of the great studs of Australia was established. The sheep-men of sixty or seventy years ago, starting with little or no knowledge of the merino, and with what we would now call most unpromising material, have, with the assistance of good natural conditions, made available to the present generation types of merinos which are the admiration of the world. They worked day in and day out among their flocks, until they knew every individual animal, its excellences and its defects. By selection and combination, often with different ideals, the historic flocks were established, and now Australian wool is a synonym for all that is excellent in that staple. The nations come to us for their fine wool; they copy Australian methods of working; and, as the South Africans are now doing, are paying very high prices for our best sheep.

Sheep-classing is another name for selection. The best ewes are selected from a given flock, and rams are selected to join them, so that the progeny shall retain the good qualities possessed by their parents, or better them.

It is not necessary that every sheep-breeder should become a stud-master in the highest sense. There are many old-established flocks wherefrom to draw good animals for flock purposes, but it is certainly desirable to make an indifferent flock a very good one, and it is within the reach of most to do so.

Coming from the general to the particular, we shall assume that the selector possesses, say, 3,000 ewes of average quality. As in the great majority of cases, these will consist of good, indifferent, and bad, in varying proportions, which can only be determined by inspection or classing. How shall the owner know which is good, indifferent, or bad? "Goodness," of course, is relative. One man's best may be only second-rate in another's flock, but we shall assume that in this case his best ewes shall be the biggest-framed ewes he possesses. That quality is easy to recognise by inspection. But it is possible that the biggest-framed ewes are so badly covered that it can be seen by the tyro that relatively it is badly covered. With those two factors, then, begins and ends his knowledge of sheep as they stand in the yard—i.e., size and covering. He can say of this sheep, "It is big," and of that "It is small," and of another "It is badly covered." What shall he do next? He must wait until shearing time, and then whatever other work may call, he must stay on the board where, say, four shearers are taking off his clip. He knows a big sheep, or at least a relatively big sheep, and he knows a small sheep. He will have an opportunity, in the ten days or so while the ewes are being shorn, of seeing each animal in detail. He will see that although his flock have been running on the same country for the past twelve months, some have big bright fleeces weighing as much as 8½ lb., and possessed of big frames. He will see also fleeces dull, short, and dirty on big-framed sheep, and will also see undersized animals with poor fleeces, and between these average sizes with average fleeces.

Obviously his big sheep with the big, bright fleeces are his best sheep, and the small sheep with bad fleeces are his worst. Let him take his brightest and biggest, and, putting a distinguishing ear-mark on them call them his No. 1 flock. His worst he shall never use again, but shall fatten them if possible, and sell them as mutton, for they are an encumbrance, and a danger to the well-being of his flock. All between, he shall call his No. 2 flock. He shall buy good rams, and select the best of these for his No. 1 flock.

He may make a few mistakes at first, but as he acquires confidence in his ability to judge of the weight of fleece and its brightness, he will make fewer and fewer.

In a few years he will have found that his No. 1 flock has become the apple of his eye, and that he is constantly watching his sheep to promote or degrade as he learns which are really good in either flock, and gradually his No. 1 rises in quality and numbers, and his ideal rises with it too, until at last he has a flock worth owning. Besides that he will have acquired much comparative knowledge, by watching and learning from his neighbours.

The above is not a fancy picture of what a man may do and learn. I knew a man who took up a selection twenty years ago in Western Queensland. At first he knew little or nothing of sheep, but by practising in much the same way as I have indicated he became, in a comparatively few years, a man whose opinion on sheep matters was worth having, and to-day he has a flock which anybody would be proud to own.

*Observe*: It pays a sheep-breeder to be on the board while shearing is going on. His harvest is being gathered, and the results of twelve months' solid work and expense are at stake. It is the only opportunity which he will have of seeing his sheep in detail, which is impossible at any other time. He will learn, what is obvious surely and yet is not generally acted upon, I have found, that "The sheep which does best on any particular country is the best kind of sheep for that country"; and—"If he take his best ewes and put better rams to them his flock must improve, until at last he is either at or near the top." He must always dispose of his culls. He must remember that the stud-masters of old had greater difficulties than he. Yet look at their works! He must exercise care, watchfulness, and common sense, and besides these a constant asking of questions of successful men in his district. He must remember that the man who knows all about sheep knows nothing, and, finally, he must not overstock when he learns the capacity of his country, for

Feeding and weeding
Is the secret of breeding,

which are the elements of sheep-classing, alias "selection."

---

## LUCERNE.

By C. E. WOOD, Manager Kamerunga State Nursery, Cairns.

The question is often asked, "Will lucerne grow down on the coast land near Cairns; if so, why is it not grown when there is apparently so much land suitable for lucerne growing?" The first question is easily answered: The lucerne plant if well looked after will grow fairly well, and when established will live through (not thrive) both the wettest and driest of seasons. I have tried lucerne in experimental beds both on the range (outside Kuranda) and down on the coast, and in April, 1910, I put in a bed at the Kamerunga Nursery. The soil was of a very sandy nature, running to pure river sand at about a depth of 10 ft.; seed germinated very well, but soon grass and weeds started to grow, and I found it necessary to hand weed between the young plants, and in doing so a good many seedlings of lucerne were destroyed; however, by keeping the bed weeded and cutting back the young plants when about 9 in. high, I eventually obtained a few fair plants. Then came the heavy wet, lasting from November, 1910, to 30th April, 1911, during which time a total of 163.98 in. fell. The result of this heavy rainfall was to wash away a large amount of soil; then weeds and grass grew thick, and after weeding about eight plants were found still growing, but looking very sickly. From 1st May, 1911, to January, 1912, we experienced the driest season on record. The plants did not do much for months, but as they were still alive in October, they received a good heavy watering, after which they started, and early in January, 1912, were 2 ft. and more high and flowering. From the above it will be seen that lucerne as a crop is hardly likely to be a success below the range, chiefly owing to the quick growth of weeds and grass; at the same time, it might prove of some advantage when sowing grass seed, especially on old cultivated land, to add a good proportion of lucerne seed, for although I have no doubt that the lucerne would soon get choked out, still it might hold its own long enough for the roots to get well down and open up the subsoil, and so bring fresh plant food to the surface soil. Although in the above trial the lucerne plants were put to a very severe test on account of having to go through both the wettest and driest seasons on record, still, from what I have seen in ordinary years, I think it will be very hard, "if possible," to grow lucerne as a field crop on our low country, on account of the quick growth in both weeds and grass; but I have no doubt further experiments will be made.

---

## THE PROTECTION OF OUR NATIVE GRASSES.

By T. JONES, Manager State Farm, Warren.

The scarcity of grass at the present time prompts me to say a few words regarding the above subject. In travelling to and fro in the country, the observant must notice that our very best grasses are to be found inside the railway fences. It seems a great pity that the best of our natural grasses are fenced off from the reach of our stock, but this is the case. In this district, in medium seasons, one can see a waving mass of kangaroo grass inside the railway fence, and the grazing farms coated with the detested spear grass. The value of kangaroo grass can be seen by the fact that it can be sold with lucerne as "oats and lucerne" chaff. This valuable grass, being well adapted to the climatic conditions of this locality, should be protected and encouraged.

The common practice of burning paddocks injudiciously has helped to eradicate this valuable grass. The constant grazing of stock on the same area all the year is another huge mistake that is being practised.

This does not give the grass an opportunity to ripen its seed and re-establish itself annually. We are constantly questioned regarding introduced grasses, and some scores of tests are made annually with different varieties, the majority of which wither away with the first indication of summer.

Our old friend, the kangaroo grass, I understand, was here before the white man, and it is still thriving where the white man has given it a chance. Last year I went to the railway line, picked some seeds, and planted it on a little plot of land as a trial, and was agreeably surprised with the result. It grew and flourished, and I intend planting a fair area of it this season, weather permitting. Every farmer and grazier will agree that it is a valuable grass, and I am sure that if it had been amongst some of our recently introduced grasses it would be boomed. I hope that these few remarks will induce landowners to protect, cultivate, and appreciate this old-established friend, the kangaroo grass.

---

## GRASSHOPPERS.

By R. JARROTT, Manager State Farm, Gindie.

Though the weather has been generally dry during December, some parts of this district have been favoured with rain. In some instances as much as 9 or 10 in. have been registered.

Those who have been fortunate enough to have received sufficient rain to start a growth in the grass feel happy about it and would be quite contented only for, not the "fly," but the grasshopper "in the ointment."

At a time like the present, when you meet a neighbour, the first question is—"Did you get any rain?" In many instances the reply was—"Yes; and have a good shoot that will put me right for another couple of months if the grasshoppers keep away." Generally, that is the very thing they do *not* do, but start straight away to devour all the grass. One friend told me that his paddock was in splendid condition, and that he had started dairying again. About fourteen days later he informed me that the grasshoppers had swept over his place, and left it as black as if a running fire had been over it.

After a prolonged spell of dry weather, the loss of a growth of green grass is a serious one, but, notwithstanding this fact, very few people endeavour to lessen this evil—the grasshopper.

I think the matter will have to be taken in hand by our legislators, as it is very little use for a few to attempt to deal with this plague. Before any good will be done, all landholders must take a hand. In South Africa and the Philippines the Government have had to take action. In the meantime, some leaflets, giving a brief outline of the life history of the grasshopper, and the usual means employed for their destruction, would be of service. This month we had to deal with a host of them that hatched in a neighbouring paddock. They were about as big again as an ordinary house-fly, and though so small, their number was so great that their track across the black soil left the ground as smooth as if it had been swept. Had they been allowed to mature, they were in sufficient numbers to have eaten us out. As it was, they split up into several mobs. We rounded them up and sprayed them with kerosene. Very little oil was used, and though the spray was as fine as mist, it killed them instantly. Owing to the valves of the spray pump—which were rubber—giving out, one mob missed this treatment. When they were camping for the night we spread a couple of dray-loads of hay around them, and set fire to it, which destroyed most of them.

[In Vol. XIII. of this journal, on page 282, will be found a full account of the grasshopper, and of the best means for its destruction, by H. Tryon, Government Entomologist and Plant Pathologist. Another useful article, with an illustration of grasshoppers and their eggs, was published in Vol. XIV. of the journal, page 48. A simple means of destroying the pest as adopted in South Africa is given in Vol. XX., page 268. Finally, in Vol. XXII., pages 276, 278, we published two articles, one on the destruction of hoppers in South Africa, the other (illustrated) showing the work of destruction on Mr. T. H. Wells's plantation, near Childers.—Editor, "Q.A.J."]

---

## WASHINGTON WHITEWASH.

This is used by the United States Government for painting lighthouses and other exposed buildings.

Three parts of fresh Rosendale (or other good) cement and two parts of clean white sand mixed thoroughly with fresh water. In applying it, the wall must be wet with clean, fresh water, to be followed immediately with an application of this cement wash. During the application this wash must be kept well stirred, and be made as thick as can conveniently be applied with a whitewash brush.

### ANOTHER GOOD WHITEWASH.

A first-class whitewash is made by dissolving 2 lb. of ordinary glue in 7 pints of water, and, when all is dissolved, adding 6 oz. of bichromate of potassium, dissolved in a pint of hot water. Stir the mixture up well, and then add sufficient whitening to make it up to the usual consistency, and apply with a whitewash brush as quickly as possible. This dries in a very short time, and, by the action of light, becomes converted into a perfectly insoluble waterproof substance, which does not wash off even with hot water. It may be coloured to any desired shade by the use of a small amount of any aniline dye or powdered colouring.

# Dairying.

## THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF JANUARY, 1912.

| Name of Cow. | Breed. | Date of Calving. | Total Milk. | Test. | Commercial Butter. | Remarks. |
|---|---|---|---|---|---|---|
| | | | Lb. | % | Lb. | |
| Davidina ... | Ayrshire ... ... | 29 Dec., 1911 | 972 | 4·0 | 43·43 | |
| Glen ... | Shorthorn ... | 30 Sept. ,, | 652 | 5·4 | 41·36 | |
| Honeycomb | ,, ... ... | 29 Aug. ,, | 776 | 4·6 | 40·14 | |
| Lass ... | Ayrshire ... ... | 16 Oct. ,, | 822 | 4·2 | 38·67 | |
| Lark ... | ,, ... ... | 29 Nov. ,, | 986 | 3·4 | 37·11 | |
| Dora ... | Shorthorn ... | 11 June ,, | 620 | 5·0 | 35·0 | |
| Auntie ... | Ayrshire ... ... | 31 July ,, | 697 | 4·4 | 34·42 | |
| Burton Pride | Shorthorn ... | 16 Nov. ,, | 684 | 4·3 | 32·98 | |
| Butter ... | ,, ... ... | 10 Nov. ,, | 876 | 3·4 | 32·96 | |
| Miss Edition | Jersey ... ... | 1 Feb. ,, | 420 | 6·5 | 32·07 | |
| Cuckoo ... | ,, ... ... | 8 July ,, | 478 | 5·5 | 30·89 | |
| Cocoa ... | ,, ... ... | 1 May ,, | 616 | 4·3 | 29·70 | |
| Silver Nell... | Shorthorn .. | 13 Dec. ,, | 684 | 3·8 | 28·95 | |
| Dutch Fanny | ,, ... ... | 24 Aug. ,, | 669 | 3·8 | 28·33 | |
| Burton's Lily | ,, ... ... | 7 Dec. ,, | 696 | 3·6 | 27 84 | |
| Bangle ... | ,, ... ... | 14 Aug. ,, | 592 | 4·2 | 27·84 | |
| Bluebelle ... | Jersey ... ... | 20 April ,, | 464 | 5·0 | 27·31 | |
| Lady Loch... | Ayrshire ... ... | 4 Dec. ,, | 499 | 4·8 | 26·99 | |
| Lydia ... | ,, ... ... | 9 Sept. ,, | 593 | 4·0 | 26·50 | |
| Rusty ... | Shorthorn ... | 4 Sept. ,, | 595 | 3·8 | 25·19 | |
| Norma ... | ,, ... ... | 12 Aug. ,, | 535 | 4·2 | 25·16 | |
| Bee ... | Jersey ... ... | 8 Dec. ,, | 444 | 5·0 | 25·05 | |
| Dot ... | Shorthorn ... | 4 Dec. ,, | 589 | 3·8 | 24·93 | |
| Burton's Fancy .. | ,, ... . | 30 Dec. ,, | 575 | 3·8 | 24·34 | |
| Daisy ... | Holstein ... ... | 2 Feb. ,, | 606 | 3·6 | 24·24 | |
| Eve ... | Jersey ... ... | 27 June ,, | 396 | 5·2 | 24·19 | |
| Helen ... | Ayrshire ... ... | 7 Jan. ,, | 713 | 3·0 | 23·46 | |
| Pauline ... | Shorthorn ... | 7 Nov. ,, | 525 | 4·0 | 23·46 | |
| Laurette ... | Ayrshire ... ... | 7 June ,, | 480 | 4·3 | 23·14 | |
| Rit ... | ,, ... ... | 20 Oct. ,, | 577 | 3·6 | 23·08 | |
| Rosebud ... | ,, ... ... | 24 June ,, | 462 | 4·2 | 21·73 | |
| Madam Melba | Holstein ... ... | 19 Dec., 1910 | 454 | 4·1 | 20·82 | |
| Bliss ... | Jersey ... ... | 5 Sept., 1911 | 484 | 3·8 | 20·48 | |

## THE DAIRY HERD, STATE FARM, BUNGEWORGORAI.

RECORD OF COWS FOR SEVENTEEN DAYS ENDING 31ST JANUARY.

| Name of Cow. | Date of Calving. | Milk. | Test. | Commercial Butter. | Remarks. |
|---|---|---|---|---|---|
| | | Lb. | % | Lb. | |
| Edith 1st ... ... ... ... | 1 Nov. 1911 | 311 | 3·8 | 13·16 | |
| Queenie ... ... ... ... | 30 Oct. ,, | 229½ | 3·6 | 9·18 | |
| Queen Mary... ... ... ... | 28 Oct. ,, | 245½ | 4·0 | 10·96 | |
| Edith 2nd ... ... ... ... | 15 Nov. ,, | 269½ | 3·6 | 10·78 | |
| Mischief ... ... ... ... | 13 Nov. ,, | 270 | 3·8 | 11·43 | |
| Jess of Greystanes ... ... ... | 15 Jan., 1912 | 233½ | 3·6 | 9·34 | 10 days |
| Belinda ... ... ... ... | 8 Jan. ,, | 409½ | 3·6 | 16·38 | |
| No. 11 ... ... ... ... | 20 Nov., 1911 | 294 | 3·9 | 12·78 | |
| No. 19 ... ... ... ... | 1 Jan., 1912 | 389½ | 3·9 | 16·94 | |
| No. 22 ... ... .. ... | 11 Dec., 1911 | 229 | 3·4 | 8·6 | |
| No. 24 ... .. ... ... | 27 Dec. ,, | 208½ | 4·0 | 9 31 | |
| Nethercraig Moonshine ... ... | 11 Jan., 1912 | 457½ | 3·8 | 19·36 | |

# Poultry.

## REPORT ON EGG-LAYING COMPETITION, Q.A. COLLEGE, JANUARY, 1912.

Two thousand six hundred and forty eggs were laid during the month, an average of 110 per pen. Several birds are now moulting. The White Leghorns owned by R. Burns and Cowan Bros. are equal for the monthly prize with 130 eggs each. The following are the individual records:—

| Competitors. | Breed. | January. | Total. |
|---|---|---|---|
| J. F. Dalrymple, N.S.W. ... ... | White Leghorns ... ... | 119 | 1,190 |
| E. A. Smith ... ... ... ... | Do. ... ... | 116 | 1,143 |
| Yangarella Poultry Farm ... ... | Do. ... ... | 117 | 1,141 |
| J. Holmes ... ... ... ... | Do. ... ... | 109 | 1,128 |
| Range Poultry Farm ... ... | Do. ... ... | 108 | 1,114 |
| Cowan Bros., N.S.W. ... ... | Do. ... ... | 130 | 1,107 |
| Alex. Smith ... ... ... ... | Do. ... ... | 111 | 1,095 |
| J. Gosley ... ... ... ... | Do. ... ... | 126 | 1,093 |
| R. Burns ... ... ... ... | Do. ... ... | 130 | 1,068 |
| S. Chapman ... ... ... ... | Brown Leghorns ... ... | 123 | 1,065 |
| A. Hollings, N.S.W. ... ... | White Leghorns ... .. | 112 | 1,063 |
| A. J. Cosh, S.A. ... ... ... | Do. ... ... | 112 | 1,061 |
| Jas. McKay ... ... ... ... | Do. ... ... | 106 | 1,058 |
| Mrs. Kinnear, S.A. ... ... | Do. ... ... | 109 | 1,051 |
| A. H. Padman, S.A. ... ... | Do. ... ... | 118 | 1,034 |
| J. Zahl ... .. ... ... | Do. ... ... | 109 | 996 |
| H. Hammill, N.S W. ... ... | Do. ... ... | 116 | 987 |
| R. Burns ... ... ... ... | S.L. Wyandottes ... ... | 117 | 960 |
| A. Astill ... ... ... ... | White Leghorns ... .. | 109 | 837 |
| R. W. Goldsbury ... ... ... | Do. ... ... | 101 | 820 |
| Mrs. Carmichael ... ... ... | Brown Leghorns ... ... | 77 | 802 |
| J. K. Stewart ... ... ... | White Plymouth Rocks (1) | 90 | 655 |
| J. K. Stewart ... ... ... | Do. do. (3) | 94 | 627 |
| J. K. Stewart ... ... ... | Do. do. (2) | 81 | 539 |
| Totals ... ... ... | ... | 2,640 | 23,634 |

## FEEDING FOWLS FOR EGG PRODUCTION.

By W. HINDES, Queensland Agricultural College.

When fowls are running at large they do not require the same attention as regards food as when they are confined in small runs. When the birds have the run of the farm or a paddock very little food will be required during the spring and summer months beyond what they can find themselves, and if a little maize, which is generally our cheapest grain, is fed at night, they will do very well. During the autumn and winter months, however, if eggs are to be procured in any quantity, pollard and bran mixed with separated milk should be fed warm at daybreak: this, with a little animal food or table scraps at midday and maize or wheat at night, will give very good results. When the birds are confined to small yards, where everything has to be fed to them, they will require the best attention if the best results are desired, and every element for egg-production should be supplied. Under these conditions, maize should be avoided, except by way of giving variety in the winter or on cold wet days. In such conditions, wheat and its by-products have been found the best as a staple food, and these have been largely used in all laying competitions, with good results. The morning feed should consist of two parts pollard to one of bran (a little more or less of the latter, according to the flouriness of the pollard), mixed into a crumbly mass (not sticky) with separated milk. Every alternate morning a little Sunlight oilcake may be added by way of variety. Potato peelings or vegetables left over from the kitchen can be boiled and used with good results. Animal food of some kind is very essential to get the best results. Bullocks' livers are perhaps as cheap as anything else where butchers' meat is available, and anyone living in the country districts can generally shoot a kangaroo, wallaby, or kangaroo rat; any of the above will be useful. If no fresh meat can be secured then the dried blood or desiccated meat will be found a very good substitute, about 5 per cent. (not more) being added to the bran and pollard. It is perhaps best to feed the fresh meat (after having been boiled) at midday. Green feed of some kind must also be supplied. Green lucerne (chaffed) is about the best, but, if not procurable, rape, young green barley, cabbage and lettuce leaves, or milk thistles may all be used with advantage. If possible, it is as well to arrange to have one or more of the above available all the year round. The evening feed should consist mostly of wheat with good heavy oats, kaffir corn, or maize by way of variety, the two former in summer and the latter in winter. As regards the quantity of food, this must be left to the feeder's judgment. To keep the appetites good is the fine art of feeding. Fowls do not always eat the same amount of food; those laying heavily eat far more than those not laying. The birds should be fed at the same time each day. If they do not come to meet you at feeding time, they are not hungry, therefore feed lightly or not at all; they will then be ready for the next feed. The best guide is to give them as much as they will eat up eagerly without leaving any. Never allow any soft food to lie about, as it will ferment quickly and cause trouble sooner or later. Grit—oyster or sea shell—and good clean water, shaded from the sun, should be kept before the birds at all times.

# The Orchard.

## OBSERVATIONS AND CULTURAL NOTES ON GRAPES—No. 3.

BY C. ROSS, Instructor in Fruit Culture.

11. *Centennial.*—The berries are of enormous size, semi-transparent, containing not more than one or two seeds. A most beautiful rich amber-coloured grape of delicious flavour. The vine is reported to be a South Australian seedling, but it proved constitutionally weak at Westbrook, the wood not ripening too well, and in adverse seasons often dying before lignifying, and becoming subject to black spot. It does better when grown as a bush than as a trellised vine, but will not bear too much topping.

12. *Cinsaut.*—A black, Sweetwater grape above medium size, thickly dusted with an intense blue bloom. The medium-sized bunches are very beautiful. The variety hails from France; good habit of growth, vigorous but not rampant, and is very hardy. A suitable variety, grown as a bush, for dry situations.

13. *Doradillo.*—A large, rich, amber-coloured grape with a thick skin, and a good carrier. This variety is largely grown in South Australia and exported beyond the limits of that State. The vine is very hardy, and gives good returns, on even dry, poor, thin land. It is well adapted as a bush, and should be short pruned.

14. *Ferdinand de Lesseps.*—An oval, golden-yellow grape of first-class quality; the flavour is that of muscat, with a distinct strawberry aroma. The skin is so thin and tender that it will not carry. The vine is a strong, vigorous grower, and requires trellising. The variety is an English-raised seedling, being the result of a cross between Royal Muscadine and the Strawberry Grape. Its excellent and peculiar qualities recommend it to every collection.

5. *Gros Colman.*—Synonymous with Dodralabi—a late, very large, round, jet black, vinous grape. Owing to its handsome appearance, firm flesh, and tough skin, it is a good carrier and very valuable for distant markets. The flavour is, however, not first class. The vine is vigorous and a great cropper, but should not be allowed to overbear, or a want of colour would soon be apparent. It is very hardy, and easily cultivated, and does well anywhere. It has been grown under glass in England for fifty years, but its origin is obscure. The variety has been grown under various synonyms in European countries, from France to the Caucasus, for a much longer period.

16. *Gros Guillaume.*—A round, black, vinous grape. The bunches are enormously large, covered with a fine bloom, and very handsome. The bunches have been grown over 2 ft. in length, and fully more across the shoulders. The weight of the record bunch was 23 lb. 5 oz., grown under glass at Charleville, Ireland. The flesh is tender and juicy, but must be well ripened to bring out its flavour. The vine is a very vigorous grower, attaining a large size in a short time; very suitable for an over-head trellis. Its fruiting habit is very erratic; some plants are abundantly prolific, others scarcely showing any. The warm, dry districts of the West would be more suitable for this variety than the coastal belt.

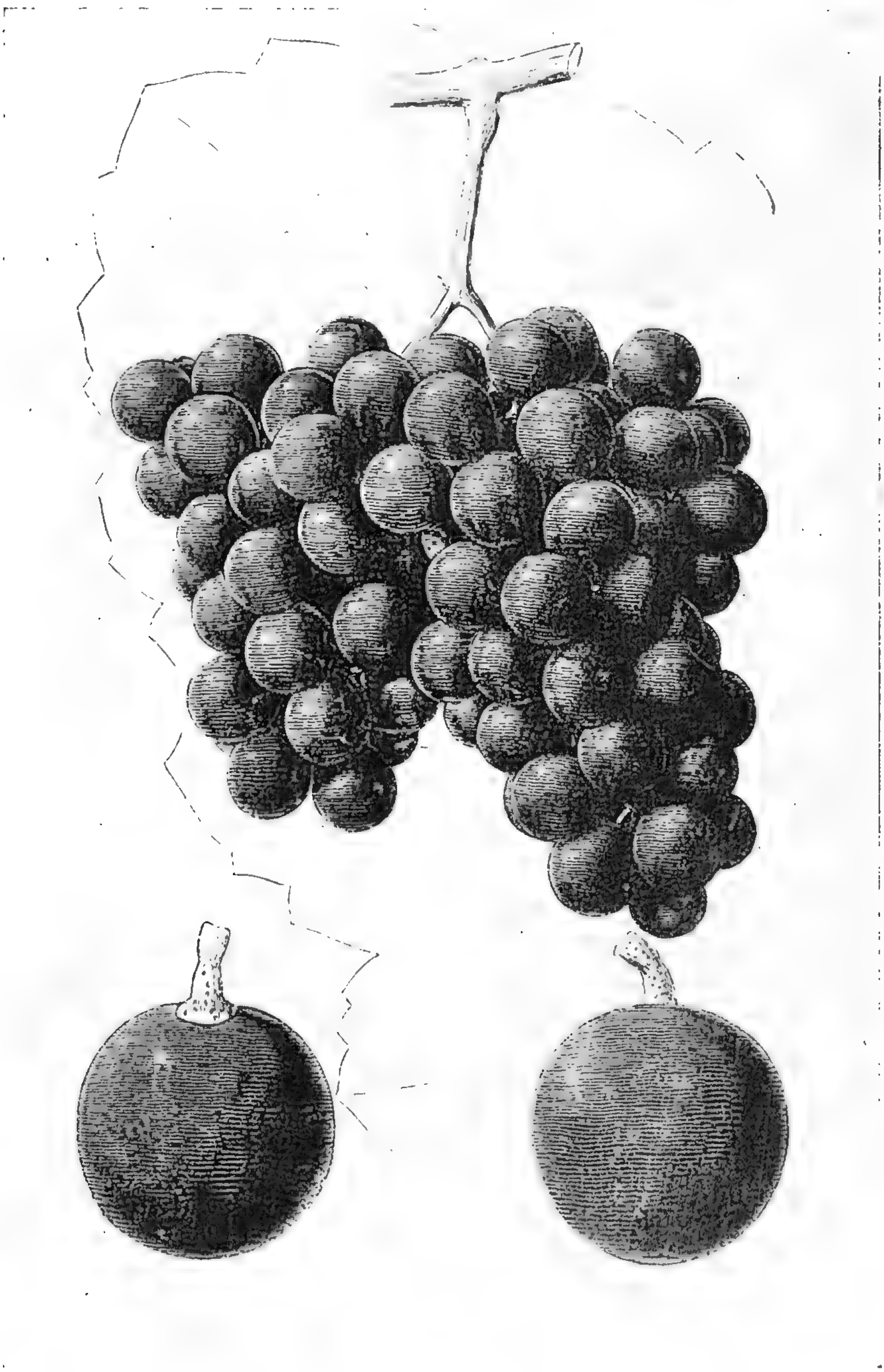


PLATE 37.—GROS COLMAN. (Bunch, $\frac{1}{3}$ natural size; Berries, natural size.)

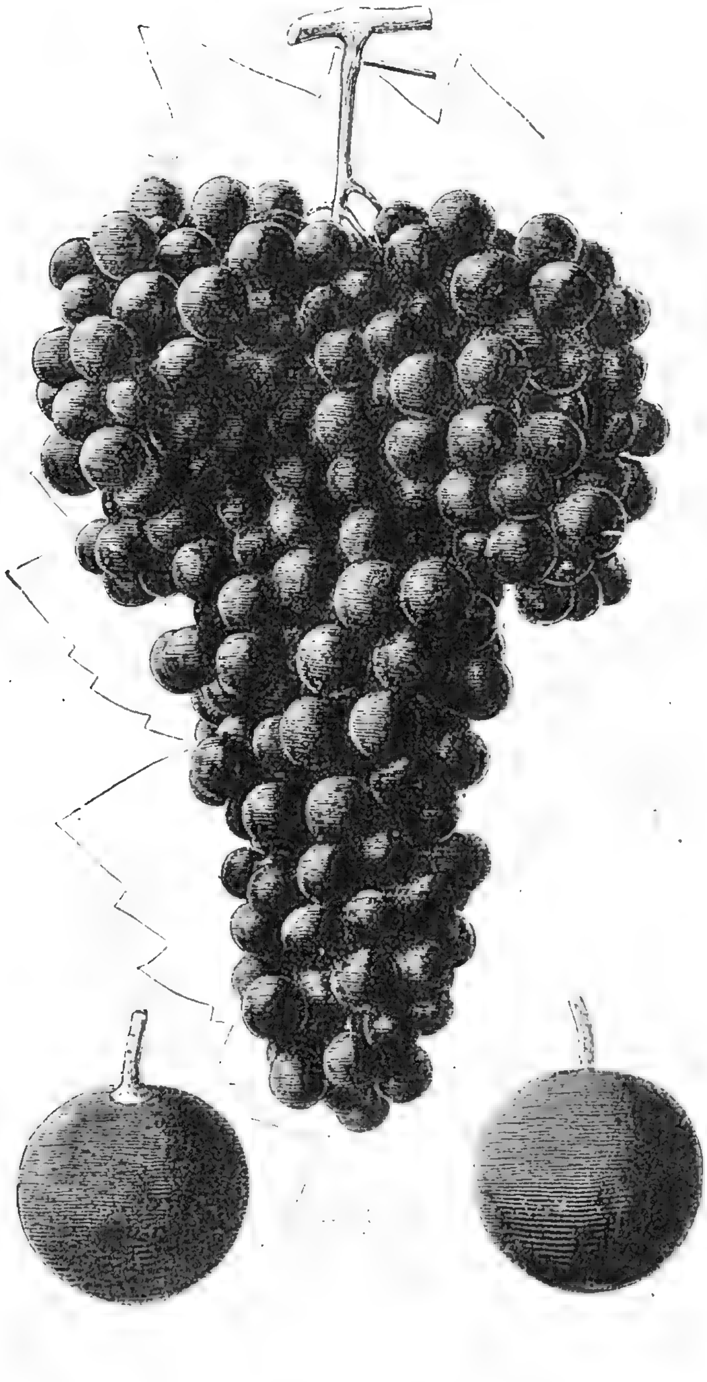


PLATE 38.—GROS GUILLAUME. (Bunch, $\frac{1}{3}$ natural size; Berries, natural size.)

## THE MUSK MELON OR CANTALOUPE.

(*Cucumis melo reticulatus.*)

The Cantaloupe is a small oval, ribbed variety of the musk melon, which latter is largely grown in the United States of America. The name Cantaloupe is derived from the Castle of Cantalupo, in Italy, the owner of which is said to have imported them from Armenia. The plant is an annual trailing vine, sensitive to frost, and is thus treated of by the Associate Editors of the "Farmers' Encyclopœdia of Agriculture," New York, Orange Judd Company:—

"The musk melon vine bears round or oval fruits, which weigh from 1½ to 6 lb. It is successfully grown all over the United States, and is an important commercial product. It resembles the cucumber in manner of growth, and is cultivated like it. Contrary to the usual belief, it does not cross with cucumbers, squashes, &c., and the quality of the fruit is not injured when they are planted with or near those crops.

"The term Cantaloupe is frequently, but incorrectly, applied to the whole group of musk melons. It is properly applied to only one group (*C. melo cantalupensis*), which is characterised by a hard, scaly and often deeply furrowed rind, having a warty appearance like a Hubbard squash. This true Cantaloupe is little grown in the United States, but is much prized in Europe.

"*Soil and Planting.*"—Like the musk melon, the Cantaloupe requires a quick, warm, sandy loam for its best growth. Musk melons generally transplant with difficulty, and it is generally advised that for this purpose they be planted on thick sods cut 4 in. square. These should be placed close together, grassy side down, in a hotbed, hollowed out somewhat, a little rich soil filled in, and six to eight seeds planted on each. The plants should be hardened off and set out in the field after all danger of frost has passed, and the three strongest plants allowed to stand in each hill.

"The usual practice in growing melons and Cantaloupes out of doors in the United States is to plant ten to fifteen seeds in hills 3 ft. apart in rows 6 ft. apart. When strong enough to resist the attacks of insects, the plants are thinned to the three strongest in the hill.

"With respect to manure, which the American farmer uses even on virgin soil, it was found on the New Jersey Station that an increase of 115 per cent. in yield of fruit resulted from the application of 150 to 200 lb. of nitrate of soda per acre. Half the fertiliser was applied at planting time about the hills and worked into the soil, and the remainder about three weeks later. Dried blood and sulphate of ammonia, used in the same manner, were a little less effective, but increased the yield from 87 to 91 per cent. A handful or two of fertiliser should be mixed into the soil of each hill."

[From the above it would appear that the Cantaloupe is largely grown in America is really the musk or rock melon, the true Cantaloupe not being much valued.]

Concerning Cantaloupes, Mr. R. S. Nevill says:—

Cantaloupes are so called from the Castle Cantalupo, in Italy, where they were first grown in Europe, from seed said to have been imported from Armenia. It is of the variety of musk melons, but very different in shape, size, and flavour from the old-fashioned musk melon. The musk melon is now very little grown in the United States of America. It is golden in colour when ripe, rather torpedo in shape, and somewhat negative in flavour. The Cantaloupe is what is known in Australia as a rock melon, and some varieties of it are sometimes called the nutmeg melon; it is the preferred melon with the American consumer. There they are usually put on ice over night, and eaten at breakfast, usually with salt and pepper, rarely if ever with sugar, except among what they call the "Yankees," who are inclined to put sugar on or in everything.

---

## NATURAL ENEMIES OF THE BANANA OCCURRING IN QUEENSLAND.*

BY HENRY TRYON, Government Entomologist and Vegetable Pathologist.

(CONTINUATION.)†

### NEMATODE ROOT GALL OR FLASK WORM DISEASE.

*Symptoms and Action.*

This malady of the Banana that results in the gradual failure of the plant, terminating in its death, is caused by decay following a most remarkable alteration in its root-system. In the course of the rootlets, and of the main roots from which these spring also, are formed gall-like swellings that ultimately are the sites of decay, with the result that not only are these organs unable to absorb the plant-nutrients that the soil yields, but toxic principles, that are formed in consequence of this decay, gain admission to the plant's system. These symptoms are very characteristic; but the yellowing and premature death of the older leaves, a general failure to thrive, and absence of marketable fruit—the common results of several root affections—are the features that more commonly direct attention to the existence of the malady; and we find also with root-gall disease, that not only may the individual shoots (suckers) remain stunted, but there is a tendency for their leaves to be small and crowded together instead of being large and widely expanding. Even more evident changes may be brought to light on cutting through the "stem" longitudinally. Then it will be seen that the apex of the shoot has rotted; and that a brown-coloured liquid more or less saturates the open framework of the leaf sheaths that all around enclose it—a harbinger, as it were, of decay in these parts also. Ultimately these changes may be succeeded by death.

This malady of the Banana was formerly prevalent in the Brisbane district, and subsequently did much damage in the Cairns plantations, even to the extent of causing their abandonment in some instances. In other countries, also, it has been similarly harmful; for instance, a few years since in the district of Alexandria (Egypt) it destroyed large areas of plants belonging to the Cavendish variety (*Musa sinensis*), and a recent

* This general account of the Banana Maladies of Queensland is reproduced from a Bulletin "The Banana in Queensland," by A. J. Boyd; Department of Agriculture and Stock, Brisbane; by authority, Oct., 1910 (*Op. cit.*, pp. 15-29).

† *Vid.* Queensland Agricultural Journal, XXVIII., Pt. 2., pp. 116-119, Feb., 1912.

writer on the Banana states—"Von den tierischen Feinden der Banane ist die gefährlichste die Nematode, *Heterodera radicola*": (Dr. M. Zagorodsky, "*Beihefte zum Tropenpflanzer,*" Bd. XII., No. 4, p. 373 1911).

*Origin and Cause.*

The cause of this Banana root-gall disease was first made known by the pioneer investigator of the plant diseases of this State, the late Dr. Joseph Bancroft, M.D. His discovery is briefly alluded to, without bibliographical reference however, in the "Kew Bulletin of Miscellaneous Information" for August, 1894, vol. iv., No. 92, p. 281. Dr. Bancroft himself detailed it in an interesting lecture that he delivered in the Divinity Hall, Brisbane, on 16th June, 1879; and the text of this, with a plate illustrating the origin of the malady, was afterwards published here in pamphlet form.* The diseased condition of the affected plants, accompanied, as has been stated, by "root galls," was—he demonstrated—due to the development in and in connection with these bodies of certain minute worms of two sexes, that in due course—in the case of the female nematodes—became flask-shaped and occupied cavities therein; and that, after becoming packed with eggs, the "flask worms" gave rise to larval individuals; whilst, meanwhile, the cavities they occupied opened in the gall surfaces, and so were occasioned wounds, that resulted in the decay of these bodies; and, that thus the roots on which they occurred perished in the soil, whilst at the same time the parasites became liberated therein to in due course attack other plants, and so cause further injuries, &c. The disease, the Brisbane savant further pointed out, was not peculiar to the Banana plant, but victimised also numerous other ones. He also named it "Flask Worm Disease" [not "Flash Worm," as stated in the Kew "Bulletin" already cited] in allusion to the form mentioned as that which the gravid female ultimately acquired.

Following Dr. Bancroft's discovery, this Root Gall Disease was met with on the roots of Banana plants of the species *Musa dacca* and *Musa rosacea* that were being cultivated at the Botanical Gardens, Berlin; and Carl Müller, being called upon to investigate it independently, confirmed the former's conclusion, naming the parasite *Heterodera radicola,* Von Greeff, thus identifying it with a nematode that had been originally found in 1864 by Von Greeff, attacking in a similar manner the roots of grass. [cf. Müller (C.), "*Landw. Jahrb.* xiii., 1884. pp. 1-42.]

Dr. Alex. Pryer, of Cairo, in 1902, repeated the observations of Bancroft and Carl Müller when investigating the Alexandria outbreak.† He, however, names the parasite *Tylenchus radicola* in deference to the views held by some that the genus *Tylenchus* should embrace *Heterodera*; and he in turn has been followed by Dr. Loos and G. P. Foaden, at whose hands the Egyptian occurrence has also claimed attention.‡

* Bancroft (Dr. J.). "Diseases of Animals and Plants," pp. 9-11. Plate. Brisbane, 1879.

† *Vid.* Pryer (Dr. Axel). "Schadigung von Bananen durch Nematoden": "Der Tropenpflanzer," 6 Jahrg., No. 5, p. 240-2 (1902).

‡ "Preliminary Report on the Nature of the Banana Disease prevalent at Alexandria.' "Journal of the Khedival Agricultural Society," Vol. iv., No. 1, p. 9 *et seq.*, Cairo, 1902.

*General Consideration.*

This account of the disease as being due to the attacks of a parasitic nematode, named *Heterodera radicola,* shows further that it is identical in origin and nature to a plant affection of very wide occurrence in the vegetable kingdom. This, Dr. A. B. Frank informed us already in 1896, as the outcome of his own observations and those of other inquirers, affected fifty different plant-species distributed in no less than thirty families—a statement that, as we now know, does not cover the full range of its distribution. According to this, the literature that has a bearing on the Banana disease under consideration, is very comprehensive indeed.

The subject of the nature and cause of the disease is as fully treated of as is necessary for the purpose of this Bulletin; but it may be added that its virulence is not dependent on the number of nematodes attacking the root system so much as on the occurrence of such soil conditions as may contribute to the decay of parts already infested, and exhibiting the structural injuries that they are wont to determine, as well to the well-being of the various organisms that promote this decay.

Again, it may be remarked also that the parasite persists for a considerable period in the soil, during which it lives a free life or may remain there dormant in the egg; and that, in consequence of this, it can be disseminated by any agency by which soil or its particles are transferable—*e.g.,* by flood water, horse implements, &c., and even occasionally by the wind.

It may, too—as we have seen—establish itself in the root systems of many different plants, both weeds as well as cultivated ones; and hence not only can it be conveyed from spot to spot by their agency, but these various plant hosts offer the opportunity for its multiplication. Commonly, plots of Bananas grown in Southern Queensland become infested with nematode gall worms by planting in land they occupy seedling tomato or tobacco plants already harbouring them. Accordingly, it is important that the agriculturist should study to recognise this disease in all plants liable to its attacks, even in the very earliest phases in which it betrays its presence in them.

Again, Banana plants become affected by it through being planted in soil in which the nematode worms are already prevalent through having grown plants victimised also by this "Root Gall."

*Remedies.*

With regard to the question of remedies, it may be pointed out that the nature of the malady is such that, as is obvious, direct applications to the plant will be of no avail. Nematode-affected plants sooner or later die, even though in dying they may yield fruit; and when they have not died, ill-health soon renders them unremunerative.

As to treating the soil, in order to rid it of root-destroying nematodes already present therein, measures that are available are not practicable under the circumstances of Banana plantation in Queensland, and perhaps of those elsewhere also; and even so, were the cost connected with them not too excessive—as we find it to be—to admit of their application. These measures consist in sterilising with steam or by high temperatures otherwise attained, or by the use of chemicals —themselves harmless to the soil—and in trapping. When the nematodes are prevalent in the soil, their numbers may doubtless be reduced to harmless proportions by the use of trap crops. This method involves (1) planting some crop that the nematodes are especially partial to, and therefore will soon infest, (2) removing this carefully with its root system entire, before sufficient time has elapsed for mature eggs to arise, and these or the young worms issuing therefrom to gain access to the soil, and (3) on such extirpation being perfected, introducing the cultivation of the plant to be raised.

From experiments conducted by Strubell in connection with the allied gall-worm of the Beet Root (*Heterodera schachtii*), this degree of development will take place in as short a period as five weeks. This costly method has been found practicable and efficacious in dealing with so valuable a crop as the Sugar Beet. In practice the use of the trap crops has to be repeated several times, and the soil, in the intervals of successive planting, kept well tilled and free from weeds.

It is, however, essential to adopt every means that can be suggested for excluding the parasitic nematodes from land as yet "clean," and to especially provide that suckers employed to establish the Banana plantation are quite free from disease and have been derived from plants that are themselves similarly healthy; but, since the detection of the disease is not always readily effected, this is a matter of no small difficulty.

In Egypt attention has been concentrated on procuring a Banana that, whilst possessing the high qualities of the Cavendish variety, is highly resistant to nematode attack. Some success has already, it is stated, followed efforts in this direction; but these have not, in our opinion, so far produced results of very material value.

## FRUIT GUMMING.

This disease of the fruit is characterised by the appearance of a thick tenacious gum-like substance that issues in drops from the flowers surmounting the developing fruit (fingers). The gum itself is yellowish coloured; pus-like, in fact, when freshly formed; but with age it turns to brown and then nearly black. A shallow fissure on the outside of the base of the flower-tube or perianth, that has become dark coloured here, is the site where it principally issues. To a less extent it may, however, also occur within the flower and on the outer face of the stamens. With its appearance, the flower commences to blacken and shrivel, the pistils and stamens being the first to be affected—in fact, it causes the flower to die away prematurely. As it progresses, the young fruit, too, blackens at its extremity, and with shrinkage gaping wounds may appear here; and, once attacked, it never fully develops. Again, on cutting it across just behind its extremity a triradiate brown figure will be seen occupying the centre of the section, occasioned by the darkening that the placental surfaces of the capillary cavities or locules have undergone. Fruit so affected remains generally too, stunted, dry, and useless.

Only a certain number of flowers, with the young "fingers" that they crown, are affected by this gumming disease at a time; and it is distributed throughout the bunch in a very irregular manner. This remark applies not only to the several "hands," but to the "fingers" that they contain. Occasionally every hand will exhibit the trouble; but this is not usually the case.

Taking a single flowering bunch, in which 8 "hands" were exposed, whilst others were still uncovered, beneath the floral bract, all but 1 showed gumming, the number of "fingers" in each "hand" affected ranging from 2 to 17, and in the total number of "hands," 50 fingers were diseased and 150 disease-free. Again, in a second bunch exhibiting also gumming-disease, and in which 9 "hands" were exposed, 4 were affected, the fingers ranging from 1 to 19 in each, and in the total number of "hands" 41 were diseased and 178 healthy.

The Cavendish variety (*Musa chinensis*) is the only Banana in which the writer has observed this disease. It occurred at Cairns. The late Instructor in Fruit Culture (A. H. Benson) has brought under his notice the existence of what evidently is the same malady—affecting the Cavendish Banana also—on the Blackall Ranges of South Queensland. It was met with there only sporadically, however.

Observations tend to indicate that Gumming Disease of the Banana is a local affection, and apparently of bacterial origin disseminated by puncturing insects. A number of flowers comprised in bunches that exhibited it were found to contain examples of Thrips, two or three occurring in each.

### FRUIT "RUST" OR FRUIT "SCAB" OR "COLOUR."

The appearances characteristic of this affection have been thus ably described:—"The earliest stages, as they occur in fairly well-grown but still green Bananas, such as would be cut for shipment, are as follows:—A reddish-brown colour appears on the green skin in the form of minute transverse markings. These marking soon merge into a uniform brown area, often of considerable extent, some parts of which may become black. In the midst of this dark-coloured area numerous shallow longitudinal cracks make their appearance. Following upon the appearance of the cracks, the skin begins to dry up and take on a greyish-brown colour, the cracks meanwhile assuming larger dimensions, though never becoming more than a millimetre, and seldom more than half a millimetre wide. The cracks finally run together more or less, so that the surface of the skin of the fruit reminds one of the appearance of crackled glassware. . . ." Pustules may be found scattered over the green or reddish parts of the skin in the form of minute raised points.*

When once the foregoing symptoms are fully developed, the fruit becomes dry and tasteless, and has a comparatively low value—in fact, it

* Cobb (W. A.). Banana Scab: Letters on Diseases of Plants. Misc. Pub Dep. of Agr. N. S. Wales, pp. 29-30, Sydney.

is only saleable on a scarce market, and the prices realised are much below those obtained for clean fruit.

The Fruit Disease is found in the Cairns and other districts of North-East Queensland, affecting the Cavendish variety of Banana (*Musa chinensis*), and is more prevalent during some seasons than others. Sometimes nearly all the hands of a bunch are affected, but this is not commonly the case. It invariably commences on the Banana fruit at a spot where adjoining fingers on a hand come into contact, and here the " brown area "—spoken of by Dr. Cobb—with a paler central portion appears; and, very often, the trouble does not proceed beyond this stage.

With regard to the cause, Cobb has suggested that it might be brought about by " a fungus having the power of attacking and penetrating healthy epidermis" (fruit rind), but leaves the question still open. For this hypothesis he finds support in the fact that fungus spores may occur in the skin cracks, and even within the point-like pustules whose presence is alluded to in his description of the disease already cited. In each case, however, the presence of these fungus elements is difficult to demonstrate, and is certainly not an invariable occurrence. His description, moreover, of the point-like pustules, as "Perithecia " (spore-cases), is certainly not one that mycologists examining them—or even his figure representing one of them—will allow.

The writer's observations on Banana cultivation where this " Fruit Scab," " Rust," or " Colour " is manifested, lead him, on the other hand, to conclude that this blemish of the fruit is directly brought about by the puncturing of the green skin by a particular insect belonging to the group of Fringe Wings or Thripidæ, examples of which—few, indeed may invariably be met with in the narrow space intervening between the " fingers " on which marks are being developed. Moreover, the changes that the altered epidermis of the skin involved in the markings has undergone, as seen on examining microscopical sections of it, support this explanation of their origin.

Dusting the bunches with flowers of sulphur will to some extent reduce the formation of this " Colour," " Rust," or " Scab."

[TO BE CONTINUED.]

---

## BANANA STUFFING.

A new banana recipe is savoury banana stuffing (for roast pork, goose, or duck, &c.).

Peel six to eight ripe bananas and chop rather coarsely. Season well with salt and pepper, and add half a breakfast cup of white breadcrumbs, a beaten egg, chopped parsley, and savoury herbs to taste. Mix the whole well, and stuff the meat or birds in the usual manner with this preparation. The delicate flavour of the bananas gives a delicious aroma to the birds when cooking.—" E. News," 1st November.

# Tropical Industries.

## THE CASHEW NUT.

By HOWARD NEWPORT, Instructor in Tropical Agriculture, Cairns.

In and around some of the oldest townships of North Queensland one frequently comes across imported trees and plants possessing a high economic value, the properties, the name, and often even the very existence of which is unknown to the present settlers.

In such places as Cooktown, Cardwell, Bowen, and the Herbert River district many such valuable trees and shrubs are to be seen. These are mostly in the gardens surrounding some of the oldest houses or sites of old residences, in Botanical Gardens or what were once such, and often on isolated spots in perhaps the middle of a grazing paddock or patch of secondary scrub, that mark the sites of the original homesteads of early farmers or settlers of which nothing now remains to indicate a once flourishing garden but an irregular group or broken avenue of such trees. Among these the mango is usually conspicuous, but the taste and fancy of the original and long gone pioneer is exemplified in the varieties and kinds of trees that, evidently chosen with wisdom, collected and obtained with difficulty, and planted and tended with the greatest care, must often never have attained maturity or fruited during his time, and now wastes its value and rarity on a, too often, totally unappreciative owner.

In many such instances the individual tastes of the pioneer, born possibly of an acquaintance with, and appreciation of, certain fruits, nuts, &c., in some other tropical country, will no doubt account for the existence of particular species; but in very many instances, though actual trace of their origin is lost, the distribution of economic plants to localities specially suited to their successful propagation can be largely accounted for by the work of the Acclimatisation Society of Bowen Park, Brisbane, in the early days of its existence, and to membership of it by the early settlers thirty and possibly forty years ago.

No doubt, also, many other plants, shrubs, and trees of interest to the settler as reminding him of other climes, or the establishment of which was judged as within the realms of possibility, were thus obtained, planted, and subsequently lost. Also doubtless numbers of such more or less uncommon trees have been destroyed, even after showing their adaptability to their new conditions, either purposely or unintentionally by later settlers who "knew not Joseph."

In some instances trees and plants of this nature have, by reason of their unusual fruit or some other characteristic, attracted attention and been reidentified, or vague or curiously twisted names and more or less legendary ideas of their uses are retained.

One thing particularly noticeable among these economic trees, &c., that have, so to speak, never "caught on" with the later generation of settlers, on account most probably of their affording no indication of an immediate cash realisation of their products, is that they were in nearly every instance of excellent quality. Hence the old group of mango trees in the old paddock, the stray citrus tree now surrounded and all but killed out by scrub, and the odd tree in an old back garden, has a fruit frequently surpassing in sweetness as well as in other respects the average present-day type.

Some of these unusual trees belong to drier countries, and the past season, bordering in parts on drought, has possibly resulted in an unusually prolific fruiting. In a recent visit to Cardwell a specimen of the Cashew Nut (*Anacardium occidentale*) was found in bearing. Though very uncommon, several of these trees also exist on the Herbert River, but the best specimens are among the two or three to be found in and around Cardwell.

This tree is a native of both the East and West Indies. There are many varieties with varying properties and uses, some of them poisonous; but two are edible—a red and a yellow fruited variety. It was a fairly well grown specimen of the yellow-fruited variety that was brought to me for identification, with the story that children were very fond of the acid juiciness of the fruit, but that one child in particular, and other people at various times, had experienced painful burning of the lips and tongue on biting the seed or seed case. To those not acquainted with the nature of this peculiar fruit the accompanying "snapshot" will show that it

PLATE 39.—THE CASHEW NUT.

(Specimen from the Garden of Mr. C. F. Clarkson, Cardwell, N.Q. Young fruit with blossom on the left mature; fruit on the right hand side.)

is a fruit somewhat pear-shaped, some 3 in. long by 2 in. to 2½ in. thick, and that it has its seed (kidney shaped) below and clear from—instead of, as is usual in fruit, surrounded by—the pulp.

It is this very nut, however, that is the reason of this tree being thought as highly of as it is in most Eastern countries, being when prepared the Cashew or Promotion nut of commerce, one of the most prized delicacies in the way of dessert table nuts, and a favourite ingredient of sweetmeats of both the East and the West Indies.

Though this highly prized nut is grown on the tree unprotected by pulp and in a position apparently defenceless from the attack of birds and animals, Nature has afforded it another and singularly effective means of protection. From the first moment of pollination the seed or nut monopolises the available plant food, quickly attaining its full size. Meanwhile the pulpy portion of the fruit appears merely as a somewhat thickened stalk or stem above the boomerang-shaped seed. (See illustration.) At this stage the nut is a bright-green colour, but from now on, as the fruit proper grows and ripens, the nut merely matures, and in doing so shrinks slightly and changes from a green to a dull-grey colour. When thoroughly ripe the fruit can be eaten, and may be preserved or dried in the usual way, but is generally very acid, and is not thought much of. The nuts at this time may be collected, but must be treated with respect. They are not edible in the raw state at all. The outer grey shell is tough, and when cut open exudes an oil, which quickly turns black on exposure to the air. This oil is known as Cashew Apple oil, Cardoil, or Cardole, and is a dangerous corrosive poison; the effect on the skin, especially of the lips or face, if the raw nut be bitten, is very similar to that of crude carbolic acid. The oil of this species is more or less volatile, or, at any rate, can be rendered innocuous by heat, and hence the nuts before use, or even shelling, are, in the East, treated by being roasted. At first the very fumes are disagreeably acrid, but when these have passed off the outer skin or husk can be readily broken away, disclosing the kernel still covered by a skin similar to that of an almond, but usually a greenish-grey in colour. In this form the nuts are marketed, but are often re-roasted, and the final skin removed before appearing on the dessert table, and when so prepared are not only free from any disagreeable acridity, but are undoubtedly of a very fine flavour.

The Cashew Apple oil or Cardole, as opposed to a bland oil obtained from the cured or cooked kernels, is used medicinally in India, and sometimes as a poison. In a nearly allied species—*Semecarpus anacardium*—the Indian Marking Nut—the same acrid oil is found to an even greater extent. The fruit is similar, but smaller, and the kernel of the nut very small and never used. These nuts are collected and stored by the Indian "dhobie" (washerman), and used by him for marking clothes. The top of the nut is cut off, and a pen, or sharpened piece of wood, dipped into the thick black semi-liquid contents, with which marks made on cloth will never wash out. Of the same genus are the "Tar" trees of North Queensland (*Semecarpus australis*), specimens of which are to be seen on the Cairns esplanade. These trees exude a similar black acrid matter (hence the colloquial name) not only from the nuts, but also from the bark, roots, and leaves, but which apparently is rather less oily in nature than that of the edible Cashew Nut.

The fruit of these Tar trees is similar in shape and form to the true Cashew Nut, though smaller, but the "tar" is exactly similar in effect to the oil of the nut, and many instances are on record where children have been more or less seriously affected by inadvertent contact with it on some part of the body. Blindness is said to be the inevitable result of a particle of this sap getting into the eye, and at the Yarrabah Aboriginal Mission Station, where the aboriginal boys on hot nights sometimes prefer to sleep in the open, it is stated that they have been affected with an irritation of the skin by merely sleeping on the ground under these trees.

The trees are evergreen, rough barked, and often crooked and knotted. They prefer sandy soil, and hence are often found on or near the seashore. The fruit of this species is sufficiently unusual to generally attract attention, and a word of warning against allowing children to bite or play with the green or raw nuts under the fruit of the edible species, and against even touching any part whatever of the indigenous Australian species, may not come amiss, and may save a great deal of inconvenience and pain.

---

## WARNINGS TO RUBBER PLANTERS.

BY O. W. BARRETT, Chief, Division of Experiment Stations, Philippine Islands.

In the belief that no good can result from withholding bad news, and also that "being forewarned is being forearmed," we feel it is incumbent upon us to issue a warning to importers of Pará rubber stumps in regard to the possibility of introducing the "Brown Root Rot" disease (*Hymenochæte noxia,* Berk.) from the Malay States. What is believed to be this very fungus has recently made its appearance in at least one plantation in the Philippines, and its virulence seems to be as great here as in the Malay States, since it kills the Pará trees coming in contact with it in apparently a very short space of time.

Judging from the circumstances it would appear that the fungus in the sole case coming under our notice was a strictly local or spontaneous affair, though we hesitate to state that this disease is really endemic here. It is more or less common in both Ceylon and Malaya, and is probably causing considerable damage both in the Samoa rubber plantations and in West Africa. Fortunately it is a contact fungus—that is, it spreads from one root directly to another without traversing more than a very short space, if any, in the soil itself; if it should also produce spores on trees long dead from its attack, such spores might, of course, spread widely and cause very extensive damage if they found a congenial lodgment.

Any stump or seedling plant of Pará rubber coming into the Philippine Archipelago from Ceylon or Malaya giving the slightest indication of a grayish-brown decaying area should be burned at once, and all plants in contact with it should be thoroughly disinfected. Either the taproot or the feeding roots may become first infected, and in the nursery or seed bed the plants may show no symptoms of the disease until the crown becomes affected, at which time the plant begins to shed its leaves; within a week or so from the time of the cutting off and poisoning of the sap supply at the base of the trunk, the tree may be dead.

Another disease against which Pará importers should guard is the "Dieback" (*Thyridaria tarda*, Ban.); this is a wound disease, and would be in evidence around the top of the stump or in cuts on its base. Still another is the so-called "Pink Fungus" (*Corticium javanicum*, Zimm.), which affects Pará, tea, and other plants in India and Ceylon. This fungus attacks the trunk usually at the fork of the branch, and may be easily identified by its pinkish colour.

Thus far all Pará plants in the Philippines seem to be free from leaf diseases, but a close watch should be kept by planters, and prompt steps for the destruction of any leaf-blight, as soon as evident, should be taken.

The common Fomes disease, though a very serious matter in Malaya, is nothing to be frightened about thus far in the Philippines; this fungus spreads only in wet or badly drained soils. It is probably more or less common throughout the Oriental tropics. If not promptly attended to in a plantation it can cause very heavy losses.

There is comparatively little risk of introducing the germs of these fungi on seeds, although, of course, there would be considerable danger if soil were used in packing.

We take this opportunity to call attention to the fact that Pará seeds coming from Singapore and any of the Malay States should *not* be packed in fresh charcoal. Charcoal which has not been "*weathered*" is almost "sure death" to any seed which does not endure drying out, and a great amount of valuable material has been lost in recent years through ignorance or carelessness on this point. By far the best material for packing Pará seeds is cocoanut-husk dust, in a "tobacco moist" condition. Seeds can easily be kept for six months in this material, whereas they would probably not endure more than six days in charcoal. As a substitute for cocoanut-husk dust, sawdust or sphagnum moss may be used, but care should always be taken that there is no excess of moisture. It must be remembered that all live seeds breathe, especially those which do not immediately become dry after maturity, and allowance should be made therefor by means of ventilating the packing case.

The fatal effects of charcoal upon the seeds are due to the fact that fresh charcoal has the property of condensing gases on its surface, and since even a small lump of charcoal has really a tremendous area of surface (on account of its porous cellular structure), we can understand how the vital gases in a box of seeds can be practically removed and the normal respiration processes inhibited thereby.—"Philippine Agricultural Review."

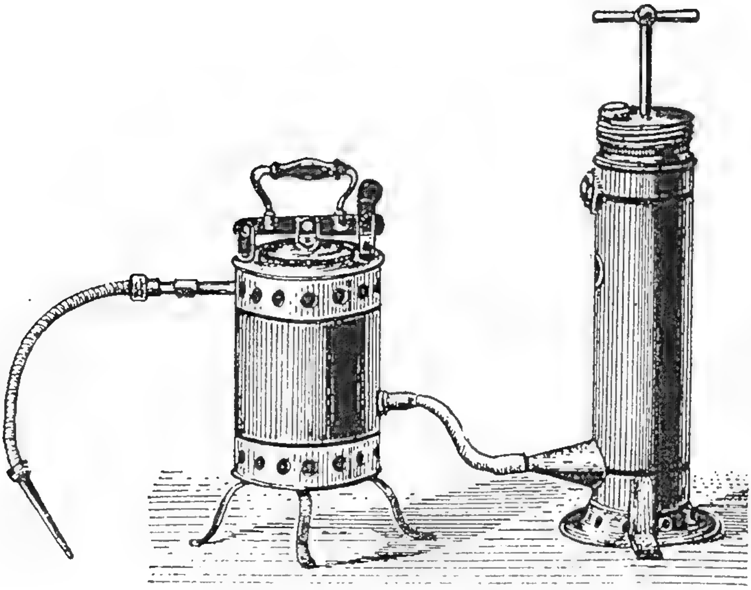
## A NEW METHOD OF CONTROLLING TERMITES THROUGHOUT THE TROPICS.

(From Notes Furnished by D. B. MACKIE, Agricultural Inspector, Philippine Islands.)

The various species of white ants, or termites, constitute one of the most serious insect pests on cultivated estates in the Tropics. In some countries only dead wood is attacked, while in others even living plant tissues are devoured, especially in case of the temporary scarcity of decaying timber; for instance, immediately after the clearing of a forest area. The damage to live plants is usually comparatively insignificant as compared to the destruction of timber, wooden implements, &c., about estate buildings. Even in places as far north as Washington, D.C., U.S.A., certain species enter houses and destroy books, furniture, &c.

Attempts along the line of rendering timber used in the construction of buildings, &c., obnoxious or impermeable to termite attacks have been carried on for the last decade or more, but it is only within the last few years that a really scientific method of directly combating the pest itself has been worked out. Of course, timbers can be soaked in tar, creosote, or any number of chemical preparations, thus protecting the material from the pest. Moreover, it is a fairly simple, though not always effective plan, to destroy the queens of the species which construct nests of earth for the rearing of their young; however, since it is almost impossible to destroy an entire colony, even by the use of kerosene, arsenic, or carbon bisulphide, this method has been rather unsatisfactory.

It has long been known that termites are particularly sensitive to arsenic, and at the same time very easily killed or driven away by either arsenical baits or by white arsenic itself deposited in the galleries of the nest. In order to make the destruction of the colony complete, then, it is only necessary to carry arsenic, in some form, throughout the nest and all of the galleries leading to it. It is now known that the vapour of white arsenic and sulphur burned together in a suitable receptacle and introduced into the nest, or even one of the main galleries leading thereto, will permeate the entire structure of the colony, leaving a poisonous deposit throughout the course of the fumes, and at the same time immediately killing nearly all of the insects by suffocation. All that is required is a metal box of some sort, which can be readily heated from beneath, connected with a flexible tube which can be inserted into the nest or main gallery. The lid of the box should, of course, fit tightly and there must be some sort of a pumping apparatus to force the fumes out of the poison chest through the flexible tube and to the extremity of the smallest gallery, even if it be 20 metres from the central nest. Machines are now on the market at a reasonable price for performing this operation. The principle is the same in all; that is, a charcoal-burning stove carrying a fume chamber on top forms one piece and a hand pump, which forces air into the fume chamber—thus driving the fumes into the nest—forms the second piece. Rubber tubing connects the pump with the main apparatus, and at the end of the hose leading from the fume chest is a metal point for thrusting into the hard structures of the nest.



Pump, fume chest, etc., used for destroying termites.

About three parts of sulphur to one part of arsenic is the best combination of the fume substances; the heat of the charcoal is sufficient to vapourise both the sulphur and arsenic, and these vapours combine more or less, forming arsenic trisulphide, which is deposited throughout the galleries of the nest and also upon the individual insects. A nest so treated is probably never again habitable by any colony that might attempt to annex the abandoned structure.

The operation of this fume apparatus is exceedingly simple, there being but few chances for a mistake to be made in its manipulation. It should be remembered, however, that moist clay, or something similar, should be placed around the nozzle of the fume hose at the point of its entrance into the nest, gallery, or infested timber; this air-tight packing will prevent the escape of the fumes. In the case of ground infested by termites whose nests are not plainly in evidence, a rod may be used to make an opening into the earth wherein the galleries are suspected to be situated. Except in very heavy soil these artificial galleries generally break into one or more of the termite tunnels, and thus the fume hose inserted into the hole made by the bar or stick will convey the fumes to the nest and galleries within a reasonable distance therefrom.

Five minutes of pumping is generally sufficient to impregnate the nest and galleries with the fumes. In the case of beams or large timbers in buildings suspected of being infested with termites, a small auger may be used to explore the interior of the wood; when a gallery is located, all that is necessary is to attach the apparatus, pack the point of entrance of the hose nozzle with mud, and pump in the poison.

A heaping teaspoonful of the poisoned mixture is usually sufficient for treating an ordinary nest. It should be remembered that the insects are not all immediately killed no matter how thorough the fumigation, but if the operation is well performed no insect should be in evidence after a period of forty-eight hours. This is explained by the fact that death is caused not entirely by asphyxiation but probably by the irritant action of the arsenic as well.

One of these machines, which are now procurable in Manila, should be in the hands of every estate owner who suspects the presence of this usually invisible but really very serious insect enemy.—"Philippine Agricultural Review."

## A BLEEDING RUBBER TREE.

A planter in Johore sent some time ago an account of a rubber tree which continued for a long time to exude latex without any apparent reason. Possibly other of our readers have come across similar instances.

The tree is, he says, a well grown tree, originally a seed planted at stake in October, 1908, growing on a very old grey clay flat on the edge of a drain. The girth of the tree on 17th August was 12 in. at 3 ft. from the base. On three occasions I have dug out large lumps of rubber from the base of the tree. The first time was a year previously, and the last at the date of his letter, when he obtained 2 lb. of rubber. The roots of the tree are quite healthy, and the tree by no means top-heavy, the branches not too large for the tree to support, and there is no reason to suppose that the tree has had a wrench from a high wind. The latex oozes from the point where the large roots proceed from the collar of the tree. The latex also gushes out at a point where one of the branches joins the main trunk and runs down the stem.

This bleeding has been going on for a whole year, and yet the crown of the tree looks perfectly healthy and has put out fine new shoots. There is not a dead branch on the tree nor an unhealthy-looking leaf. He remarks that at the rate of rubber production in this way it would be satisfactory to have a number of such trees as it only took him two minutes to dig out 2 lb. of wet rubber, and a coolie could collect 150 lb. a day at a cost of 50 cents—*i.e.*, a third of a cent a pound, and even cheaper on contract rates.

I have not seen the tree and can give no suggestion as to the cause in this case, but the amount of latex produced by so small a tree is rather remarkable, as it seems to be a good deal more than one could obtain from so small and young a tree by ordinary tapping.—ED.—"Agricultural Bulletin," for November, 1911.

## NEGLECTED INDUSTRIES.

### CULTIVATION OF THE NUTMEG.

Although the nutmeg is indigenous to Queensland, as was shown by its discovery in the scrubs of the far North at the time of the opening of the Palmer Goldfield about thirty-eight years ago, no attempt has yet been made by tropical agriculturists in the North to grow nutmegs on a commercial scale. Yet it might well pay to do so. The following article, taken from "Capital," and republished by the "Tropical Agriculturist," of Ceylon, in December, 1911, may open the door to this industry:—

"During the earliest period in the history of its commerce, the nutmeg, a native of the wilds of the Moluccas, pandered for years to the greed of the Dutch. For, perceiving the fact that in the world, as then known, it grew only in the evergreen forests of the "Spice Islands," not only was the cultivation prohibited by them, but quantities of the nuts were actually burnt to keep up prices when they declined. Thus, for years, the outside world was held in the veriest bondage of trade by the Dutch—the most intrepid and venturesome maritime nation, and the greatest fetchers and carriers of the time. Nemesis, however, overtook them in the shape of the great blue wild pigeon, which, swallowing the nut in its red aril, digested the mace and cast the seed on land and sea beyond its home. This interesting fact in the distribution of the nutmeg coming, in time, to be generally known, its cultivation was, in spite of the Dutch, introduced into all or most of the countries lying about the balmy spice groves. Thence it entered the gardens of the Straits, and through them has spread both far and wide—in fact, throughout the tropics of the world."

"But the most productive regions of its cultivation continue to be near its home; for, though plantations of it flourish in the West Indies, its greatest yield is still in the East—the Malay Peninsula, island of Ceylon, and the silt-laden banks of the rivers of the West Coast. In these it is that the nutmeg tree—that graceful fragrant child of the sun—piercing the umbrage of its associates with its pert and shapely pointed crown, bears, amidst its dark-green foliage, its golden pear-shaped fruits in abundance. Maturing in the seventh month from the fading of the flower, the fruit splits open into two fleshy halves, and discloses the glossy black shell of the seed enclosed in a net of the scarlet mace. This seed or nut, whole or shelled, is the nutmeg, which, for centuries past, has always met the demand of the world for a mild, engrossing, and wholesome spice. Of all the famous spices of the East it is not only this but even more—its fine and essential aromatic oils, whilst being the least aggressively pungent, are also the most agreeably flavoured and gratefully fragrant obtained from a spice.

"The nutmeg is a dioecious tree—*i.e.*, the male flowers, which are distinct from the female, are borne on separate individuals. These cannot, as a rule, be distinguished from those that bear the female flowers until both male and female trees begin to blossom in or about the seventh year from planting. The tree is in leaf throughout the year; and delights to live in the midst of other shady evergreen trees like itself. For its successful cultivation it demands shade, at least, for the first five years of its life, a climate with a rainfall of at least 60 in., and a well-drained, rich alluvial loam or virgin forest land for soil. It also prefers a low-lying situation, and needs protection from strong and drying winds. Protection from wind is an essential factor for its successful growth anywhere; for, being a very shallow-rooted tree, it is easily blown down by the wind. Organic plant-food in the soil is, perhaps, the next important factor; for without it in a readily available form the tree is thriftless and its yield poor. For these reasons it is chiefly that in the systematic cultivation of the nutmeg tree the best results are always obtained by raising it on the banks of rivers or streams that had been erstwhile covered with virgin forest. In any other soil or situation the tree requires to be heavily manured, watered in the dry weather, and protected from wind. Its cultivation demands some care and attention, though no special skill appears to be called for. It may be pursued in the following manner:—Select for seed large round fresh nutmegs from fruitful mature trees in full bearing, rejecting those that rattle in the shell. Sow the seed, in the shell, about a foot apart and an inch below the surface, in prepared beds or boxes of good soil, in a cool and shady place. Keep the seed beds moist by frequent watering. When the seeds sprout, after a month or two, water the plants freely, particularly in dry weather. On selecting the site for the plantation, clear the land and pit it at about 25 or 30 ft. apart, keeping the pits open for a month or two. Just before planting mix the soil excavated with two parts of burnt earth and one of old cattle-manure. When the plants are 2 or 3 ft. high, and have from three to four verticles of branches, transplant them in showery weather, screening from wind and the heat of the sun. Water soon after the plants are put out, and thereafter if possible every second day for at least once a week throughout the dry weather. Banana nurses between the plants give them the requisite shade and protection. Earth up all roots that break out through the surface, keep the soil below the crowns clean weeded, and plough, harrow, or otherwise keep the soil between both lands and nurses in a thoroughly perfect degree of tilth. The plants should be mulched with dry leaves in the hot weather. The nutmeg is remarkably free from the attacks of insect pests or fungi; but is occasionally subject to invasion by *Loranthus* (Indian Mistletoe) and allied green semi-parasites. These parasites, as well as all suckers from the stem should be carefully removed when they appear.

"For manuring, carefully loosen the soil lying immediately over the roots, and spread the manure evenly upon it. Manure annually after the first fall of rain, and until the plants are five years old, with the manurial compost suggested above at the rate of 3 or 4 bushels per tree. After the fifth and up to the fifteenth year the proportion of the ingredients may with advantage be altered to equal quantities of both burnt earth and cowdung, and the amount applied itself doubled or tripled, except in the case of the male trees, which, being left in the proportion of one to every ten female trees, should be treated so as to be kept healthy and strong, but not so vigorous as the female trees. After the fifteenth year the dung in the manure should be only about a month or two old, and form double the quantity of the burnt earth. Other organic manures in place of cattle dung that may be used with much success are ground-nut oil cake and vegetable mould. The nutmeg begins to bear in the sixth or seventh year, attains to full between the fifteenth and thirtieth years, and continues to bear two or three crops a year annually up to the eightieth year, when the yield begins to decline. Trees more than 100 years old planted by the descendants of the Dutch in Cochin are still in good condition and bearing on the right bank of the Periyar in North Travancore. Again, a small garden of nutmeg trees planted by Dr. Helfer, at Kaupya, in Mergui, is still productive under the care of the Chinese Babas. About two-thirds the number of trees planted out will be generally female trees, which bear on an average in the fifteenth year about 2,000 nuts each. Varying with size, from 80 to 150 nuts weigh 1 lb., so that the yield per tree at the lower rate is about 13 lb. per annum. The yield of mace is usually about one-fifth the weight of the shelled nuts, but its value is twice as much as the latter. The price of nutmegs in the London market varies from 6d. to 1s. per lb.; and of the mace from 1s. to 2s. per lb., according to size and quality. The value of the annual yield of an acre holding only thirty bearing trees, estimated on the lowest weights of produce and on the mean, in each case of the market rates, would be about £18. This is the possible average annual return from an acre in the fifteenth year, which is but the commencement of maturity, but, as the estate would be productive for at least seven years previous to maturity, a considerable and increasing profits admit of being annually taken from and after the commencement of productivity."

---

## TIMES OF SUNRISE AND SUNSET AT BRISBANE, 1912.

| Date. | January. | | February. | | March. | | April. | |
|---|---|---|---|---|---|---|---|---|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. |
| 1 | 4·57 | 6·45 | 5·21 | 6·42 | 5·42 | 6·19 | 5·58 | 5·46 |
| 2 | 4·58 | 6·46 | 5·22 | 6·42 | 5·42 | 6·18 | 6·59 | 5·45 |
| 3 | 4·58 | 6·46 | 5·22 | 6·42 | 5·43 | 6·17 | 6·0 | 5·44 |
| 4 | 4·59 | 6·46 | 5·23 | 6·41 | 5·44 | 6·16 | 6·0 | 5·43 |
| 5 | 5·0 | 6·46 | 5·24 | 6·40 | 5·44 | 6·15 | 6·0 | 5·42 |
| 6 | 5·0 | 6·46 | 5·24 | 6·40 | 5·44 | 6·14 | 6·1 | 5·40 |
| 7 | 5·1 | 6·47 | 5 25 | 6·39 | 5·45 | 6·13 | 6·1 | 5·39 |
| 8 | 5·2 | 6 47 | 5·26 | 6·38 | 5·45 | 6·12 | 6·1 | 5·38 |
| 9 | 5·3 | 6·47 | 5·27 | 6·37 | 5·46 | 6·11 | 6·2 | 5·37 |
| 10 | 5·3 | 6·47 | 5·28 | 6·36 | 5·47 | 6·10 | 6·2 | 5·36 |
| 11 | 5·4 | 6·47 | 5·29 | 6·35 | 5·47 | 6·9 | 6·3 | 5·35 |
| 12 | 5·4 | 6·48 | 5·29 | 6·35 | 5·48 | 6·8 | 6·4 | 5·34 |
| 13 | 5·5 | 6·47 | 5·30 | 6·34 | 5·49 | 6·7 | 6·4 | 5·33 |
| 14 | 5·6 | 6·47 | 5·30 | 6·34 | 5·50 | 6·6 | 6·5 | 5·32 |
| 15 | 5·7 | 6·47 | 5·31 | 6·33 | 5·50 | 6·4 | 6·5 | 5·31 |
| 16 | 5·8 | 6·47 | 5 32 | 6·32 | 5·51 | 6·3 | 6·6 | 5·30 |
| 17 | 5·9 | 6·46 | 5·32 | 6·32 | 5·51 | 6·2 | 6·7 | 5·29 |
| 18 | 5·10 | 6·46 | 5·33 | 6·31 | 5·51 | 6·1 | 6·7 | 5·28 |
| 19 | 5·11 | 6·46 | 5·34 | 6·30 | 5·52 | 6·0 | 6·7 | 5·27 |
| 20 | 5·11 | 6·46 | 5·35 | 6 29 | 5·52 | 5·59 | 6·8 | 5·26 |
| 21 | 5·12 | 6·46 | 5·35 | 6·28 | 5·52 | 6·58 | 6·9 | 5·25 |
| 22 | 5·12 | 6·46 | 5·36 | 6·27 | 5·53 | 5·57 | 6·9 | 5·24 |
| 23 | 5·13 | 6 46 | 5·37 | 6·26 | 5·54 | 5·56 | 6·10 | 5·23 |
| 24 | 5·14 | 6·45 | 5·38 | 6·25 | 5·54 | 5·55 | 6·10 | 5·22 |
| 25 | 5·15 | 6·45 | 5·39 | 6·24 | 5·55 | 5·54 | 6·11 | 5·21 |
| 26 | 5·16 | 6·44 | 5·40 | 6 23 | 5·55 | 5·53 | 6·11 | 5·21 |
| 27 | 5·17 | 6·44 | 5·40 | 6·22 | 5·55 | 5·52 | 6·12 | 5·20 |
| 28 | 5·18 | 6·44 | 5·41 | 6·21 | 5·56 | 5·50 | 6·12 | 5·19 |
| 29 | 5·19 | 6·43 | 5·41 | 6·20 | 5·57 | 6·49 | 6·13 | 5·18 |
| 30 | 5·19 | 6·43 | ... | ... | 5·57 | 5·48 | 6·13 | 5·17 |
| 31 | 5·20 | 6·42 | ... | ... | 5·58 | 5·47 | ... | ... |

### Phases of the Moon.

| | | | H. M. |
|---|---|---|---|
| 4 Jan. | ○ | Full Moon | 11 30 p.m. |
| 11 " | ☽ | Last Quarter | 5 43 " |
| 19 " | ● | New Moon | 9 10 " |
| 27 " | ☾ | First Quarter | 6 51 " |
| 3 Feb. | ○ | Full Moon | 9 58 a.m. |
| 10 " | ☽ | Last Quarter | 10 51 " |
| 18 " | ● | New Moon | 3 44 p.m. |
| 26 " | ☾ | First Quarter | 5 27 a.m. |
| 3 Mar. | ○ | Full Moon | 8 42 p.m. |
| 11 " | ☽ | Last Quarter | 5 56 a.m. |
| 19 " | ● | New Moon | 8 9 " |
| 26 " | ☾ | First Quarter | 1 2 p.m. |
| 2 April | ○ | Full Moon | 8 5 a.m. |
| 10 " | ☽ | Last Quarter | 1 24 " |
| 17 " | ● | New Moon | 9 40 p.m. |
| 24 " | ☾ | First Quarter | 6 47 " |

# Botany.

## CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

BY F. MANSON BAILEY, C.M.G., F.L.S., Colonial Botanist.

During a recent visit to some of the higher parts of the Macpherson Range by Messrs. R. W. Lahey, H. Tryon, and C. T. White, specimens of the following plants were obtained:—

### RANUNCULACEÆ.

CLEMATIS GLYCINOIDES, *DC.*

### MAGNOLIACEÆ.

DRIMYS DIPETALA, *F. v. M.* Common, leaves aromatic.

### CRUCIFERÆ.

CARDAMINE HIRSUTA, *Linn.* Watercourses.

### CAPPARIDÆ.

CAPPARIS NOBILIS, *F. v. M.*

### PITTOSPOREÆ.

PITTOSPORUM REVOLUTUM, *Ait.*, var. TOMENTOSUM, *Bail.* *(P. tomentosum,* Bonpl.)

### POLYGALEÆ.

COMESPERMA ERICINUM, *DC.*

### MALVACEÆ.

ABUTILON OXYCARPUM, *F. v. M.*

### STERCULIACEÆ.

STERCULIA ACERIFOLIA, *A. Cunn.*

S. DISCOLOR, *F. v. M.*

TARRIETTA ARGYRODENDRON, *Benth.*, var. TRIFOLIOLATA, *Bail.* *(T. trifoliolata,* F. v. M.) Stavewood.

T. ACTINOPHYLLA, *Bail.*

### TILIACEÆ.

SLOANEA AUSTRALIS, *F. v. M.* Maiden's Blush.

ELÆOCARPUS OBOVATUS, *G. Don.*

### GERANIACEÆ.

OXALIS CORNICULATA, *Linn.* Wood Sorrel.

### RUTACEÆ.

MELICOPE PUBESCENS, *Bail.*

MEDICOSMA CUNNINGHAMII, *Hook. f.*

### MELIACEÆ.

FLINDERSIA AUSTRALIS, *R. Br.* Crow's Ash.

### AMPELIDEÆ.

VITIS ANTARCTICA, *Benth.*
V. NITENS, *F. v. M.*
V. HYPOGLAUCA, *F. v. M.*

### SAPINDACEÆ.

HARPULLIA ALATA, *F. v. M.*
AKANIA HILLII, *Hook. f.*

### ANACARDIACEÆ.

RHODOSPHÆRA RHODANTHEMA, *Engl.* Deep Yellow wood.

### LEGUMINOSÆ.

JACKSONIA SCOPARIA, *R. Br.* Dogwood.
INDIGOFERA AUSTRALIS, *Willd.*
TEPHROSIA BIDWILLI, *Benth.* Open grass lands.
SWAINSONA GALEGIFOLIA, *R. Br.* Indigo.
LONCHOCARPUS BLACKII, *Benth.*
MEZONEURUM SCORTECHINII, *F. v. M.*
CASSIA BREWSTERI, *F. v. M.*, var. MARKSIANA, *Bail.*
ACACIA LONGIFOLIA, *Willd.*, var. SOPHORÆ, *F. v. M.* A shrub.

### ROSACEÆ.

RUBUS MOLUCCANUS, *Linn.*
R. ROSÆFOLIUS, *Sm.*
R. MOOREI, *F. v. M.*

### SAXIFRAGEÆ.

CUTTSIA VIBURNEA, *F. v. M.* Creek sides.
WEINMANNIA BENTHAMI, *F. v. M.*

W. LACHNOCARPA, *F. v. M.*, var. PARVIFOLIA, *Bail.*, n. var. (Plate 40, fig. 1.)—This variety differs from the normal form only in its foliage, which is much smaller, the leaflets seldom exceeding 1¼ in. long and 5 lines broad. Macpherson Range, at fairly high altitude (over 3,000 ft.). The normal form (Plate 40, fig. 2) occurs in the Coomera River scrubs.

### HALORAGEÆ.

HALORAGIS TEUCROIDES, *A. Gray.* Amongst grass, open country.

### MYRTACEÆ.

ANGOPHORA SUBVELUTINA, *F. v. M.* Apple-tree
EUCALYPTUS ACMENIOIDES, *J. C. Schauer.* Stringybark.
E. SIDEROPHLOIA, *Benth.* Black Ironbark.
E. TERETICORNIS, *Sm.* Blue Gum.
E. SALIGNA, *Sm.* Grey Gum.
TRISTANIA CONFERTA, *R. Br.* Brisbane Box.
EUGENIA SIMMONDSIÆ, *Bail.*

### ONAGRARIEÆ.

EPILOBIUM JUNCEUM, *Forst.*

### UMBELLIFERÆ.

HYDROCOTYLE LAXIFLORA, *DC.*


PLATE 40.—1. WEINMANNIA LACHNOCARPA, *F. v. M.*, var. PARVIFOLIA, *Bail.*, n. var.
2. W. LACHNOCARPA, *F. v. M.* Normal form.

### ARALIACEÆ.

PANAX SAMBUCIFOLIUS, *Sieb.* A shrub.
P. CEPHALOBOTRYS, *F. v. M.* A climber, common.
P. ELEGANS, *F. v. M.* A tree.

### CAPRIFOLIACEÆ.

SAMBUCUS XANTHOCARPA, *F. v. M.*

### RUBIACEÆ.

RANDIA CHARTACEA, *F. v. M.*
PSYCHOTRIA LONICEROIDES, *Sieb.*
P. SIMMONDSIANA, *Bail.*
P. SIMMONDSIANA, *Bail.*, var. EXIGUA, *Bail.*
ASPERULA CONFERTA, *Hook. f.*, var. ELONGATA, *Benth.*

### COMPOSITÆ.

BRACHYCOME MICROCARPA, *F. v. M.*
EPALTES AUSTRALIS, *Less.*
HELIPTERUM ANTHEMOIDES, *DC.*
HELICHRYSUM BRACTEATUM, *Willd.*
H. ELATUM, *A. Cunn.*
H. APICULATUM, *DC.*
CASSINIA SUBTROPICA, *F. v. M.*
*ERECHTHITES VALERIANÆFOLIA, *DC.* Federal Weed. Has established itself along surveyors' routes.
GYNURA PSEUDOCHINA, *DC.*
SENECIO CUNNINGHAMII, *DC.*
S. ANETHIFOLIUS, *A. Cunn.*
SONCHUS OLERACEUS, *Linn.*

### CAMPANULACEÆ.

LOBELIA TRIGONOCAULIS, *F. v. M.* Watercourses and damp shady places.

### EPACRIDEÆ.

TROCHOCARPA LAURINA, *R. Br.*

### MYRSINEÆ.

MYRSINE VARIABILIS, *R. Br.*

### SAPOTACEÆ.

SIDEROXYLON AUSTRALIS, *Benth. and Hook.* Scrub Plum or Black Apple.

### OLEACEÆ.

JASMINUM SIMPLICIFOLIUM, *Forst.*

### APOCYNACEÆ.

CARISSA OVATA, *R. Br.*
ALYXIA RUSCIFOLIA, *R. Br.*
TABERNÆMONTANA ORIENTALIS, *R. Br.*
LYONSIA RETICULATA, *F. v. M.*

### SOLANACEÆ.

Solanum aviculare, *Forst.*

S. stelligerum, *Sm.*, var. lucorum, *F. v. M.*

S. semiarmatum, *F. v. M.*

### ACANTHACEÆ.

Eranthemum variabile, *R. Br.* Common; flowers varying from nearly white to blue, and sometimes marked with dull crimson spots.

### MYOPORINEÆ.

Myoporum acuminatum, *R. Br.*, var. angustifolium.

### VERBENACEÆ.

Spartothamnus junceus, *A. Cunn.*

### LABIATÆ.

Plectranthus parviflorus, *Willd.* (Plate 41). There are in Queensland two very distinct forms which I should call varieties of this species, and might bear the distinguishing names of var. *minor* and var. *major*, the first being found everywhere, the latter confined to the hilltops. The figure given in Lodd. Bot. Cat. 1185 represents the var. *major*.

### AMARANTACEÆ.

Nyssanthes diffusa, *R. Br.*

### POLYGONACEÆ.

Muhlenbeckia gracillima, *Meissn.*

### ARISTOLOCHIACEÆ.

Aristolochia deltantha, *F. v. M.*, var. Laheyana, *Bail.*, n. var. A slender climber *(C.T.W.)*; stems slightly angular, perhaps becoming terete with age. Leaves broadly linear-lanceolate to oblong, these latter being much shorter and probably abortive, the ordinary form 1½ to 3 in. long and from ½ to 1 in. broad, the few oblong ones 1½ to 2 in. long and slightly over 1 in. broad, not showing the deeply cordate base and the 3 to 5 nerves of the Northern plant, but with an equally prominent reticulation, and the flowers quite similar. Found growing at a high altitude (3,800 ft.), Macpherson Range, Feb., 1912.

### PIPERACEÆ.

Piper Novæ-Hollandiæ, *Miq.*

Peperomia leptostachya, *Hook and Arn.*

P. reflexa, *A. Dietr.*

### LAURINEÆ.

Cryptocarya glaucesens, *R. Br.*

### PROTEACEÆ.

Persoonia lanceolata, *Andr.* In open places at a fairly high altitude this plant forms a tree attaining a height of about 30 ft. *(C.T.W.)*.

Helicia ferruginea, *F. v. M.*

Grevillea robusta, *A. Cunn.*

Lomatia silaifolia, *R. Br.*

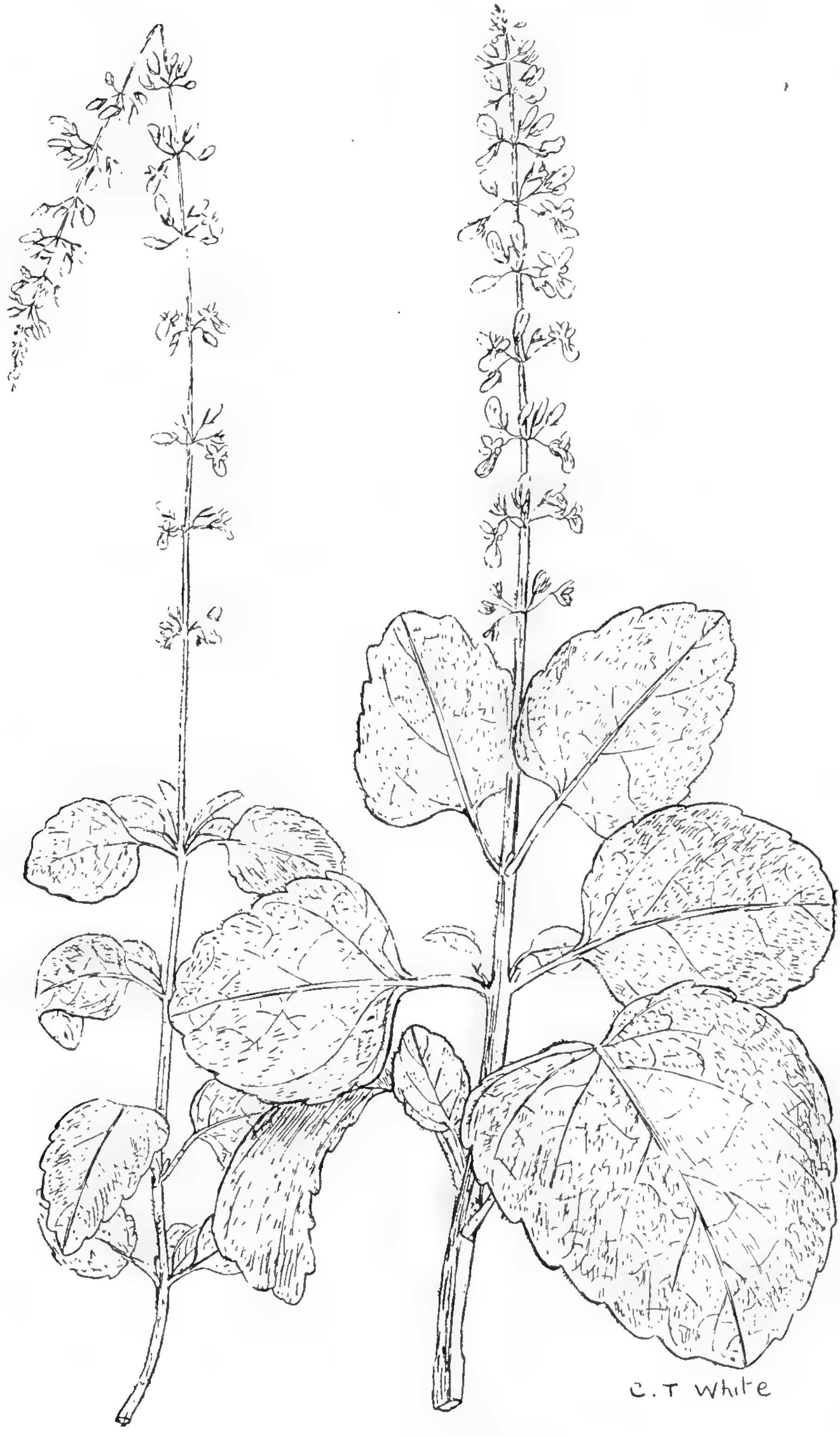



PLATE 41.—1. PLECTRANTHUS PARVIFLORUS, *Willd.*, var. MINOR, *Bail.*
2. PLECTRANTHUS PARVIFLORUS, *Willd.* var. MAJOR, *Bail.*

### THYMELÆACEÆ.

PIMELEA PAUCIFLORA, *R. Br.*
WICKSTRŒMIA INDICA, *C. A. Mey.*

### LORANTHACEÆ.

LORANTHUS MAYTENIFOLIUS, *A. Gray,* Bot. Amer. Expl. Exped. i., 739, t. 99; *Benth.,* Fl. Austr. iii., 393. Plant glabrous. Leaves opposite, petiolate, broadly ovate or obovate, not exceeding 2 in., not very thick, irregularly veined. Flowers in terminal shortly pedunculate cymes, with a bract under each flower. Calyx border rather deeply cup-shaped, truncate. Petals 6 or occasionally 5, free, narrow, anthers adnate, linear. Bentham remarks *(l.c.)* that this species differs from all the Australian free-petaled species with adnate anthers by the terminal inflorescence. Found parasitic on Persoonia and Casuarina trees; open country, fairly high altitude, Macpherson Range *(C.T.W.).*

### EUPHORBIACEÆ.

CLEISTANTHUS CUNNINGHAMII, *F. v. M.*
BALOGHIA LUCIDA, *Endl.* Scrub Bloodwood.
ACALYPHA NEMORUM, *F. v. M.*
ALCHORNEA ILICIFOLIA, *F. v. M.*
HOMALANTHUS POPULIFOLIUS, *Grah.*
EXCÆCARIA DALLACHYANA, *Baill.*

### URTICACEÆ.

FICUS WATKINSIANA, *Bail.*
URTICA INCISA, *Poir.*
LAPORTEA GIGAS, *Wedd.*
L. PHOTINIPHYLLA, *Wedd.*
ELATOSTEMMA RETICULATUM, *Wedd.* A large species, in creeks.
E. STIPITATUM, *Wedd.* A small species, in scrubs.

### CASUARINEÆ.

CASUARINA SUBEROSA, *Ott. and Dietr.*
C. TORULOSA, *Ait.* Forest Oak.

### CUPULIFERÆ.

FAGUS MOOREI, *F. v. M.* Common at high altitudes.

### CONIFERÆ.

ARAUCARIA CUNNINGHAMII, *Ait.*

### ORCHIDEÆ.

LIPARIS CŒLOGYNOIDES, *F. v. M.*
DENDROBIUM SPECIOSUM, *Sm.,* var. HILLII, *F. v. M.*
D. BECKLERI, *F. v. M.*
CALANTHE VERATRIFOLIA, *R. Br.*
CYMBIDIUM CANALICULATUM, *R. Br.*
DIPODIUM PUNCTATUM, *R. Br.*
SARCOCHILUS FITZGERALDI, *F. v. M.* On rocks near waterfalls.
S. CECILIÆ, *F. v. M.*

## SCITAMINEÆ.

ALPINIA CÆRULEA, *Benth.* In many instances the leaves of this plant were very badly infested with the fungus *Phyllachora alpiniæ*, C. & M.

## DIOSCORIDEÆ.

DIOSCOREA TRANSVERSA, *R. Br.*

## LILIACEÆ.

SMILAX GLYCYPHYLLA, *Sm.*

S. AUSTRALIS, *R. Br.*

RHIPOGONUM DISCOLOR, *F. v. M.*

R. FAWCETTIANUM, *F. v. M.* A beautiful white flowering climber.

EUSTREPHUS LATIFOLIUS, *R. Br.*

GEITENOPLESIUM CYMOSUM, *A. Cunn.*

### DRYMOPHILA, R. Br.

Perianth deciduous, of 6 distinct equal segments, lanceolate and spreading or almost reflexed. Stamens 6, hypogynous, not exceeding the perianth and sometimes much shorter; filaments filiform; anthers oblong, erect, attached between the short basal lobes, the cells opening in longitudinal slits. Ovary sessile, short, 3-celled, with several often many ovules in each cell superposed in 2 rows. Styles 3, linear, slightly flattened, recurved, apparently stigmatic from near the base. Fruit a globular ovoid berry. Seeds globular or variously shaped by mutual pressure; testa thickly membranous or almost crustaceous, adnate to the hard albumen; embryo short. Perennials, with simple or slightly branched leafy stems. Leaves distichous, spreading, sessile or nearly so. Flowers solitary or rarely 2 together in the axils, articulate on recurved pedicels, without bracts.—*Benth.*, Flora Austr. vii. 12.

D. MOOREI, *Baker,* Journ. Linn. Soc. xiv. 571. *(D. pyrrhocarpa*, F. v. M., Fragm. ix. 190.) Stems 12 in. or less, slightly flexuous. Leaves from almost ovate to oblong-lanceolate, from 1½ to 2 in. long or perhaps more, subcoriaceous, of a somewhat glossy green, paler on the underside, longitudinal nerves 12 to 18, prominent as well as the horizontal veins. Peduncles 4 to 6 lines long; flowers carneous, white, perianth segments about ¼ in. long. Berry from 6 to 8 lines long, colour red. Flowers and ripe fruit of the Queensland plant not seen. A small plant, common in shady places at high altitude, Macpherson Range *(C.T.W.)*.

CORDYLINE TERMINALIS, *Kunth.* Lily Palm.

ARTHROPODIUM PANICULATUM, *R. Br.*

DIANELLA LÆVIS, *R. Br.*

D. CÆRULEA, *Sims.*

D. CÆRULEA, *Sims,* var. CONGESTA, *Bail.* (*D. congesta,* R. Br.) Fairly common.

## PHILYDRACEÆ.

HELMHOLTZIA GLABERRIMA, *Theo. Caruel.* Add to description in Queensland Flora, p. 1646. Capsule, 2½ lines long, 1½ line broad, opening in three valves; seeds narrow, 1½ line long, light-coloured, very finely striate *(C.T.W.)*.

POLLIA CRISPATA, *Benth.*

ANEILEMA ACUMINATUM, *R. Br.*

## JUNCACEÆ.

XEROTES LONGIFOLIA, *R. Br.*

X. LONGIFOLIA, *R. Br.*, var. MONTANA, *Benth.* (*X. Montana,* R. Br.) Inflorescence almost reduced to a single spike. Common.

XANTHORRHÆA ARBOREA, *R. Br.*

JUNCUS PAUCIFLORUS, *R. Br.*

## PALMÆ.

ARCHONTOPHŒNIX CUNNINGHAMII, *Wendl. and Drude.* Piccabeen Palm.

BACULARIA MONOSTACHYA, *R. Br.* Walking-stick Palm.

CALAMUS MUELLERI, *Wendl. and Drude.* Small Lawyer Cane.

## AROIDEÆ.

ALOCASIA MACRORRHIZA, *Schott.* Cunjevoi.

POTHOS LOUREIRI, *Hook. and Arn.*

GYMNOSTACHYS ANCEPS, *R. Br.* A robust form attaining a height of 9 ft., common in the scrubs at an elevation of about 2,000 ft. *(C.T.W.)*.

## CYPERACEÆ.

CYPERUS ERAGROSTIS, *Vahl.*

C. LUCIDUS, *R. Br.*

LEPIDOSPERMA LATERALE, *R. Br.*

SCLERIA BROWNII, *Kunth.*

S. SPHACELATA, *F. v. M.*

CAREX PANICULATA, *Linn.*

C. GRACILIS, *R. Br.*

## GRAMINEÆ.

TRAGUS RACEMOSUS, *Desf.*

ANDROPOGON SERICEUS, *R. Br.*

SORGHUM FULVUM, *Beauv.*

ANTHISTIRIA CILIATA, *Linn.*

DANTHONIA PALLIDA, *R. Br.*

POA CÆSPITOSA, *Forst.*, var. AUSTRALIS, *Benth.* Leaves mostly radical, setaceous, much shorter than the stem, which is erect and exceedingly scabrous, about 1 ft. high. Panicle rather small, loose and spreading. Glumes 1 to 1½ line long.

## FILICES.

GLEICHENIA FLABELLATA, *R. Br.*

TRICHOMANES, sp.

HYMENOPHYLLUM, sp.

ALSOPHILA, AUSTRALIS, *R. Br.*, var. GLAUCA, *Bail.*, n. var. This variety differs from all other Queensland forms in having the underside of the fronds prominently glaucous, almost white, and being also clothed with rather long scale-like hairs. At high altitudes, Macpherson Range.

DAVALLIA DUBIA, *R. Br.*, var. HIRSUTA, *Bail.* In stature and habit varies but little from the normal form, the principal distinction being in the clothing of the plant, which is in all parts covered with long scale-like hairs, particularly dense upon the stipites and branches.

ADIANTUM FORMOSUM, *R. Br.*

PTERIS UMBROSA, *R. Br.*

LOMARIA PATERSONI, *Spreng.*

L. CAPENSIS, *Willd.*

ASPLENIUM NIDUS, *Linn.* Bird's-nest Fern.

A. FALCATUM, *Lam.*

ASPIDIUM DECOMPOSITUM, *Spreng.*

POLYPODIUM ATTENUATUM, *R. Br.*

P. PUSTULATUM, *Forst.*

P. SCANDENS, *Forst.*

PLATYCERIUM ALCICORNE, *Desv.* Elk's-horn Fern.

P. GRANDE, *J. Sm.* Stag's-horn Fern.

---

# Statistics.

## COMMONWEALTH METEOROLOGY.

### RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

| STATIONS. | 1911. | | | | | | | | | | | | 1912. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. |
| *North.* | | | | | | | | | | | | | |
| Bowen ... ... ... | 23·72 | 7·57 | 10 66 | 1·64 | 0·12 | 0·2 | Nil | 0·15 | Nil | 1·5 | 0·19 | 1·32 | 1·56 |
| Cairns ... ... | 34·49 | 27·43 | 35·35 | 52·31 | 2·08 | 1 44 | 1·48 | 0·27 | 0 6 | 0·88 | 1·95 | 0 90 | 4·81 |
| Geraldton (Innisfail)... | 36·96 | 35·51 | 28·39 | 50 53 | 3·58 | 5·10 | 6·20 | 0 79 | 0·20 | 0·73 | 1·61 | 0·75 | 5·50 |
| Gindie State Farm ... | 11·69 | 4·15 | 2·29 | 0·29 | 0·29 | Nil | Nil | 0·49 | ... | 0·81 | ... | 3.50 | 0·68 |
| Herberton ... ... | 11·43 | 13·16 | 15 35 | 14·17 | 0·58 | 0·36 | 0·40 | 0·5 | Nil | 0·9 | 0·62 | 5·36 | 5·29 |
| Hughenden ... ... | 9·15 | 3·76 | 0·17 | 6·29 | 0·4 | 0·2 | 0·2 | Nil | Nil | Nil | 1·37 | 0·69 | 5·78 |
| Kamerunga State Nurs. | ... | 23·08 | ... | 52·28 | 1 51 | ... | ... | ... | ... | ... | ... | ... | |
| Mackay ... ... ... | 30·52 | 13·04 | 14 41 | 3 14 | 0·77 | 0·22 | 0·43 | 0 18 | 0·3 | 0·93 | 0·17 | 0·41 | 2·08 |
| Mossman ... ... | 32·76 | 21·95 | 71·64 | 37·10 | 1·44 | 0 33 | 1·28 | 0·39 | 0·09 | 0 55 | 0·86 | 3 31 | ... |
| Rockhampton .. ... | 9·64 | 21·07 | 6 39 | 1·44 | 0·56 | Nil | 0·24 | 1·17 | Nil | 0·40 | 0·6 | 0·81 | 2·50 |
| Townsville ... ... | 25·40 | 19·24 | 4·24 | 3 02 | 0 7 | 0·11 | Nil | Nil | Nil | 0·39 | 0·31 | 2·84 | 1·64 |
| *South.* | | | | | | | | | | | | | |
| Biggenden State Farm | 10·37 | 7·34 | 6·25 | .. | ... | .. | ... | ... | 0·79 | ... | .. | ... | ... |
| Brisbane ... ... | 10·30 | 5·84 | 4 69 | 0 88 | 0·90 | 0 9 | 1·70 | 2·22 | 0 84 | 4·95 | 0·84 | 1 94 | 1·85 |
| Bundaberg ... ... | 21·05 | 9·75 | 4·31 | 1·46 | 0·56 | Nil | 0·37 | 1·15 | Nil | 2·36 | 1·30 | 2·98 | 3·96 |
| Bungeworgorai ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 0·73 |
| Crohamhurst ... ... | 28·85 | 19·20 | 16·67 | 2·94 | 1·21 | 0·13 | 3·58 | 2·62 | 0·51 | 6·27 | 1·74 | 3·02 | 5·62 |
| Dalby ... ... ... | 8·08 | 2·24 | 3·20 | 0·76 | 0·91 | Nil | 0·68 | 0·43 | 0·42 | 3·45 | 1·99 | 1 55 | 1·76 |
| Esk ... ... | 11·90 | 6·04 | 3 54 | 0·99 | 1·90 | Nil | ... | 1·51 | 2·04 | 4·17 | 0 47 | 0 44 | 1·38 |
| Gatton Agric. College | 12·03 | 3 98 | 2·80 | 1·38 | 0·58 | Nil | 0 72 | 0 90 | 0·96 | 3 77 | 0·49 | 1·90 | 3·56 |
| Gympie ... ... ... | 9·13 | 5·33 | 6·02 | 1·88 | 0·32 | Nil | 0·97 | 0·48 | 0 26 | 2·42 | 0 50 | 2·10 | 2·92 |
| Ipswich ... ... ... | 8·15 | 4·19 | 2·51 | 1·38 | 0·42 | Nil | 0·59 | 1·12 | 0·34 | 4·71 | 0·25 | ... | 1·87 |
| Maryborough ... ... | 16·93 | 6·58 | 7·20 | 2·61 | 0·16 | 0·11 | 0·62 | 1·47 | 0 9 | 2·81 | 0·90 | 4·98 | 2·39 |
| Roma ... ... ... | 11·52 | 5·94 | 1·25 | 0·14 | 1·13 | Nil | 0·67 | 1·55 | 0·87 | 1·9 | 1·55 | 1·19 | 0·74 |
| Roma State Farm ... | 9·72 | ... | 5·39 | 0·04 | ·02 | . | ... | 1·39 | 0·74 | 1·31 | 1·29 | 1·45 | ... |
| Tewantin ... ... | 20·84 | 8·50 | 18·11 | 1·78 | 0·57 | 0·22 | 2·53 | 1·07 | 0·4 | 7·48 | 1·14 | 2·13 | 5·60 |
| Warren State Farm ... | ... | 11 75 | 3·17 | ... | ... | Nil | 0·6 | 1·01 | ... | 0·64 | ... | ... | 0 82 |
| Warwick ... ... | 7·13 | 2 01 | 3·12 | 0·74 | 1 04 | Nil | 1·20 | 1·50 | 0·80 | 1·78 | 2·26 | 0·70 | 1·57 |
| Warwick, Hermitage State Farm ... | ... | ... | ... | ... | ... | ... | ... | .. | ... | 0·60 | ... | ... | ... |
| Westbrook State Farm | 5·26 | 3·90 | 1·76 | 5·50 | 0·79 | 0·1 | 1·1 | 0·54 | 0·82 | 1·77 | 2·68 | 0·23 | 1·16 |
| Yandina ... ... | 12·04 | 10·73 | 12·02 | 2·68 | 0· | Nil | 2·43 | Nil | 0·30 | 2·90 | 1·36 | 1·87 | 5·95 |

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND, Divisional Officer.

## BRISBANE BOTANIC GARDENS SECTION.

By J. F. BAILEY, Director.

### SOME INDIGENOUS FLOWERING TREES.

When making a selection of trees with showy flowers persons are apt to overlook the fact that among the native flora are quite a number equal in beauty to many of the well-known exotic kinds. In order that readers of the Journal may become acquainted with some of the showiest, a few are described in the accompanying notes.

*Barklya syringifolia* is a close-growing evergreen tree, with glossy leaves resembling those of the Lilac (Syringa), hence the name. During December it bears numerous racemes, about 9 in. long, of densely packed blossoms of a bright golden colour.

The genus Cassia furnishes a number of decorative species, and the indigenous *C. Brewsteri* and its several varieties are well worthy of cultivation on this account. The variety tomentella, a small-growing tree, is very gay during October and November with its racemes of small yellow flowers.

*Castanospermum australe,* the Moreton Bay Chestnut or Bean Tree, is one of the handsomest of our shade trees, as well of possessing considerable merit as a flowering tree. The leaves are of a glossy green colour, and assist in setting off the abundance of orange-yellow flowers borne along the branches of the tree. The tree is looked upon with suspicion by stock-owners on account of its reputation of the foliage and seed possessing deleterious properties.

*Bauhinia Hookeri,* or Queensland Ebony, is, unlike most species of the genus, a slow-growing plant. Two fine specimens are growing in these gardens, and were a beautiful sight during the months of November and December, when they were covered with large white blooms, the crimson-coloured organs in the centre acting as an ornate setting to the white petals.

*Buckinghamia celsissima* is an inhabitant of our Northern scrubs, and thrives about Brisbane, where quite a number of good specimens are to be seen. It is now (14th February) smothered with long racemes of light-cream coloured flowers. (*Vide* accompanying illustration.) The positions in which the trees are growing are, however, not suitable for photographing.

*Erythrina indica,* or Coral Tree, serves as an excellent shade tree during the summer, while in the spring, just before the appearance of the new leaves, it forms a striking object with its abundance of closely packed scarlet flowers.

*Hymenosporum flavum* is a small-growing evergreen tree which bears, during the months of October, November, and December, numerous somewhat large yellow flowers, which possess an agreeable fragrance.

*Lagunaria Pattersoni* is a tall evergreen tree which in some cities is extensively used for adorning the streets, although some objection has been made to it on account of the minute hairs thrown out by the ripe capsule being said to cause irritation to persons suffering from throat troubles. It is nevertheless a most beautiful object during November and December, when it is a mass of small pink Hibiscus-like flowers.

Plate 42.—Buckinghamia celsissima.

PLATE 43.—STENOCARPUS SINUATUS.

*Stenocarpus sinuatus.*—During the first two months of the year the gayest tree in the Gardens is undobtedly the "Wheel-of-fire" tree, with its perfectly formed umbels of scarlet blossoms, which are produced in great profusion on the branches of the tree. When young, this tree has the beautifully lobed leaves so characteristic of the order to which it belongs—viz., Proteaceae. A flowering portion is shown in the accompanying illustration.

*Sterculia acerifolia,* or, as it is appropriately called, "Flame Tree," is a deciduous tree, which, previous to the advent of the new leaves, and sometimes just after their appearance, is very gay with its profusion of fiery, bell-shaped flowers. The foliage, which is composed of large, Maple- (Acer) like leaves, throws a grateful shade during the summer months, and for this purpose is very popular.

## "NEW WAY" ENGINE PUMPING PLANT.

Our illustration shows a 6-h.p. "New Way" air cooled engine driving a deep well cylinder pumping plant of the walking beam type. The water is drawn from a depth of about 400 ft. and delivered into a tank for watering stock. The weight of the long length of heavy pump rods is counterbalanced by a weight on the beam. The pumping gear is furnished with a winding drum, which can be used to lower casing, lift rods, &c. The cylinder is fitted with removable four-leather, all-brass plunger, with brass ball valves, and arranged so that the plunger and bottom valve can be drawn up through the pipe when required. The "New Way" engine is run by benzine or motor spirit, the cost not exceeding 1d. per horse-power per hour. The benzine is raised by piston suction, thus doing away with the troublesome benzine pump. The valves are seated in cages, removable instantly from outside with a wrench. The cylinder is in one piece, and no packing used. One lubricator oils all moving parts, and the enclosed gears run in an oil bath. The pump was constructed in Brisbane to the order of Messrs. W. A. Preston and Co., 175 Albert street, who are the sole agents in Queensland for the "New Way" air cooled engine.

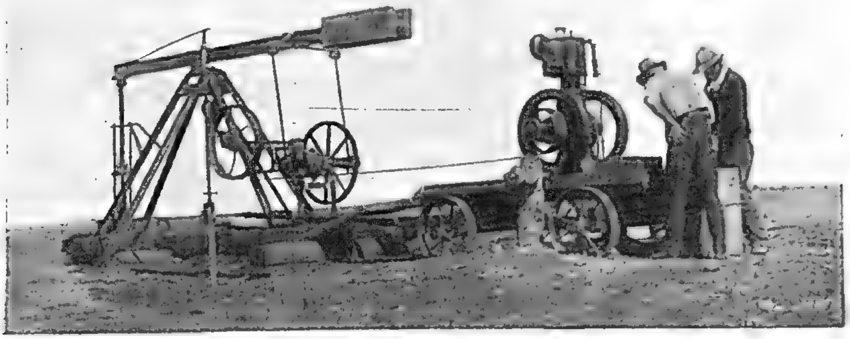


PLATE 44.—"NEW WAY" ENGINE PUMP.

# Chemistry.

## ANALYSES OF FERTILISERS.

By J. C. BRÜNNICH.

Since the introduction of "*The Fertilisers Act of* 1905" it has been customary to check the composition of all our commercial fertilisers by getting our inspectors to collect once or twice a year samples from all dealers, and to have these samples analysed at our Agricultural Laboratory.

**A complete list** of these **analyses** carried out recently is herewith published for the information of farmers.

In accordance with the Act, every dealer, manufacturer, importer, or agent who deals in fertilisers for the purposes of trade is required to register each year, giving the names or brands of fertilisers dealt in by him. We have now fifty-six registered dealers in our State. Upon the sale of any fertiliser the seller must supply to the buyer an **invoice certificate** signed by the seller or his agent, stating full name and place of business of the seller, trade mark, brand, or other sign used to identify such fertiliser; quantity of the fertiliser or net weight in lb.; and the composition of the fertiliser, giving the respective amounts of nitrogen, phosphoric acid, and potash contained therein. Such a certificate can be attached in form of a label to each bag or package, or it may be supplied separately in form of printed slips, but the **bag must be distinctly branded** with the number of net pounds of fertiliser in the bag or package, and the figure, trade mark, or sign under which the fertiliser is sold.

The latitude allowed under the Act, in any **deficiency** in the composition, in order to allow for slight variations in manufacture, is a fairly liberal one, amounting to 5 per cent. of the total nitrogen or of potash certified to be present, if the fertiliser contains not less than 10 per cent. of nitrogen or potash, and 7 per centum of the total phosphoric acid certified to be present, if the contents of phosphoric acid are not under 15 per cent. In the case of fertilisers containing smaller amounts of fertilising ingredients, less than 10 per cent of nitrogen or potash, and less than 15 per cent. of phosporic acid, the amounts of deficiency allowed are—nitrogen and potash ½ per cent., and phosphoric acid 1 per cent.

On the whole, it may be stated that the composition of the fertilisers agrees fairly well with the guaranteed amounts, which, for this reason, are not given on the table.

Hitherto great confusion has existed through stating the composition of fertilisers in various ways, giving, for instance, phosphoric acid as bone phosphate, tricalcic phosphate; nitrogen as ammonia and ammonium sulphate; potash as potassium sulphate and potassium chloride, &c. All such statements only mislead the farmer, and to avoid this, the Act provides for the statement of the valuable fertilising ingredients in percentage amounts of **nitrogen** (N), **potash** ($K_2O$, and **phosphoric acid** ($P_2O_5$).

The conversion of the amount of one compound into another is very simple, and as many manuring formulæ contain the old denominations, I will repeat here a table for such conversion:—

| Amount of— | | Multiplied by | Gives the Corresponding Amount of— | |
|---|---|---|---|---|
| Ammonia ... ... ... ... | $NH_3$ | 0·824 | Nitrogen, N | |
| Ammonium sulphate ... | $(NH_4)_2SO_4$ | 0·212 | | |
| Sodium nitrate (Chili saltpetre) | $NaNO_3$ | 0·165 | | |
| Potassium nitrate (saltpetre) ... | $KNO_3$ | 0·139 | | |
| Nitrogen ... ... ... ... | N | 1·214 | Ammonia, $NH_3$ | |
| Nitrogen ... ... ... ... | N | 4·714 | Ammonia sulphate | |
| Potassium sulphate ... ... | $K_2SO_4$ | 0·541 | Potash, $K_2O$ | |
| Potasium chloride ... ... | KCl | 0·631 | | |
| Potassium nitrate ... ... | $KNO_3$ | 0·466 | | |
| Potash ... ... ... ... | $K_2O$ | 1·850 | Potassium sulphate | |
| Tricalcic phosphate ... | $Ca_3P_2O_8$ | 0·458 | Citrate insoluble | Phosphoric acid, $P_2O_5$ |
| Monocalcic phosphate ... | $CaH_4P_2O_8$ | 0·607 | Water soluble | |
| Tetracalcic phosphate ... | $Ca_4P_2O_9$ | 0·391 | Citrate soluble | |
| Limestone, marble ... ... | $CaCO_3$ | 0·560 | Lime, CaO | |
| Gypsum ... ... ... ... | $CaSO_4$ | 0·411 | | |

It will be noticed in this table, and also in the table of analyses, that **phosphoric acid** appears under three different headings—**water soluble, citrate soluble,** and **citrate insoluble phosphoric acid.** A short explanation of these terms will not be out of place.

In bones, and in most of the mineral phosphates, phosphoric acid exists in combination with lime, in the form of a calcium phosphate: **Tricalcic phosphate,** which is insoluble in water and in citric acid solutions, but soluble in mineral acids. On account of this insolubility the action of bone manure and mineral phosphates is exceedingly slow, and may extend over many years. The finer the bones or the phosphates are crushed or powdered the quicker will be the action, and for this reason the fineness of the bone meal is of importance, and should be stated.

When strong sulphuric acid is allowed to act on this insoluble tricalcic phosphate, part of the lime combined with the phosphoric acid is withdrawn, lime sulphate or gypsum being formed and the phosphoric acid is left in the form of **monocalcium phosphate.**

$$\underset{\text{Bone phosphate or tricalcic phosphate.}}{Ca_3P_2O_8} + \underset{\text{Sulphuric acid.}}{2H_2SO_4} = \underset{\text{Gypsum.}}{2CaSO_4} + \underset{\text{Monocalcium phosphate or superphosphate.}}{CaH_4P_2O_8}$$

This new compound is soluble in water, and therefore readily available to the plants, but on account of the special process of manufacture it is the most expensive form of phosphoric acid in our fertilisers. The superphosphate is generally manufactured from steamed bones, bone ash, and mineral phosphates. Mineral phosphates containing a high amount of iron or alumina are not suitable for the manufacture of superphosphates, because these bases readily recombine with this acid phosphate, to form again insoluble phosphates, called reduced or reverted phosphates. A similar change would take place if lime were added to superphosphate, and also in soils containing a large amount of lime, a **dicalcium phosphate,** $Ca_2 H_2 P_2 O_8$, may be formed, which is insoluble in water, but soluble in citric acid solutions. Another form of a lime phosphate is found in basic slag or Thomas phosphate—namely, **tetracalcium phosphate,** $Ca_4 P_2 O_9$, which also is insoluble in water, but soluble in saline solutions, particularly such which contain salts of citric acid. These last two compounds are, therefore, classed as citrate soluble phosphoric acid, which is fairly readily absorbed by the plant roots, and, therefore, comes close in its value to the water soluble phosphoric acid. Basic slag is an artificial product, and should be ground as fine as possible, and a good sample of this fertiliser should nearly all pass through a sieve having 100 meshes to the linear inch. Thomas phosphate is one of the cheapest and best sources to supply phosphoric acid; it is of particular value to sour lands, deficient in lime but rich in humus.

The amount of citrate soluble phosphoric acid is generally determined in basic slag only; and in many instances the phosphoric acid, given as citrate insoluble in the accompanying table of analyses, may contain small amounts of citrate soluble phosphoric acid.

**Nitrogen** is the most expensive of all the fertilising ingredients of a manure, and is chiefly supplied in form of **nitrate nitrogen,** as in Chili saltpetre, or in form of **ammonia salts,** as in ammonium sulphate, or in form of organic nitrogen, as in blood, meatworks manure, &c. Nitrate of soda is a very quick-acting manure; nitrogen in the form of nitrate is in the most available form, but nitrates are not readily retained or absorbed by the soil, and therefore liable to be washed away by heavy rains. Nitrogen in ammonium sulphate is not in such an available form, as it has to be changed into nitrates by the process of nitrification. Favourable conditions and lime salts are necessary for this process, and in soils very deficient in lime this manure, therefore, may give poor or no results. Ammonium salts are retained and absorbed by the soil, and losses in the drainage water are not to be feared.

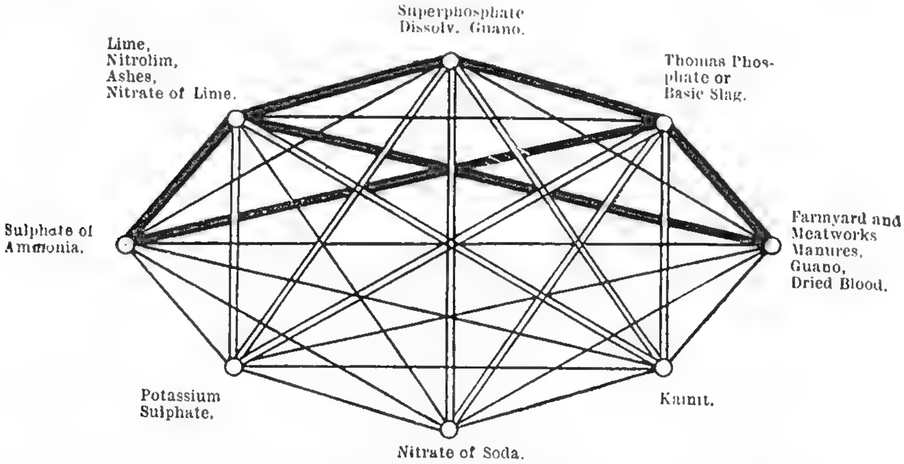
Of particuluar interest are the samples of **nitrate of lime,** and **nitrolim** or **calcium cyanamide,** of which large quantities are being imported.

These artificial fertilisers, which are really produced from nitrogen in the air, have given excellent results in a very large number of manuring trials, conducted the last three or four years, all over the world. I believe that our soils, of which a great number are rather deficient in lime, will derive particular benefit from these nitrogenous manures. The form of nitrogen in nitrolim is apparently nearly as available as the nitrogen of nitrates, much quicker in action than ammonia nitrogen, and not depending on the presence of lime in the soil. Nitrate of lime has the great advantage over nitrate of soda of not draining so easily through the soil. Nitrate of soda rather tends to exhaust soils, and spoils their physical conditions by depriving them of the lime, which faults are prevented by using nitrate of lime. Nitrolim is a very fine slate black powder, not liable to cake. As already stated, the action of this manure is only slightly slower than that of nitrates, and the large amount of lime (up to 50 per cent.) which it contains is in itself a great advantage. I believe that this new manure will prove of great value to our pineapple farmers and cane-growers.

**Potash** is generally used in the form of potassium sulphate. The chloride and kainite are as a rule not suitable to our soils.

In studying the composition of the mixed fertilisers on the table of analyses, it will be noticed that in most of them the amounts of phosphoric acid are rather high as compared with the amounts of nitrogen and potash. For this reason I generally recommend farmers to make their own mixtures from the pure concentrated manures, according to the requirements of their soil and crops.

When **mixing fertilisers** together, such mixtures must be avoided which would lead to decomposition, which, for instance, would take place if ammonium sulphate was mixed with lime or with Thomas phosphates, superphosphate with lime; or which may cause caking, like mixing kainite with Thomas phosphate A very simple guide for the mixing of manures is given in the accompanying diagram, devised by Dr. Geekens, which I slightly modified, however, to apply to our local conditions.




Manures joined by a heavy black line should *never be mixed* together; those connected by a double line must only be *mixed immediately before use*; and those joined by a thin single line may be safely *mixed* together *at any time.*

It is a matter of extreme difficulty to fix the monetary value of a manure, as so many factors influence the value. Cost of manufacture and mixing, bagging, rebagging, labelling, loss during storages, deterioration and decomposition on keeping, carriage and freight, &c., have to be taken into consideration. Again, in many cases the value derived from the chemical composition does not represent the actual value of the fertiliser, which depends upon many causes, local conditions, and requirements.

Some method of comparison is absolutely necessary, and for this purpose it is customary to use unit values, which are the cost price of 1 per cent. per ton of the various fertilising constituents, or actually the cash value of 22.4 lb. of each ingredient. For instance, in a sulphate of ammonia, costing £15 per ton, containing 20.68 per cent. of nitrogen, the unit value of nitrogen would be $\frac{15 \times 20}{20{\cdot}68}$ = 14.5s. = 14/6.

The following **unit values** were approximately fixed for the calculation of the **manurial value per ton in Brisbane:—**

| | | s. | d. |
|---|---|---|---|
| Nitrogen | as nitrate ... | 16 | 0 |
| | in ammonium salts ... | 14 | 6 |
| | in blood, fine bone, &c. ... | 14 | 6 |
| Potash | as sulphate ... | 5 | 6 |
| | as chloride ... | 5 | 0 |
| Phosphoric acid | water soluble ... | 5 | 3 |
| | citrate soluble ... | 4 | 0 |
| | Insoluble as in fine bones ... | 3 | 0 |

As an example, we will calculate the value of the mixed fertiliser No. 1338, Shirley's "£ s. d." Cane Manure, which is supposed to contain 7 per cent. water soluble phosphoric acid, 7.7 per cent. nitrogen, and 7.7 per cent. potash. From the analysis we find that it contains 7.33 per cent. water soluble phosphoric acid, .38 per cent. insoluble phosphoric acid, 6.68 per cent. potash, and 8.04 per cent. nitrogen, and the value per ton is, therefore, as follows:—

| | | | | | |
|---|---|---|---|---|---|
| N | 8·04 | × | 14s. 6d. | = | 116·58s. |
| $K_2O$ | 6·68 | × | 5s. 6d. | = | 36·74s. |
| Water sol. $P_2O_5$ | 7·33 | × | 5s. 3d. | = | 38·48s. |
| Insol. $P_2O_5$ | ·38 | × | 3s. 0d. | = | 1·14s. |
| | | | | | 192·94s = £9 12s. 11d. |

The advertised price of this manure is £9 10s. per ton in Sydney.

On the whole, it may be stated that these comparative manurial values fairly well represent the market value, if the manures are purchased on a large scale. It is, of course, quite impossible to get manures in small lots of 1 or 2 cwt. at this price, particularly such manures as superphosphate and nitrate of soda, which require frequent rebagging.

Farmers have the means in their own hands to obtain cheap and reliable fertilisers—they simply have to co-operate and order large quantities, a few months ahead, and in this case the fertilisers will be obtained just as cheaply here in Brisbane as in Sydney or Melbourne.

Of course, for our Western and Northern farmers the freight on manure will considerably raise the cost, but even in these cases considerable saving will be effected on ordering large quantities, and all manure vendors will make special quotations for such orders.

In order to encourage the use of fertilisers, and more particularly to induce experimenting on the part of our agriculturists, I give herewith a table of the **approximate manurial requirements of various crops** in lb. per acre:—

MANURIAL REQUIREMENTS IN LB. PER ACRE.

| — | Nitrogen. | Phosphoric Acid. | Potash. | Lime. |
|---|---|---|---|---|
| Bananas ... ... ... ... | 30— 60 | 50—80 | 30—160 | 56 |
| Barley ... ... ... ... ... | 20— 40 | 20—53 | 50— 95 | 30 |
| Barley, Brewers' ... ... ... | 15— 20 | 30—65 | 60— 95 | 30 |
| Beans ... ... ... ... ... | 0— 27 | 20—56 | 75—130 | 70 |
| Cabbages ... ... ... ... | 100—200 | 50—70 | 50—150 | 150 |
| Carrots ... ... ... ... | 50— 70 | 15—25 | 40— 75 | 56 |
| Cauliflowers ... ... ... ... | 100—150 | 30—50 | 30— 60 | 56 |
| Citrus Fruit ... ... ... ... | 40— 80 | 30—40 | 40— 80 | 40 |
| Corn ... ... ... ... ... | 20— 80 | 20—53 | 50—110 | 30 |
| Cotton ... ... ... ... ... | 20— 30 | 30—60 | 15— 30 | 70 |
| Cucumbers ... ... ... ... | 30— 56 | 20—36 | 50— 72 | 20 |
| Lucerne ... ... ... ... | 0— 10 | 40—70 | 65—100 | 140 |
| Mangolds ... ... ... ... | 50— 80 | 30—70 | 100—160 | 56 |
| Meadowlands ... ... ... | 50— 75 | 20—30 | 80—110 | 40 |
| Onions ... ... ... ... ... | 60— 81 | 20—36 | 50— 80 | 56 |
| Peas ... ... ... ... ... | 0— 13 | 20—56 | 56—100 | 70 |
| Pineapples ... ... ... ... | 50— 75 | 50—75 | 100—150 | 70 |
| Potatoes ... ... ... ... | 20— 53 | 20—50 | 67—100 | 30 |
| Rape ... ... ... ... ... | 50— 70 | 40—70 | 60— 80 | 80 |
| Sisal Hemp ... ... ... ... | 10— 20 | 20—40 | 50— 70 | 50 |
| Sorghum... ... ... ... ... | 30—100 | 30—60 | 70—150 | 30 |
| Sugar-cane ... ... ... ... | 30— 80 | 20—60 | 50—100 | 50 |
| Tobacco ... ... ... ... | 50—140 | 50—90 | 80—150 | 70 |
| Tomatoes ... ... ... ... | 30— 50 | 50—80 | 50— 80 | 30 |
| Turnips ... ... ... ... | 90—112 | 20—33 | 100—150 | 80 |
| Wheat ... ... ... ... ... | 10— 40 | 15—56 | 20— 65 | 30 |

From this table the necessary amounts of fertilisers to be applied per acre may be easily calculated. We take, for instance, Cabbages, which require a heavy application of manure, and wish to calculate the smallest amounts required per acre on an average class of soil.

The 100 lb. of nitrogen can be supplied by application of 485 lb. of ammonium sulphate; or 790 lb. of dried blood; or 630 lb. of nitrate of soda.

The 50 lb. of phosphoric acid can be supplied by 280 lb. of superphosphate or 200 lb. of bonemeal.

The 50 lb. of potash would be supplied by 100 lb. of sulphate of potash.

As a rule, in land under cultivation for some time, complete fertilisers, containing all the three principal plant foods, will be required; but, in some instances, one or the other may have to be considerably increased in order to get the best results. This can be generally ascertained by experimenting on a small scale, or a soil analysis may also give the required information. An excess of any particular plant food can be very harmful, and for this reason I follow with a table giving the amounts of artificial fertilisers to be applied to the various crops calculated for the small area of a square yard, and in the case of fruit trees for each tree:—

### **Experimental Manuring** in *Garden and Orchard.*

| | | |
|---|---|---|
| | Use the following artificial fertilisers in oz. per square yard— | |
| Cabbages, cauliflowers, lettuce, celery | Superphosphate ... ... | $1\frac{1}{4}$ to 2 oz. |
| | Sulphate of potash ... ... | $0\frac{1}{2}$ to 1 oz. |
| | Nitrolim ... ... ... | $1\frac{1}{4}$ to $2\frac{1}{2}$ oz. |
| | (or dried blood ... ... | $1\frac{3}{4}$ to $3\frac{1}{2}$ oz.) |
| Strawberries, tomatoes, potatoes, grass | Superphosphate ... ... | 1 to $1\frac{1}{2}$ oz. |
| | Sulphate of potash ... ... | $0\frac{1}{2}$ to $0\frac{3}{4}$ oz. |
| | Nitrolim ... ... ... | 1 to 2 oz. |
| | (or dried blood ... ... | $1\frac{1}{2}$ to 3 oz.) |
| Carrots, radishes, turnips, onions, shallots | Superphosphate ... ... | 1 to 2 oz. |
| | Sulphate of potash ... ... | $0\frac{3}{4}$ to $1\frac{1}{4}$ oz. |
| | Nitrolim ... ... ... | $0\frac{3}{4}$ to $1\frac{1}{4}$ oz. |
| | (or dried blood ... ... | 1 to $1\frac{3}{4}$ oz.) |
| Peas, beans, and other legumines | Superphosphate ... ... | 2 to 3 oz. |
| | Sulphate of potash ... ... | 1 to $1\frac{1}{2}$ oz. |
| | Nitrolim ... ... ... | 0 to $0\frac{1}{3}$ oz. |
| Pineapples ... ... ... ... | Superphosphate ... ... | $1\frac{1}{2}$ to 3 oz. |
| | Sulphate of potash ... ... | 2 to 3 oz. |
| | Dried blood ... ... ... | 3 to 4 oz. |
| | (or nitrolim ... ... ... | $2\frac{1}{2}$ to 3 oz.) |
| | Use per tree (small to large) in lb.— | |
| Oranges, mandarins, and lemons ... | Superphosphate ... ... | 2 to 5 lb. |
| | Sulphate of potash ... ... | $1\frac{1}{2}$ to $3\frac{1}{2}$ lb. |
| | Nitrolim ... ... ... | 3 to 9 lb. |
| | (or dried blood ... ... | 5 to 14 lb.) |
| Deciduous trees, plums, apricots, etc. | Superphosphate ... ... | 2 to 4 lb. |
| | Sulphate of potash ... ... | 1 to 2 lb. |
| | Nitrolim ... ... ... | 2 to 4 lb. |
| | (or dried blood ... ... | 3 to 6 lb.) |
| Bananas, apply per stool once or twice a year | Superphosphate ... ... | 2 to 3 lb. |
| | Sulphate of potash ... ... | 1 to 2 lb. |
| | Nitrate of lime or dried blood ... ... | 1 to 2 lb. |

In some cases the dried blood may replace the nitrolim or cyanamide in the manuring mixtures, and nitrolim again may be replaced by nitrate of lime, using the increased quantities given for dried blood.

For very young trees the quantities should be reduced, and for very large trees the quantities could be increased.

It is always better to apply the nitrolim and nitrate of lime separately, as a top dressing, a week or more after the application of the other manures.

The effect of all artificial fertilisers will be very much increased if small quantities of **stable manure** can be applied at the same time. The presence of organic matter in the form of **humus** is of the greatest importance to keep up the fertility of a soil; and in a loose, well-worked soil the manures are always more effective.

When we consider the functions of the various plant-foods, it may be stated as a general rule **that potash,** which is found most abundantly in young leaves and twigs of plants, is intimately connected with the production of starch, sugar, and other carbohydrates in the leaves, and subsequent transference of these bodies to the fruits. Part of the potash is generally returned back to the soil after it has done its work in the plant.

**Nitrogen** promotes the growth of leaves and stems, and rather retards maturity and development of buds and flowers. The leaves show generally a deep green colour, and the whole of the plant becomes more vigorous in its growth by the application of nitrogenous manure. The amount of nitrogen in the plant itself and corresponding amounts of proteins are generally increased.

**Phosphoric acid** has a rather ripening effect on plants. Phosphates are generally found in the seeds, partly in association with the proteins and partly associated with fats, more particularly in Lecithin, a highly nutritious fatty compound, found in many seeds. No plant would produce seeds unless a sufficient quantity of phosphoric acid in the form of phosphates is present in the soil.

**Lime** aids in decomposition of organic matters, and also converts many compounds into a more available form. Its chief action, however, is to improve the physical condition of soils, particularly loosening heavy clay soils, and also, again, giving body to light sandy soils. Lime also counteracts any acidity produced by decaying vegetable matters.

# ANALYSES OF FERTILISERS.

| Lab. No. | Fertiliser. | Where Obtained. | Moisture. | Phosphoric Acid $P_2O_5$. Water Soluble. | Citrate Soluble. | Citrate Insoluble. | Total. | Potash, $K_2O$. | Nitrogen, N. | Comparative Manurial Value per Ton. £ | s. | d. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | % | % | % | % | % | % | £ | s. | d. | |
| | **Simple Fertilisers: Potash Manures.** | | | | | | | | | | | | |
| 214 | Sulphate of Potash (Shirley's) | R. B. Lawson, Stanthorpe ... ... | ·46 | ... | ... | ... | ... | 52·50 | ... | 14 | 9 | 0 | 97·00 per cent. Sulphate of Potash |
| 1319 | Ditto ditto ... ... | Paul and Gray, Brisbane ... ... | ·50 | ... | ... | ... | ... | 51·10 | ... | 14 | 1 | 0 | 94·70 ditto ditto ditto |
| 1320 | Ditto ditto ... ... | Webster and Co., ditto ... ... | ·55 | ... | ... | ... | ... | 49·90 | ... | 13 | 14 | 8 | 92·40 ditto ditto ditto |
| | **Simple Fertilisers: Nitrogenous Manures.** | | | | | | | | | | | | |
| 213 | Sulphate of Ammonia (Shirley's) | R. B. Lawson, Stanthorpe ... ... | ·10 | ... | ... | ... | ... | ... | 20·69 | 15 | 0 | 0 | 97·44 per cent. Sulphate of Ammonia |
| 1321 | Ditto ditto ... | Paul and Gray, Brisbane ... ... | ·05 | ... | ... | ... | ... | ... | 20·70 | 15 | 0 | 2 | 97·50 ditto ditto ditto |
| 1322 | Ditto ditto ... ... | Webster and Co., ditto ... ... | ·06 | ... | ... | ... | ... | ... | 20·70 | 15 | 0 | 2 | 97·50 ditto ditto ditto |
| 1572 | Ditto ditto ... | Brisbane Gas Co. ... ... ... | ·66 | ... | ... | ... | ... | ... | 20·93 | 15 | 3 | 6 | 98·60 ditto ditto ditto |
| 1323 | Nitrate of Soda ... ... | Webster and Co., Brisbane ... ... | ·68 | ... | ... | ... | ... | ... | 15·75 | 12 | 12 | 2 | 95·40 ditto Nitrate of Soda |
| 1514 | Nitrate of Lime ... ... | Trackson Bros., ditto ... ... | ... | ... | ... | ... | ... | ... | 13·07 | 10 | 9 | 6 | 27·71 ditto CaO (Lime) |
| 1513 | Nitrolim (Cyanamide) ... | ditto ditto ... ... | ... | ... | ... | ... | ... | ... | 19·31 | 15 | 9 | 0 | 65·00 ditto ditto |
| | **Bone, Blood, Meatworks Manures, &c.** | | | | | | | | | | | | |
| 1324 | Bone Dust (Baynes Bros.) | Summerlin, Brisbane ... ... | 7·48 | ... | ... | 24·42 | 24·42 | ... | 3·44 | 6 | 1 | 10 | Coarse, 78 p. cent.; fine, 22 p. cent. |
| 1325 | Ditto (Queensland Fertilser Co.) | T. H. Wood, ditto ... ... | 5·94 | ... | ... | 24·60 | 24·60 | ... | 3·45 | 6 | 3 | 6 | Coarse, 50 p. cent.; fine, 50 p. cent. |
| 1326 | Ditto ditto | H. A. Petersen, ditto .. ... | 7·50 | ... | ... | 24·92 | 24·92 | ... | 4·28 | 6 | 16 | 10 | Coarse, 80 p. cent.; fine, 20 p. cent. |
| 1513 | Ditto ... ... .. | Queensland Fertiliser Co., Runcorn | 5·78 | ... | ... | 22·05 | 22·05 | ... | 3·52 | 5 | 17 | 2 | Coarse, 55 p. cent.; fine, 45 p. cent. |
| 1034 | Ditto (Francis, Ipswich) | Fenwick and Co., Brisbane... ... | 4·96 | ... | ... | 26·80 | 26·80 | ... | 2·67 | 5 | 19 | 0 | Coarse, 40 p. cent.; fine, 60 p. cent. |
| 210 | Bone Phosphate (Shirley's) | R. B. Lawson, Stanthorpe ... ... | 8·09 | ... | ... | 25·90 | 25·90 | ... | 4·20 | 6 | 18 | 10 | Coarse, 54·4 p. cent.; fine, 45·6 p. cent. |
| 1327 | Fertiliser (Foggit, Jones, and Co.) | Summerlin, Brisbane... ... ... | 5·80 | ... | ... | 11·75 | 11·75 | ... | 6·25 | 6 | 5 | 11 | |
| 260 | Ditto ditto ... | Foggit, Jones, and Co., Brisbane ... | 6·26 | ... | ... | 12·59 | 12·59 | ... | 6·04 | 6 | 5 | 5 | |
| 994 | Ditto ... ... ... | Q.M.E. and A. Co., Ross River ... | 4·50 | ... | ... | 13·57 | 13·57 | ... | 6·54 | 6 | 15 | 7 | |
| 995 | Ditto ... ... ... | N.Q.M.E. Co., Alligator Creek ... | 4·32 | ... | ... | 18·55 | 18·55 | ... | 5·55 | 6 | 16 | 2 | |

## ANALYSES OF FERTILISERS—*continued.*

| Lab. No. | Fertiliser. | Where Obtained. | Moisture. | Phosphoric Acid $P_2O_5$. Water Soluble. | Citrate Soluble. | Citrate Insoluble. | Total. | Potash, $K_2O$. | Nitrogen, N. | Comparative Manurial Value per Ton. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | % | % | % | % | % | % | % | £ s. d. | |
| | **Bone, Blood, Meatworks Manures, &c.—*continued.*** | | | | | | | | | | |
| 1788 | Ditto ("Hashmagandy") | Bergl Australia, Ltd., Bowen ... | 7·15 | ... | ... | 21·35 | 21·35 | ... | 3·37 | 5 12 10 | |
| 1805 | Ditto ... ... ... | Q.M.E. and A. Co., Brisbane ... | 5·76 | ... | ... | 16·00 | 16·00 | ... | 5·20 | 6 3 5 | |
| 1517 | Ditto ... ... ... | Birt and Co., Brisbane ... ... | 7·24 | ... | ... | 9·66 | 9·66 | ... | 6·46 | 6 2 9 | |
| 368 | Ditto (Torrens Ck. Meat Export Co.) | Australian Estates and Mortgage Co., Brisbane | 9·86 | ... | ... | 15·50 | 15·50 | ... | 4·48 | 5 11 6 | |
| 431 | Ditto ... ... ... | Burdekin Meat Preserving Co. ... | 4·68 | .. | ... | 14·65 | 14·65 | ... | 5·22 | 5 19 7 | |
| 1179 | Ditto (Fitzroy) ... ... | C.Q.M.E., Lake's Creek ... ... | 7·93 | ... | ... | 19·52 | 19·52 | ... | 3·88 | 6 14 9 | |
| 1505 | Ditto (Gladstone Meat-works) | Aplin, Brown, and Crawshay, Brisbane | 8·46 | ... | ... | 12·91 | 12·91 | ... | 7·02 | 7 0 8 | |
| 1555 | Ditto (Baynes Bros.) ... | E. Gleeson, Stanthorpe ... ... | 7·25 | .. | ... | 20·38 | 20·38 | ... | 4·42 | 6 5 3 | |
| 215 | Ditto ditto ... | Ditto ditto ... ... | 5·89 | ... | ... | 21·30 | 21·30 | ... | 4·52 | 6 9 6 | |
| 651 | Ditto ... .. ... | J. C. Hutton Propy. Ltd., Brisbane | 16·00 | 2·67 | 7·33 | | 10·00 | ... | 6·24 | 6 6 6 | |
| 1757 | Dried Blood ... ... ... | Bergl Australia, Bowen ... ... | 15·85 | ... | ... | ... | ... | ... | 12 64 | 9 3 0 | |
| 430 | Ditto ... ... ... | Burdekin River Meat Preserving Co. | 12 38 | ... | ... | ... | ... | ... | 12·78 | 9 5 2 | |
| 1516 | Ditto ... ... ... | Birt and Co., Brisbane ... ... | 13·16 | ... | ... | ... | ... | ... | 12·52 | 9 1 7 | |
| | **Superphosphates and Basic Slags.** | | | | | | | | | | |
| 408 | Superphosphate (Shirley's) | R. B. Lawson, Stanthorpe ... ... | 9·75 | 16·42 | ·99 | | 17·41 | ... | ... | 4 9 8 | |
| 1328 | Ditto ditto | Paul and Gray, Brisbane ... ... | 5·80 | 18·51 | ·62 | | 19·13 | ... | ... | 4 19 5 | |
| 1329 | Ditto ... .. ... | Webster and Co., ditto ... ... | 9·90 | 17·90 | 1·73 | | 19·63 | ... | ... | 5 0 1 | |
| 1330 | Basic Slag ... ... .. | Ditto ditto ... ... | ·64 | ... | 11 24 | 2·38 | 13·62 | ... | ... | 2 12 7 | Fine, 74 per cent. |
| | **Mixed Fertilisers.** | | | | | | | | | | |
| 1331 | Shirley's No. 0 ... .. | Paul and Gray, Brisbane ... ... | ·32 | ... | 2·12 | 14·25 | 16·37 | 6·48 | 2·18 | 5 18 4 | |
| 1332 | Ditto No. 2 ... ... | ditto ditto ... ... | 10·60 | 15·40 | ·36 | | 15·76 | ·96 | 1·68 | 5 11 9 | |
| 211 | Ditto No 3 ... ... | R. B. Lawson, Stanthorpe .. .. | 8·33 | 15·21 | ·68 | | 15·89 | 2·19 | 3·11 | 6 9 4 | |
| 1558 | Ditto No. 3 ... ... | ditto ditto ... ... | 5·26 | 12·68 | 1·59 | | 14·27 | 2·12 | 3·20 | 6 10 4 | |
| 212 | Ditto No. 5 ... ... | ditto ditto ... ... | 5·48 | 11·89 | ·46 | | 12·35 | 6·27 | 3·26 | 7 5 8 | |
| 1557 | Ditto No. 5 ... ... | ditto ditto ... ... | 4·18 | 13·40 | 1·90 | | 15·30 | 6·00 | 3·15 | 7 15 10 | |
| 1333 | Ditto No. 5 ... ... | Paul and Gray, Brisbane ... ... | 8·10 | 12·65 | ·11 | | 12·76 | 7·00 | 3·41 | 7 14 8 | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1334 | Ditto No. 7 ... .. | ditto ditto .. ... | 9·64 | 11·81 | ·52 | 12·33 | 5·20 | 1·34 | 5 12 10 |
| 316 | Ditto No. 9 ... ... | R. B. Lawson, Stanthorpe ... ... | 5·35 | 5·71 | ·72 | 6·43 | 5·20 | 3·59 | 5 13 1 |
| 1335 | Ditto No. 9 ... ... | Paul and Gray, Brisbane ... ... | 1·60 | 7·33 | ·71 | 8·04 | 3·97 | 3·72 | 5 16 11 |
| 317 | Ditto No. 11 ... ... | R. B. Lawson, Stanthorpe ... ... | ·72 | 12·10 | ·55 | 12·65 | 8·25 | nil | 5 10 10 |
| 1556 | Ditto No. 11 .. ... | ditto ditto ... ... | 4·66 | 12·17 | ·83 | 13·00 | 7·12 | nil | 5 6 0 |
| 1336 | Ditto No. 11 ... ... | Paul and Gray, Brisbane ... ... | 6·84 | 15·30 | ·30 | 15·60 | 5·60 | nil | 5 12 4 |
| 1337 | Ditto No. 19 ... ... | ditto ditto ... ... | 2·10 | 6·44 | ... | 13·80 | 3·00 | 3·93 | 5 7 2 |
| 1338 | Ditto £. S. D. Cane Fertiliser | ditto ditto ... ... | 3·18 | 7·33 | ·38 | 7·71 | 6·68 | 8·04 | 9 12 11 |
| 1339 | Ditto Special ... .. | ditto ditto ... ... | ·84 | 4·20 | ·70 | 4·90 | 10·07 | 10·45 | 11 11 5 |
| 1340 | Cereal Guano ... ... | Webster and Co., ditto ... ... | 10·02 | 7·50 | 3·25 | 10·75 | 2·23 | 3·44 | 5 13 0 |

## Miscellaneous Fertilising Substances.

| | | | | | | | | | | Lime % | Magnesia % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Molasses ... ... ... | .. | 20·00 | ... | ... | ·22 | ... | 3·85 | ·73 | 1 12 5 | 1·28 | ·45 |
| Sea Weed ... ... ... | ... | 6·15 | ... | ... | ·18 | ... | ·40 | ·32 | 1 7 2 | 2·76 | ... |
| Ash of Lantana ... ... | ... | ... | . | ... | 3·57 | ... | 13·96 | ... | 4 4 1 | 16·95 | 4·39 |
| Ditto Belar (*Casuarina lepidophloa*) ... ... | ... | ... | ... | .. | ·02 | ... | 4·95 | ... | 1 6 1 | 49·10 | ·84 |
| Ditto Gidyea (*Acacia homolophylla*) ... ... | ... | ... | ... | ... | ·90 | ... | 1·10 | ... | 0 8 6 | 48·70 | 1·52 |
| Ditto Brigalow (*Acacia harpophylla*) ... ... | ... | ... | ... | ... | ... | ... | ·69 | ... | 0 3 5 | 54·40 | 1·61 |
| Ditto Apple-tree (*Angophora subvelutina* ... | .. | .. | ... | ... | ·34 | ... | 4·45 | .. | 1 5 6 | 29·65 | 8·05 |
| Ditto Tobacco (Queensland) ... ... ... | ... | ... | ... | ... | 5·36 | ... | 27·05 | ... | 8 4 10 | 40·70 | 14·32 |
| Ditto Pineapple Plants ... | ... | ... | ... | ... | 5·88 | ... | 15·02 | ... | 5 0 3 | 7·20 | 4·60 |
| Ditto Grape Marc .. ... | ... | ... | ... | ... | 10·45 | ... | 23 62 | ... | 8 1 4 | 6·62 | 2 12 |
| Ditto Bottle-tree (*Sterculia Rupertis*) ... | ... | ... | ... | ... | ·24 | ... | 29·02 | ... | 8 0 4 | 23·48 | 13 35 |
| Ditto Banana Plants ... | ... | ... | ... | ... | 1·46 | ... | 36·64 | ... | 10 5 11 | 21·32 | 7·02 |
| Ditto Coffee Berry Pulp ... | ... | ... | ... | ... | 7·84 | ... | 54·64 | ... | 16 4 0 | 6·94 | 14·75 |
| Ditto Sisal Hemp ... ... | ... | ... | .. | ... | 4·60 | ... | 8·00 | ... | 2 7 10 | 31·86 | 21·31 |
| Ditto Cane Tops ... ... | .. | ... | ... | .. | 4·90 | ... | 6·49 | ... | 2 10 5 | 4·78 | 4·96 |
| Ditto ditto Trash ... .. | ... | ... | ... | ... | 3·20 | ... | 4·90 | ... | 1 16 7 | 4·00 | 2·60 |

# General Notes.

## PERRY.

This is an alcoholic beverage, obtained by the fermentation of the juice of pears. The manufacture is in all essentials identical with that of cider, though there are some variations in detail arising from the more abundant mucilage of the pear. The fruits are either taken at once to the crushing mill or allowed, like apples, to remain in heaps so as to ripen uniformly; they are then crushed between rollers of granite or millstone grit, and the must or juice poured into casks. In making the better kind of perry only the best sorts of pear are used without admixture, but for ordinary purposes pears of various kinds are mixed indiscriminately, although, as in the case of the apple, the fruits used for the manufacture of perry are not those which are most suitable for dessert. It is considered better not to crush the pips, as the flavour of the perry is thereby deteriorated. The most scrupulous cleanliness is absolutely requisite, and all the metal work of the machinery should be sedulously kept bright, otherwise the acids of the juice dissolve the oxides, and, in the case of lead, produce poisonous salts. Pear juice contains grape sugar, tannic, malic, and tartaric acids, albumen, lime, pectin, mucilage, and other ingredients. The quantity of potash and phosphoric acid in the juice is relatively large. At a temperature ranging from 50 degrees to 80 degrees Fahr. the juice undergoes natural fermentation without the addition of yeast. This fermentation, however, is brought about by the agency of a "ferment" (saccharomyces), which feeds on the grape sugar of the juice, decomposing it, and causing the rearrangement of its constituents in the form of alcohol, carbonic acid gas, glycerine, &c. The saccharomyces ferments in the first instance absorb oxygen and liberate carbonic acid, as in the process of respiration, but the air of the fluid in which they live speedily becomes exhausted of its oxygen, and then the ferments obtain further supplies from the glucose, in effecting the decomposition of which they set free more oxygen than they require, and this uniting with the hydrogen and the carbon forms the products of fermentation.

In practice the pulp is removed from the mill and placed in open vats for forty-eight hours, or longer. Gentle fermentation sets in as shown by the formation of froth and bubbles of carbonic acid gas. The pulp is then placed in layers separated by hair cloths, which act as sieves or filters when the mass is placed in a press like a cheese press. The pressure is gradual at first and afterwards increased. The juice or must is poured into hogsheads, leaving an unfilled space as "ullage." The hogsheads are placed in a cool cellar, when fermentation begins as above explained, and a thick scum forms on the surface called the "upper lees." At the same time mucilage and ferment cells with the more solid particles sink to the bottom and form the "lower lees" at the bottom of the barrel. When the fermentation has subsided, the liquor between the upper and the lower lees should be bright, but in the case of perry, owing to the large quantity of mucilage, the juice has to be filtered through filters of Forfar linen—a tedious process. The clear liquor is now racked off into clean casks, not quite filled, but leaving space for "ullage," and kept uncorked at a low temperature. A better practice is to close the cask with a bung, through which a curved siphon-like tube is passed, one end of it being in the "ullage," and the portion of it outside the cask being bent downwards and then upwards; then either the bend of the tube may be filled with one or two tablespoonfuls of water or the outer end of the bent tube may be plunged in a cup of water, the object in all cases being to provide for the escape of gas from the cask and to prevent the passage of air into it. In a week or so the fermentation ceases, or nearly so, the liquor becomes clear and quiet, when isinglass is added in the proportion of 1 oz. to a hogshead of 100 to 115 gallons. (In Devonshire the hogshead contains uniformly 50 gallons.) In January or February the bungs are driven in firmly. While fermentation is going on, a temperature of 50 degrees to 70 degrees is most propitious, but after the liquor is racked off it should be kept in a uniformly cool cellar as near to 40 degrees Fahr. as can be done. When it is desirable to restrain over violent or hasty fermentation, sulphur or salicylic acid is employed. The latter being the simpler and cleaner, is the better agent to be adopted. An ounce or an ounce and a half to 100 gallons should be poured into the fermenting liquor immediately after it has been racked. It is very effectual, and leaves no sensible effects on the liquor if carefully used, being tasteless and free from smell. Great care should be taken, however, not to allow the acid to come in contact with any metal such as iron, or a black colour will result. Perry contains about 7 per cent. of alcohol, and will keep in casks, if well made, for three or four years, or longer if in bottle. It does not, however, travel well.

# Answers to Correspondents.

## ROOT DISEASE OF BANANAS.

Mr. Eric Pettigrew, River Bank, East Bundaberg, writes:—

I seek advice concerning banana culture, and as yours is a department of information, I trust you will not regard me as improprietous in soliciting your assistance. During the later portion of 1911 your handbook on "The Banana in Queensland" chanced to come beneath my notice; its perusal I found most engrossing. A section of our suburban garden is devoted to thirty stools of sugar bananas. The grove was established hardly two years ago, but the plants have thriven wondrously in that space. Their situation is sheltered, but sunny; the stools are in four rows, running east and west; the ends of rows are about twenty or thirty paces from the brink of the river's bank, which is lofty; the ground has a gentle slope inland. The whole of the ground on which the grove is planted has been hand-trenched to a depth of about 18 in., at which depth a 6 to 8 in. layer of free sand is encountered, below which again is earth. The trenching was done eighteen or twenty months ago. All plants after fruit has been gathered are sliced into small pieces, and buried in trenches between rows, as well as sweet potato vines, exhausted green pea vines, duckyard cleanings, and a little stable manure. Up to the present we have gathered twenty-six bunches, the number of fruit on each bunch fluctuating between 94 and 115, the greater portion of the fruit scaling 4 oz. and over, 5 in. or a trifle over in circumference, and 6 in. in length, and of a most delectable flavour. They have thriven prodigiously and without cessation, with irrigation from the town water supply, until a few weeks ago, within which time three stools have faltered, their leaves have broken, dropped, and turned yellow, and the plant has withered within a few days. On reference to your publication, previously mentioned, I find the affliction coincides in every detail with that described under No. 1 Root Disease. I have dug the whole of the affected plants out, and destroyed them. On cutting the bulbulous extremity of the plant, whence the roots emerge, the reddish-brown colouring is pronounced; in some it runs in a circle around the stem about 2 in. from the exterior; in others it presents a speckled appearance, which on closer examination each speck is discovered to be a diseased fibre. Here, then, is where I am in need of your assistance. To save a diseased stool is impossible, and even were it within the realm of achievement would be unprofitable. What I have in mind is a preventive or an eradicator, to protect the threatened decimation of our grove. Or, perhaps, what would be of value, some material or lotion which would render the site of the diseased stool perfectly hygienic, so that it might be replaced with a healthy sucker with some assurance of safety. In this connection lime has suggested itself to us, but we have read of it as being temporarily promotive to growth, but finally exhaustive. Any remedy which would be within the scope of application of the amateur gardener would be of inestimable aid. We sincerely hope that within your fund of knowledge will be found some alleviation of our anxiety as to the fate of our grove of graceful plants. I thank you in anticipation of assistance,

In reply to Mr. Pettigrew, Mr. C. Ross, Instructor in Fruit Culture, says:—

The sugar banana is more subject to the disease than any other variety, and makes its appearance in the best tended plantations. The disease is no doubt constitutional, consequently the utmost care must be exercised in the choice of bulbs or suckers. Fresh slacked lime is a good hygienic agent, but if used on your soil a few shovelfuls of stiff clay broken into nodules and mixed with the soil to check its exhaustive properties is essential. In your case, I should recommend that the layer of sand be thoroughly broken up and incorporated with the subsoil. The most effectual and economic method is to use dynamite for the purpose. It is the best soil purifier, killing insect and fungus germs. The method of procedure is as follows, viz.:—Clear away 2 or 3 in. of the loose surface soil where the plant is to be put in, and bore a hole with a bar or auger right through the sand-layer, well into the subsoil, say 3 ft. from the surface altogether; insert a small plug of dynamite with detonating cap and sufficient length of fuse attached. Tamp the hole well with pliable clay up to the surface. The explosion will have the effect of disintegrating, incorporating, as well as disinfecting all soil particles to a depth and width of 6 to 9 ft. according to soil texture.

## THE CANTALOUPE.

"SELECTOR," Mackay—

See article on the Cantaloupe in this issue. It is unlikely that you could get seed of the true Cantaloupe in Brisbane. It appears that what the American farmer calls Cantaloupes are really our rock-melon, and that the only musk melon called Cantaloupe is scarcely grown in the United States.

# The Markets.

## PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR FEBRUARY.

| Article. | | FEBRUARY. Prices. |
|---|---|---|
| Bacon, Pineapple | lb. | 8d. to $9\frac{1}{2}$d. |
| Bran | ton | £8 |
| Butter | lb. | 1s. 2d. |
| Chaff, Mixed | ton | £7 to £8 10s. |
| Chaff, Oaten (Victorian) | " | £7 10s. to £8 |
| Chaff, Lucerne | " | £8 10s. to £10 |
| Chaff, Wheaten | " | £6 10s. to £7 |
| Cheese | lb. | $7\frac{3}{4}$d. to 8d. |
| Flour | ton | £10 10s. |
| Hay, Oaten (Victorian) | " | £7 10s. to £8 |
| Hay, Lucerne | " | £9 |
| Honey | lb. | $1\frac{1}{2}$d. |
| Maize | bush. | 5s. 6d. to 5s. 10d. |
| Oats | " | 4s. to 4s. 3d |
| Pollard | ton | £8 10s. |
| Potatoes | " | £16 |
| Potatoes, Sweet | cwt. | 6s. to 8s. |
| Pumpkins | ton | £10 to £11 |
| Wheat, Milling | bush. | 4s. 9d. |
| Onions | ton | £16 |
| Hams | lb. | 1s. $1\frac{1}{2}$d. |
| Eggs | doz. | 1s. 2d. to 1s. 6d. |
| Fowls | pair | 2s. to 4s. |
| Geese | " | 5s to 6s. |
| Ducks, English | " | 3s. to 3s. 6d. |
| Ducks, Muscovy | " | 4s. to 5s. |
| Turkeys (Hens) | " | 7s. to 8s. |
| Turkeys (Gobblers) | " | 12s. to 18s. |

## SOUTHERN FRUIT MARKETS.

| | |
|---|---|
| Apples (Choice), per case | 10s. to 12s. |
| Apples (Cooking), per case | 3s. to 5s. 6d. |
| Apricots, half case | 3s. to 5s. |
| Bananas (Fiji), G.M., per bunch | 1s. 6d. to 2s. 6d. |
| Bananas (Fiji), G.M., per case | 15s. 6d. to 16s. |
| Cocoanuts, per dozen | 2s. 6d. to 3s. |
| Lemons (local), per gin case | 5s. to 11s. |
| Oranges (local), per gin case | 8s. to 15s. |
| Oranges (Navels), per gin case | 16s to 18s. |
| Mandarins (Emperors), per case | 8s. to 12s. |
| Passion Fruit (local), per half-case | 3s. to 5s. |
| Papaw Apples, per half-case | 3s 6d. to 6s. |
| Peaches, per half-case | 3s. 6d. to 9s. |
| Peanuts, per lb. | $5\frac{1}{2}$d. |
| Pears (local), per bushel case | 7s. to 12s. |
| Pineapples (Queensland), common, per case | 9s. to 10s. |
| Pineapples (Queensland), Ripley's, per case | 9s. to 10s. |
| Pineapples (Queensland), Queen's, per case | 14s. to 15s. |
| Plums, per half-case | 3s. 6d. to 5s. 6d. |
| Quinces, per gin case | 4s. to 4s. 6d. |
| Rockmelons, per half-case | 2s. to 3s. 3d. |
| Strawberries, per dozen punnets | 17s. to 24s. |
| Tomatoes, per quarter-case | 2s. to 2s. 6d. |
| Watermelons, per dozen | 7s. to 14s. |

## PRICES OF FRUIT—TURBOT-STREET MARKETS.

| Article. | FEBRUARY. Prices. |
|---|---|
| Apples (Eating), per case | 4s. to 7s. 6d. |
| Apples (Cooking), per case | 3s. to 6s. |
| Apricots, per case | 2s. 5d. to 5s. 6d. |
| Bananas (Cavendish), per dozen | 2d. to 3d. |
| Bananas (Sugar), per dozen | 1½d. to 2d. |
| Cape Gooseberries, per case | ... |
| Cherries, per quarter-case | ... |
| Citrons, per cwt. | ... |
| Custard Apples, per quarter-case | ... |
| Grapes, per lb. | 1d. to 3d. |
| Lemons, per case | 6s. to 7s. |
| Mandarins, per case | ... |
| Mangoes, per case | 1s. to 3s. 9d. |
| Nectarines, per case | ... |
| Oranges (Navel), per case | ... |
| Oranges (Other), per case | ... |
| Papaw Apples, per quarter-case | 1s. to 2s. 6d. |
| Passion Fruit, per quarter case | 2s. 6d. to 3s. 6d. |
| Peaches, per quarter-case | 3s. to 4s. |
| Peanuts, per lb. | 3½d. |
| Pears, per case | 6s. to 8s. |
| Persimmons, per half-case | 3s. to 5s. |
| Plums, per quarter-case | 3s. to 4s. |
| Pineapples (Ripley), per dozen | 6d. to 1s. 6d. |
| Pineapples (Rough), per dozen | 4d. to 1s. |
| Pineapples (Smooth), per dozen | 1s. to 2s. |
| Rockmelons, per dozen | 7s. to 12s. |
| Strawberries, per tray | 3s. 6d. |
| Tomatoes, per quarter-case | 2s. 6d. to 5s. 6d. |
| Watermelons, per dozen | 4s. 6d. to 15s. |

## TOP PRICES, ENOGGERA YARDS, JANUARY, 1912.

| Animal. | JANUARY. Prices. |
|---|---|
| Bullocks | £8 10s. to £10 |
| Cows | £5 7s. 6d. to £7 17s. 6d. |
| Merino Wethers | 21s. 9d. |
| Crossbred Wethers | 19s. 6d. |
| Merino Ewes | 17s. |
| Crossbred Ewes | 19s. 9d. |
| Lambs | 15s. |
| Pigs (Baconers) | 43s. |
| Pigs (Porkers) | 30s. |

# Orchard Notes for April.

## THE SOUTHERN COAST DISTRICTS.

The gathering and marketing of citrus fruit, as well as of pines, bananas, custard apples, persimmons, &c., is the principal work of the month. In the Notes for March attention was drawn to the necessity for keeping all pests in check, particularly those attacking the ripening fruit. As it is the height of folly to look after the orchard thoroughly during the growing period of the crop and then to neglect the crop when grown, every possible care must be taken to keep fruit fly, peach moth, black brand, or other pests that destroy or disfigure the fruit in check, and this can only be accomplished by combined and systematic action. Citrus fruit at this time of the year often carries badly, as the stem is tender, easily bruised, full of moisture, and, consequently, very liable to the attacks of the blue mould fungus, which causes specking. The loss from this cause can be lessened to a considerable extent by carefully attending to the following particulars:—

1st. Never allow mouldy fruit to hang on the trees or to lie about on the ground. It should be gathered and destroyed, so that the countless spores which are produced by the fungus shall not be distributed broadcast throughout the orchard, infesting many fruit, and only waiting for a favourable opportunity, such as an injury to the skin by an insect or otherwise, combined with favourable weather conditions (heat and moisture), to start into growth.

2nd. Handle the fruit carefully to prevent bruising. Cut the fruit, don't pull it, as pulling is apt to plug the fruit—that is to say, to either pull the stem out or injure the skin round the stem—and a fruit so injured will go mouldy.

3rd. Sweat or dry the fruit thoroughly; if the weather is humid, laying the fruit out in the sun on boards or slabs is a very good plan.

4th. After sweating, examine the fruit carefully, and cull out all bruised or punctured fruit, and only pack perfectly sound dry fruit. It is better for the loss to take place in the orchard than for the loss to take place in the case in transit.

5th. If the mould is very bad, try dipping the fruit for a few seconds in a 2 per cent. solution of formalin. This will kill the spores, and if the fruit is placed in the sun and dried quickly before packing there will not be much chance of its becoming reinfested.

Don't gather the fruit too green, especially such varieties as the Beauty of Glen Retreat Mandarins, as immature fruit spoils the sale of the good article.

If the orchard has not been cleaned up after the summer rains, do so now; and do any other odd jobs that may be required, such as mending fences, grubbing out dead or worthless trees, cleaning out drains, &c.

Strawberry planting may be continued, and where new orchards are to be planted continue to work the soil so as to get it into the best possible tilth.

## THE TROPICAL COAST DISTRICTS.

Clean up the orchards after the rainy season. Look out for scale insects, and cyanide or spray for same when necessary.

Go over the trees carefully, and when there is dead wood or water sprouts remove them. If bark fungus is showing, paint the affected branches with the sulphur and lime wash. Clean up bananas, pineapples, and other fruits, as after the end of the month it is probable that there will not be any great rainfall, so that it is advisable to keep the ground well cultivated and free from weeds, so as to retain in the soil the moisture required for the trees' use during the winter months. Keep bananas netted; destroy guavas wherever found.

## THE SOUTHERN AND CENTRAL TABLELANDS.

If the orchards and vineyards have not already been cleaned up, do so. Cultivate or plough the orchard, so as to get the surface soil into good tilth, so that it can absorb and retain any rain that falls, as, even though the trees will simply be hardening off their summer's growth of wood, it is not advisable to let the ground dry out. When citrus fruits are grown, attend to them in the manner recommended for the Southern Coast Districts; and when grown in the dry parts, keep the land in a state of good cultivation. Should the trees require it, a light watering may be given. Do not irrigate vines; let them ripen off their wood.

# Farm and Garden Notes for April.

FIELD.—The wheat land should now be ready for sowing the early wheats, and that which has not been prepared should be ploughed without delay, April, May, and June at latest being the months for sowing. The main potato crop, planted in February and March, will now be ready for a first or second hilling up. The last of the maize crop will now have been got in. Where cotton is grown, the pods will now be opening, and advantage should be taken of dry weather to get on with the picking as quickly as possible. Picking should not be begun until the night dew has evaporated nor during rain. Sorghum seed will be ripe. Tobacco also will be ripening, and either the leaves or the whole plant harvested. Lucerne may be sown, as the growth of weeds has now slacked off, but the ground must be thoroughly prepared and cleaned. Sow oats, barley, rye, wheat, mangolds, and Swede turnips. Plant out paspalum roots. Seed wheat of whatever variety soever should be dipped in a solution of sulphate of copper (bluestone) in the proportion of 1 lb. of sulphate to 24 gallons of water. The seed may also be treated with hot water by plunging it in a bag into hot water at 120 degrees Fahr. for a minute or two, and then into water heated to 135 degrees Fahr. Allow it to remain in this for ten minutes, moving it about all the time. Then plunge the seed into cold water and spread out to dry. This plan is useful in districts where bluestone may not be obtainable. Another safeguard against bunt, smut, black and red rust is to treat the seed with formalin at the rate of 1 lb. of formalin to 40 gallons of water. Schering's formalin costs about 2s. 10d. per lb., and is sold in bottles. It is colourless and poisonous, and should be kept where no children or persons ignorant of its nature can have a chance of obtaining it. To treat the seed, spread it on a wooden floor and sprinkle the solution over it, turning the grain over and over until the whole is thoroughly wetted. Then spread it out to dry, when it will be ready for sowing. Instead of sprinkling, dipping may be resorted to. A bushel or so of seed is placed in a bag and dipped in the solution. During five minutes the bag is plunged in and out, and then the seed is turned out to dry. Formalin is less injurious to the grain than bluestone, but, while the latter can be used over and over again, formalin becomes exhausted. It therefore follows that only the amount required for immediate use for sprinkling should be prepared. Do not sow wheat too thickly. Half a bushel to the acre is sufficient—more on poor land and less on rich soils. On light sandy soil the wheat should be rolled. On sticky land it should only be rolled when the land is dry, otherwise it will cake, and must be harrowed again after rolling. When the wheat is 6 in. high go over it with light harrows. If the autumn and winter should prove mild and the wheat should lodge, it should be kept in check by feeding it off with sheep.

KITCHEN GARDEN.—Hoe continually among the crops to keep them clean, and have beds well dug and manured, as recommended last month, for transplanting the various vegetables now coming on. Thin out all crops which are overcrowded. Divide and plant out pot-herbs, giving a little water if required till established. Sow broad beans, peas, onions, radish, mustard and cress, and all vegetable seeds generally except cucumbers, marrows, and pumpkins. Early celery should be earthed up in dry weather, taking care that no soil gets between the leaves. Transplant cauliflowers and cabbages, and keep on hand a supply of tobacco waste, preferably in the form of powder. A ring of this round the plants will effectually keep off slugs.

FLOWER GARDEN.—The operations this month will depend greatly on the weather. If wet, both planting and transplanting may be done at the same time. Camellias, gardenias, &c., may be removed with safety. Plant out all soft-wooded plants such as verbenas, petunias, pentstemons, &c. Sow annuals, as carnations, pansy, mignonette, daisy, snapdragon, dianthus, stocks, candytuft, phlox, sweet peas, &c. Those already up must be pricked out into other beds or into their permanent positions. Growth just now will not be too luxuriant, and shrubs and creepers may be shortened back. Always dig the flower beds rough at first, then apply manure, dig it in, and after this get the soil into fine tilth. Land on which you wish to raise really fine flowers should have a dressing of bonedust lightly turned in. Wood ashes also form an excellent dressing for the garden soil. Prune out roses. These may be planted out now with perfect success. Take up dahlia roots, and plant bulbs as recommended for March. Layers that have made sufficient roots should now be gradually severed from the plant, and left for a fortnight before potting, to ripen the young roots.

# QUEENSLAND AGRICULTURAL JOURNAL

Vol. XXVIII. APRIL, 1912. Part 4.


# Agriculture.

## RAISING ROOT CROPS.

By G. B. BROOKS, Instructor in Agriculture.

When the suitability of our soil and climate, together with the enormous yields that can be secured are considered, it is somewhat surprising that the raising of root crops has not been practised to a greater extent than has hitherto been the case—in fact, I feel assured that in no other country in the world can heavier crops of mangels and turnips be raised than in Queensland.

The writer had the privilege of showing the Scottish Commissioners, when visiting the Agricultural College, a fine crop of mangels. As is well known, these men are practical farmers, and had visited almost every agricultural country in the world, yet they freely expressed the opinion that they had never, in their travels, seen anything approaching this crop, both in point of yield and enormous size of roots. In this particular crop a large proportion of the roots ranged in weight from 40 to 60 lb.

The writer has also raised crops in the Burnett district giving over 60 tons to the acre; and, with a very favourable season, the yield has been as high as 80 tons.

The accommpanying illustrations show crops of mangels grown respectively in the Burnett, Lockyer, and Darling Downs districts.

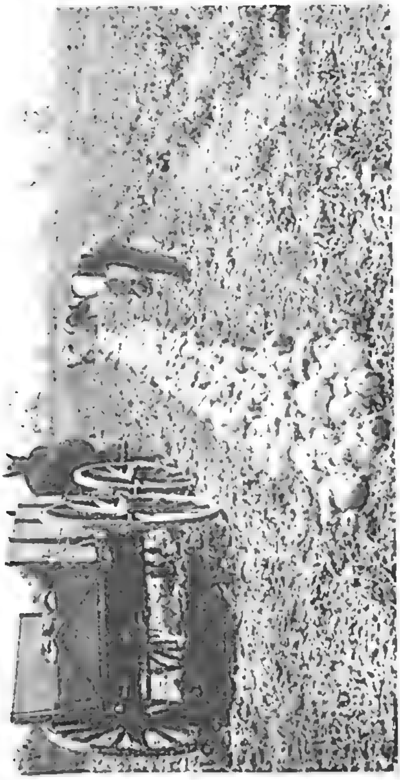
Turnips, sugar beet, and kohl-rabi, although not giving such a high yield as mangels, are equally suitable to our soil and climate.

## THEIR VALUE ON THE FARM.

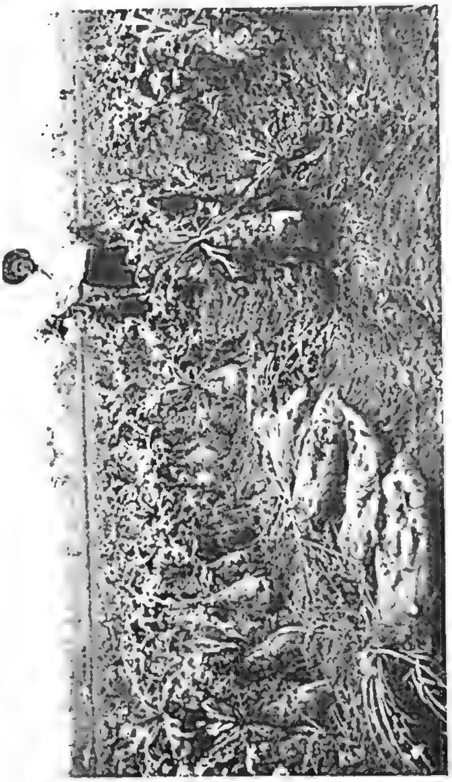
Although root crops can be profitably utilised in the feeding ration of most of our farm animals, yet it is to the pig-raiser that they are of special value. If care be exercised in regard to time of planting, and in the selection of suitable varieties, a crop can be grown that will provide material for a period of six to eight months; and by the addition of sweet potatoes to the list, a rotation of feeds can be secured to extend over the whole year.

PLATE 45.—LONG RED MANGOLDS AT "HERMITAGE" STATE FARM, DARLING DOWNS.

1. Red Globe Mangolds, Burnett District.



2. Swede Turnips, Lockyer District.



3. Long Red Mangolds, Burnett District.

Long Red Mangolds, Burnett District.

Plate 46.—Mangolds in the Burnett and Lockyer Districts.

## PREPARATION OF THE LAND.

In this, as well as many other crops, much of the success lies in thorough preparation of the soil. One can scarcely err in having the land in readiness too early. The length of time will, of course, depend upon the texture of the soil, and, also, to some extent, upon the crop that has previously occupied the land. Roots generally do well following a cereal crop, as harvesting takes place sufficiently early to allow of the thorough preparation of the land before planting. Deep cultivation, where possible, should be practised. Ploughing should not be carried out to a less depth than 6 in., and, where depth of soil will permit, a depth of 9 in. will be found to give better results.

## SOIL.

A fairly heavy well-drained loam is most suitable for mangels and swedes. The Yellow and White variety of turnips can, however, be raised on a much lighter class of soil. Unless the land has been under crop for many years, or is of very poor quality, manuring is not a necessity. The question of artificial manures for root crops is not considered of sufficient importance to be dealt with in this article.

## VARIETIES TO GROW.

To keep up a supply of roots for the longest possible period, the following selection is recommended:—

White Pomeranian Turnip, for use in June.
Aberdeen Green Top Yellow Turnip, for use in July.
Field Swede Turnip, for use in August.
Vilmorin's Improved Sugar Beet—September.
Long Red Mangel—August to December.
Red Globe or Yellow Globe—August to January.

The Globe Mangel is used last, as it withstands the hot weather somewhat better than the Long varieties.

## METHOD OF PLANTING.

Mangels, more especially the Long varieties, give best results when planted on the "flat." Turnips, on the other hand, prefer a slight "ridge" or "hill." These "ridges" can be most expeditiously set up with a double mould-board or ridge plough; however, should that not be available, the ordinary mould-board type will answer the purpose.

As the drill machines, used in the planting of root crops, are not in general use in this State, it will be found advisable, before sowing, to flatten down the top of the ridge with a light roller. This will firm the surface soil, and, moreover, the young plants will be less liable to suffer should a dry spell eventuate.

It may be mentioned that the reason why turnips do better on a raised drill is that, when thinning out takes place, the soil gets drawn from the top of the "ridge" with the hoe, thus exposing the greater portion of the shanks or roots of the plants left. It is this exposed portion that swells out to form the bulb or root. This is why, in turnip-growing countries, growers like to see the young plants left, after thinning out, holding on to the soil by only a few fine roots. Turnips grown on the flat or in a slight depression are liable to get the root portion covered by soil when scuffling, with the result that the crop not only invariably turns out light, but of poor quality, running mostly to top, and having very thick fibrous necks.

Mangels should be allowed a space of 3 ft. between the rows, with a distance of 18 in. between the plants; 5 lb. of seed is sufficient to plant an acre.

Providing the soil is moist, soak for a few hours previous to planting. This will accelerate germination considerably.

Turnips and sugar beet can, where areas are limited, be planted somewhat closer than mangels, 30 in. being a fair width, and thinned out to 12 in. apart; 2 lb. of the former and 6 lb. of the latter are required, respectively, to sow an acre.

### TIME TO PLANT.

This will vary somewhat according to district. As a general rule, however, it will be found that good results can be secured by getting the crop in early in March, although, on the other hand, the planting season can be extended to June. In addition to climatic considerations, the advantage of getting the crop in early is of some importance, as it will provide a supply of feed for the winter months. I have carried out numerous experiments with the object of determining how early it would be safe to plant in the coastal districts, and have found that very early sowing is not a success, as young mangels will not survive a temperature of over 90 degrees Fahr. Swede turnips are not affected to the same extent as mangels by a hot spell, but they will, together with the White and Yellow sorts, fall a prey to aphis should climatic conditions remain hot and humid.

### TRANSPLANTING.

Mangels transplant very readily. With good seed, together with a favourable germination, sufficient young plants ought to be available from 1 acre to plant out an area of 3 acres. The size at which the young plants should be handled is not very important. They may be transplanted from the thickness of a lead pencil to 1 in. in diameter. It is advisable, however, that the work be done in dull or showery weather, or, at all events, when the soil is moist. The transplanting of turnips is not to be recommended. It is an essential that the growing crop be well cultivated, more especially during the early stages of growth.

The storing of root crops either in a shed or "pit" during the hot summer months is not generally successful.

---

## DAIRYING V. WHEAT-GROWING.

The following very interesting comparison of costs and profits in connection with the above industries was published early in March in the "Brisbane Courier." The results, as shown here, will have more special interest for farmers in the wheat-growing areas than for those engaged in the cultivation of crops more suited to the coastal and Northern districts than wheat. Dairy farmers generally all over the State will be interested in the figures here given.

For many years wheat and maize were the leading crops of that part of the Darling Downs which has Warwick for its centre. The soil generally is very rich, the climate almost perfect, and the rainfall good. In recent years wheat has become a diminishing factor, and dairying has increased rapidly. The reason of this is the very practical one of costs and returns. One of the very ablest wheat-growers in Queensland has given up cereals for the cream-can, and to him I put the question of working costs and returns. He has prepared them carefully and reasonably from the practical man's standpoint, and as he found them under practical conditions. The figures he gives will be studied with great interest by many farmers on the Downs and many intending settlers. The estimates are based on practical results—in the one case of cereal-growing, and in the other of dairying and mixed farming. The figures set forth are as follows:—

WHEAT AND MAIZE FARMING.

| | £ s. d. | £ s. d. |
|---|---|---|
| 400 acres at £10 per acre .. .. | .. | 4,000 0 0 |
| Ploughing 200 acres, at 8s. per acre | 80 0 0 | |
| Cultivating 200 acres, at 4s. per acre | 40 0 0 | |
| Harrowing 200 acres, at 2s. 6d. per acre .. .. .. .. | 25 0 0 | |
| Drilling in seed, at 3s. per acre .. | 30 0 0 | |
| Wheat, 200 bushels graded seed, at 4s. per bushel .. .. .. | 40 0 0 | |
| Harvesting 200 acres, at 8s. per acre | 80 0 0 | |
| 1,067 sacks, at 6d. .. .. .. | 26 13 6 | |
| Carting the 1,067 sacks to railway station, 4 miles, 6d. .. .. | 26 13 6 | |
| | | 348 7 0 |

MAIZE FOR GRAIN.

| | £ s. d. | £ s. d. |
|---|---|---|
| 150 acres maize, ploughing, at 8s. per acre .. .. .. | 60 0 0 | |
| 150 acres second ploughing, at 5s. per acre .. .. .. | 37 10 0 | |
| Cultivating 150 acres, at 3s. per acre .. .. .. .. | 30 0 0 | |
| 150 acres harrowing, at 2s. 6d. per acre .. .. .. .. | 18 15 0 | |
| Scuffling 150 acres twice, at 4s. per acre .. .. .. .. | 30 0 0 | |
| Pulling or stacking 150 acres maize, at 7s. per acre .. .. .. | 52 10 0 | |
| 2,000 sacks, at 6d. .. .. .. | 50 0 0 | |
| Carting to railway 2,000 sacks, 4 miles, at 6d. .. .. .. | 50 0 0 | |
| Thrashing 2,000 bags, at 6d. .. | 50 0 0 | |
| | | 378 15 0 |
| | | £4,727 2 0 |
| Interest, at 5 per cent. .. .. | | 236 7 0 |
| Total .. .. .. .. | | £4,963 9 0 |

| | £ s. d. | £ s. d. |
|---|---|---|
| Proceeds 200 acres wheat, 16 bushels per acre, 3,200 bushels, at 3s. .. .. .. .. | | 480 0 0 |
| Proceeds on 150 acres maize, 40 bushels, 6,000 bushels, at 2s. .. .. .. .. .. | | 600 0 0 |
| | | £1,080 0 0 |

Fifty acres of grass land is to keep two cows, and, say, a few horses. I think 16 bushels of wheat has been the average this last five years, also maize at 40 bushels.

DAIRYING AND MIXED FARMING.

| | £ s. d. | £ s. d. |
|---|---|---|
| 640-acre farm, at £7 per acre .. | .. | 4,480 0 0 |
| 150-ton silo, at £1 per ton .. .. | .. | 150 0 0 |
| 140 head dairy cows, at £3 10s. per head .. .. .. .. | .. | 490 0 0 |
| 20 breeding sows, at £2 per head .. | .. | 40 0 0 |
| 150 acres ploughed, at 8s. per acre, for fodder for cows .. .. | .. | 60 0 0 |
| Harrowing 150 acres, at 2s. 6d. per acre .. .. .. .. | .. | 18 15 0 |
| 70 acres maize planted—seven days' wages and food .. .. | 2 3 0 | |
| 12 bushels seed maize, at 2s. 3d. .. | 1 7 0 | |
| 80 acres barley planted—wages and food, for planting .. .. | 2 10 0 | |
| 160 bushels seed barley, at 2s. 6d. .. | 20 0 0 | |
| | | 26 0 0 |
| Labour and machinery for cutting and filling silo .. .. | .. | 60 0 0 |
| 2-plant milking machines, shed, and yards .. .. .. .. | .. | 350 0 0 |
| Wages for dairyman and food .. | .. | 83 4 0 |
| Wages for the boy and food .. | .. | 75 8 0 |
| | | £5,833 7 0 |

WHEAT FOR GRAIN.

| | £ s. d. |
|---|---|
| 75 acres ploughed, at 8s. per acre .. .. .. | 30 0 0 |
| Cultivating, at 4s. per acre .. .. .. | 15 0 0 |
| Harrowing, at 2s. 6d. per acre .. .. .. | 9 7 6 |
| 400 sacks, at 6d. .. .. .. .. .. | 10 0 0 |
| Harvesting the above, at 8s. per acre .. .. | 30 0 0 |
| Carting 400 sacks 4 miles to railway, 6d. per bag | 10 0 0 |
| | £5,937 14 6 |

MAIZE FOR GRAIN.

| | £ | s. | d. |
|---|---|---|---|
| 75 acres maize ploughed, at 8s. per acre .. .. | 30 | 0 | 0 |
| Second ploughing, at 5s. per acre .. .. | 18 | 15 | 0 |
| Cultivating, at 4s. per acre .. .. .. | 15 | 0 | 0 |
| Harrowing, at 2s. 6d. per acre .. .. .. | 9 | 7 | 6 |
| Scuffling twice, at 4s. per acre .. .. .. | 15 | 0 | 0 |
| Pulling and stacking maize, at 7s. per acre .. | 26 | 5 | 0 |
| 1,000 sacks, at 6d. .. .. .. .. .. | 25 | 0 | 0 |
| Threshing 1,000 sacks, at 6d. .. .. .. | 25 | 0 | 0 |
| Carting to railway, 4 miles, and loading, 6d. per bag, 1,000 sacks .. .. .. .. | 25 | 0 | 0 |
| | £6,117 | 2 | 0 |
| Interest, at 5 per cent. .. .. .. | 305 | 8 | 0 |
| | £6,422 | 10 | 0 |

INCOME.

| | £ | s. | d. |
|---|---|---|---|
| Proceeds of 100 cows at 15s. per head, per month | 984 | 0 | 0 |
| 10 fat pigs, per month, £2 per head .. .. | 240 | 0 | 0 |
| Wheat, 75 acres at 16 bushels per acre, 1,200 bushels, 3s. .. .. .. .. .. | 180 | 0 | 0 |
| Maize, 75 acres at 40 bushels per acre, 3,000 bushels, 2s. .. .. .. .. .. | 179 | 7 | 6 |
| | £1,583 | 7 | 6 |

You will see that there is 340 acres still left for grazing, and 300 acres under cultivation.

---

## TREATMENT OF SEED WHEAT FOR SMUT OR BUNT.

Wheat-growers will now be sowing or getting ready to sow wheat. It is most important that they should be supplied with the latest information as to treating the seed for the prevention of the above diseases. There are many new settlers in the wheat-growing areas who have as yet had no experience in dealing with a disease whose spores, unless their vitality is destroyed, will, when sown with the wheat, germinate and grow with the wheat plant, living upon its tissue, and be the cause of the production of a "smutted" wheat-ear. The object of any treatment is to destroy the vitality of these "smut" spores without injuring the vitality of the seed grain.

At the risk of repeating ourselves, we propose to reprint portions of an article which we published in October, 1911, taken from the "Agricultural Gazette" of New South Wales, which deals with a decision on the part of the New South Wales Department of Agriculture to recommend farmers to treat their seed wheat for smut (bunt) by steeping it in solutions of bluestone and lime. This decision was arrived at as one of the results of the Departmental Wheat Conference, held on 17th and 18th January, 1911, to consider several matters connected with wheat-growing and kindred subjects, and a *resumé* of the reasons which led to the decision was ordered to be published in the "Gazette" for the information of wheat-growers.

The "Tasmanian Mail" referred to the matter at length, and, with regard to the bluestone and lime treatment, wrote:—

"In recommending bluestone and lime, those officers present at the conference have reverted to a fungicide which has consistently given good results in both the experimental plots and in the paddock. The principle of its action is very simple. The bluestone kills the smut spores upon the grain. Bluestone (sulphate of copper) is a well-known and well-tried fungicide, destructive to nearly all forms of fungus life. But if it is applied alone to smutty wheat it forms a coating around the grain, and when the seed begins to grow this coating of bluestone is very injurious to the young shoots and roots. It must, therefore, be removed before the seed is permitted to germinate. A very simple method of doing this has been suggested by Mr. Peacock. The seed may be allowed to stand for an hour or two after dipping in bluestone solution, so as to ensure that all the smut spores are killed, and then dipped into cold water to wash off the bluestone. This has been found effective at both Bathurst and Cowra Farms; but a fatal objection to its use in dry districts is the fact that a large quantity of water is required. The water soon becomes saturated with bluestone, and has to be replaced, as its virtue in dissolving the coating of bluestone on the grain has gone. Water is not plentiful in the bulk of the wheat areas.

"A better method is to dip the bluestoned wheat into a solution of lime. The lime combines chemically with the bluestone and neutralises its destructive properties. The quantity of water necessary is, therefore, much less.

"Some scientific investigations recently made at the Woburn Experimental Farm, in England, by Pickering, resulted in the statement that milk of lime (lime suspended in water) is not so efficient nor economical to use with bluestone as lime water (lime dissolved in water). Lime water would be obtained by decanting the water from the lime as a perfectly clear fluid; milk of lime is made by simply slacking fresh lime in water. Pickering's discovery is being tested by the department in another connection. At present it cannot be recommended to farmers in treating wheat for smut, partly because it has not been sufficiently tested, and partly because a farmer could not always be quite sure that his lime is perfectly unslacked. If air or water has acted upon the lime since it has been burnt, it may be converted into carbonate of lime, when Pickering's method will give nothing but pure water. The department, therefore, recommends—for the present, at any rate—the use of freshly burnt lime mixed with water. This is commonly known as 'lime water,' but it is really a mixture of lime and water.

" The actual method of applying the bluestone and lime treatment is given below by Mr. Sutton :—

" THE BLUESTONE TREATMENT.

" The most popular fungicide for treating seed grain, and the one in most general use, is bluestone (copper sulphate). The efficiency of this fungicide depends upon bringing the 'smut' spores into contact with a solution of bluestone for a sufficient length of time to destroy their vitality. Various plans are adopted for attaining this object. Whatever method is adopted, it should be done with sufficient thoroughness to ensure that no spores escape coming into contact with the fungicide long enough to destroy their vitality. A weak solution requires a relatively longer time to destroy the spores than a strong one does. At one time it was the common practice to 'steep' the seed in a weak solution (½ per cent.) for twelve hours, but this method has now been almost superseded by methods which require the seed to be 'steeped' for a few minutes—three to five—in a stronger solution of, say, 2 per cent.

" Bluestone when used alone, and not in combination with lime, or lime water, very injuriously affects the germinating power of the seed. Under some conditions, as much as half the seed treated is destroyed, or the vigour of the resulting plants so weakened that they are practically valueless. The ill-effects can be almost entirely prevented by sprinkling the treated seed whilst wet with air-slacked lime or wood ashes, or by immersing it for a few minutes in lime water. Lime water is made by mixing freshly burnt (lumpy) lime in water—say, 2 lb. of unslacked lime—in 20 gallons of water. If freshly burnt lime is not available, the seed should be sprinkled with air-slacked lime or wood ashes. Air-slacked lime is not soluble in water, and therefore lime water cannot be made by mixing air-slacked lime and water together."

---

## NOTES FROM KAMERUNGA STATE NURSERY.

BY C. E. WOOD, Manager Kamerunga State Nursery, Cairns.

Although we are now in the middle of our wet season—a time when little can generally be done in the field beyond cutting down weeds, &c., with scythe or hook—the season is proving exceptional, as up to 29th February, only 16.45 in. had fallen since 1st January, as against 60.31 in. last year; so that, where necessary, it has been possible to work growing crops with cultivator.

Some 200 cuttings of vanilla have also been planted in the new block; the planting is done at the foot of trees, all the undergrowth having been cleared; but for this to succeed well, considerably more rain will be required, as the unworked ground requires heavy soaking so as to have a sufficient supply of moisture for future use without resorting to watering too soon. This staple has so far done well here, and when destroyed by the cyclone last year was carrying a good crop, and gave every indication of proving a valuable acquisition as a crop especially adapted to the small farmer, or as an occupation for women who prefer an outdoor life where all the work is carried out under shade.

# Dairying.

## THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF FEBRUARY, 1912.

| Name of Cow. | Breed. | Date of Calving. | Total Milk. | Test. | Commercial Butter. | Remarks. |
|---|---|---|---|---|---|---|
| | | | Lb. | % | Lb. | |
| Glen ... | Shorthorn ... | 30 Sept., 1911 | 679 | 5·5 | 43·87 | |
| Nellie II. ... | ,, ... ... | 1 Feb., 1912 | 953 | 3·9 | 41·47 | |
| Davidina ... | Ayrshire ... ... | 29 Dec., 1911 | 893 | 4·0 | 39·91 | |
| Butter ... | Shorthorn... ... | 10 Nov. ,, | 799 | 4·0 | 35·62 | |
| Lass ... | Ayrshire ... ... | 16 Oct. ,, | 737 | 4·2 | 34·67 | |
| Honeycomb | Shorthorn... ... | 29 Aug. ,, | 655 | 4·6 | 33·88 | |
| Helen ... | Ayrshire ... ... | 3 Jan. ,, | 800 | 3·6 | 32·00 | |
| Lark ... | ,, ... ... | 29 Nov. ,, | 821 | 3·5 | 31·85 | |
| Burton's Pride | Shorthorn ... | 16 Nov. ,, | 686 | 4·1 | 31·46 | |
| Dora ... | ,, ... ... | 10 June ,, | 590 | 4·7 | 31·23 | |
| Cocoa ... | Jersey ... ... | 1 May ,, | 620 | 4·3 | 29·90 | |
| Burton's Maid | Shorthorn ... | 2 Feb., 1912 | 699 | 3·6 | 27·96 | |
| Miss Edition | Jersey ... ... | 1 Feb., 1911 | 378 | 6·0 | 26·64 | |
| No. 6 ... | Shorthorn ... | 27 Jan., 1912 | 750 | 3·2 | 26·46 | |
| Duchess Fanny | ,, ... ... | 1 Aug., 1911 | 596 | 3·8 | 25·23 | |
| Bluebelle ... | Jersey ... ... | 20 April ,, | 445 | 5·0 | 25·11 | |
| Bangle ... | Shorthorn .. .. | 14 Aug. ,, | 526 | 4·2 | 24·74 | |
| Burton's Lily | ,, ... ... | 7 Dec. ,, | 590 | 3·7 | 24·28 | |
| Auntie ... | Ayrshire ... ... | 31 July ,, | 472 | 4·5 | 23·87 | |
| Cuckoo ... | Jersey ... ... | 8 July ,, | 377 | 5·4 | 23·79 | |
| Silver Nell... | Shorthorn .. | 13 Dec. ,, | 558 | 3·8 | 23·61 | |
| Bee ... | Jersey ... ... | 8 Dec. ,, | 417 | 5·0 | 23·53 | |
| Eve ... | ,, ... ... | 27 Jan. ,, | 407 | 5·1 | 23·45 | |
| Laurette ... | Ayrshire ... ... | 7 June ,, | 455 | 4·3 | 23·38 | |
| Careless ... | Jersey ... ... | 16 Dec. ,, | 495 | 4·2 | 23·28 | |

## ADVICE ON THE ROUTINE OF THE DAIRY.

By E. GRAHAM, Dairy Expert.

The phenomenally rapid growth of dairying pursuits in Queensland demands that attention be given to the necessity of certain well-recognised factors and conditions, the improper control of which may unnecessarily increase butter-fat losses on the farm, or materially reduce the quality of butter made from "farm skimmed" or home "separator cream."

Success almost solely depends upon the degree of cleanliness observed in the immediate surroundings wherein the milk is drawn from the cows, the care taken in cleansing the cows' udders, the attention bestowed upon the utensils and appliances used for containing or separating the milk, and the care the cream receives from the time it is separated and delivered at the factory.

Too great effort cannot be exerted in encouraging both higher sanitary and higher economic standards amongst the majority of Queensland dairy farms.

So far, unfortunately, little systematic effort has been made on these lines. It might at first seem that the logical way to reach the cream producer is through the factory returns, but, as yet, few factories have made sufficient difference, in the prices paid for the various grades of cream supplied them, to command the respect of the cream producer for any suggestions factories might make in the direction of improvement in the quality of the raw product.

Most factories receiving at least three distinct qualities of cream from their patrons pay a uniform price for the resultant butters.

This method of making average payments to cream suppliers is not equitable, and positively destroys the chief incentive to produce high quality cream.

As a natural corollary to the present system of factory payments, it follows that the supplier of the good article is sacrificed and underpaid for his product, in order that some monetary preference may be given to those supplying factories with an inferior article.

Few, if any other, products are paid for with such common disregard of quality, and certainly it is not surprising to find producers negligent in the production and handling of milk products while the above custom of payments prevails.

Milk or cream should be graded and paid for by the factories in strict accordance with its quality; and the factory which, in order to gain patronage, is guilty of classifying milk or cream of higher grade than its actual quality merits, does much to retard the progress of dairying interests in this State.

The redemption of quality requires a united effort. Our own citizens demand a full, clean-flavoured, high-quality butter, while for export only the highest grade article can be expected to realise full market rates, At the height of the export season fully 80 per cent. of the butter manufactured in this State is sold on the oversea markets. Generally, export butters are not presented to the consumers until at least six weeks subsequent to their actual manufacture.

This fact alone emphasises the need for every dairyman to possess and exercise advanced knowledge in the modern methods of cream production, for, despite the utmost care in manufacture and cold storage processes, little or nothing can be done whereby the faulty cream supplies can be converted into butter of sufficiently good keeping quality to withstand the lengthy oversea voyage to Great Britain. It is particularly under the stress of export conditions that the butters made from creams of inferior quality behave unsatisfactorily and unduly deteriorate in quality.

Again, the local consumption of low-grade butter is very limited, and it naturally follows that almost all the butter of this character is forced into the export list. Although such butters have a market value, they are not of sufficient merit to build up any good reputation for this State. To so far effect an improvement in the quality of the butter as would allow of the uplifting of the secondary grade butters into the category of the first grade would be a great although not an impossible achievement, and result in vastly increased profit to those directly concerned in the industry.

Some of the sanitary and economic features of the cream supply are discussed for the purpose of pointing the way to higher quality and greater profits to those engaged in the production of cream. An attempt will be made to deal with the milk at the various stages and operations following from the time it is secreted in the udder until the cream is ultimately despatched to the factory, and it is hoped that some of the recommendations made in these pages will be of interest to dairymen, and sufficiently sound and practical to warrant adoption by those anxious to supply an article worthy of their best efforts.

Attention will be first directed to the early sources of bacterial contamination of milk, and the means whereby infection may be minimised and combated.

Although milk, at the instant it is secreted in the udder, is probably sterile, it has been repeatedly shown impossible, except in rare instances, to obtain milk from the cows' teats that is not more or less infected with bacteria.

The germs readily find their way into the inner parts of the udder through the milk diet, and, rapidly multiplying in the presence of favourable temperature and food, they are carried out into the milk by the process of milking.

Any disease or injury to the udder may further add to the numbers and harmfulness of the bacteria in the milk.

However, the most abundant contamination usually takes place after the milk is drawn from the udder. Dust or filth from the cow, hands of the milker, utensils, or dust of the yard may add large numbers of bacteria. Strainers, separators, and other appliances, if unclean, may all prove detrimental to the quality of the milk, and there are innumerable other ways under which the process of infection may occur.

All germs arising from a filthy source are resentful and deleterious to quality, but there are some species of germ life that are helpful to the butter-maker and cheesemaker alike when they can be controlled, but certainly these species of germ life are not associated with nor can they be developed in any other than the most cleanly conditions.

Milk is recognised as a great medium for the propagation of many forms of germ life, and it is this fact, together with the astoundingly rapid multiplication of germs, under favourable circumstances, that enables the bacteria to exert such a powerful influence on the quality of many dairy products.

From a sanitary standpoint it is most necessary to keep the cow's body clean, especially the udder, teats, and flanks; while the animal's tail must be securely fastened and not permitted to switch about during the process of milking. Repeated trials show that where cleanly conditions obtain from day to day it requires little more than one or two minutes to properly brush the flanks and sponge and dry the udder of a cow preparatory to milking.

The body of the cow, and especially the flanks and udder portions, must be clean and free from dust to ensure wholesome and pure milk. Bacteria are transported upon dust particles, and, because of this, do not distribute dusty foods for feeding purposes at milking time. It is little short of a crime to proceed to milk a dirty cow without first rendering her parts clean by brushing, washing, and wiping. To wash the hands alone is not sufficient precaution.

To the water used for cleansing purposes, it is recommended there be added enough permanganate of potash to colour the water a bright red colour. Frequent renewals of the water are also necessary. A bowl placed under a water tap, so as to allow of the hands being washed in it, and then the tap turned on so as to rinse the hands, afford the satisfactory method for cleansing the milker's hands.

In milking, it is advisable, if cows are leg-roped, to apportion that work to one attendant, and thus avoid the necessity for every milker to handle the usually none too clean leg-rope.

It is advantageous to reject the first few streams of milk, as such milk is of poor quality and likely to be highly contaminated with forms of germ life that have found entrance from the exterior of the udder as previously explained, and, as the first milk contains little butter fat, no perceptible monetary loss will accrue from the adoption of this practice.

The wise dairyman will, at all times, maintain healthful and clean surroundings wherein the cows are milked. The losses caused by neglect in this particular are too serious to be considered lightly.

Only healthy animals should be permitted in the dairy herd. The health of the consuming public demands this care, while the knowledge that, generally, only the healthy cows can make the fullest use of their food provides a secondary reason for care in this respect.

The various appointments of the dairy farm will now be discussed.

[TO BE CONTINUED.]

# Poultry.

## REPORT ON EGG-LAYING COMPETITION, Q.A. COLLEGE, FEBRUARY, 1912.

Two thousand four hundred and sixty-five eggs were laid during the month, an average of 102.3 per pen. J. Gosley wins the monthly prize with 130 eggs. The following are the individual records:—

| Competitors. | Breed. | February. | Total. |
|---|---|---|---|
| J. F. Dalrymple, N.S.W. ... ... | White Leghorns ... ... | 107 | 1,297 |
| E. A. Smith ... ... ... ... | Do. ... ... | 112 | 1,255 |
| J. Holmes ... ... ... ... | Do. .. ... | 108 | 1,236 |
| Yangarella Poultry Farm ... ... | Do. ... ... | 95 | 1,236 |
| J. Gosley ... ... ... | Do. ... ... | 130 | 1,223 |
| Cowan Bros., N.S.W. ... ... | Do. ... ... | 107 | 1,214 |
| Range Poultry Farm ... ... | Do. ... ... | 94 | 1,208 |
| S. Chapman .. ... ... ... | Brown Leghorns ... ... | 128 | 1,193 |
| A. J. Cosh, S.A. ... ... ... | White Leghorns ... ... | 123 | 1,184 |
| A. Hollings, N.S.W. ... ... | Do. ... ... | 119 | 1,182 |
| Alex. Smith ... ... ... ... | Do. ... . | 81 | 1,176 |
| Jas. McKay ... ... ... ... | Do. .. ... | 108 | 1,166 |
| R. Burns ... ... ... ... | Do. ... ... | 91 | 1,159 |
| Mrs. Kinnear, S.A. ... ... | Do. ... ... | 101 | 1,152 |
| A. H. Padman, S.A. ... ... | Do. ... ... | 110 | 1,144 |
| J. Zahl ... .. ... .. | Do. ... .. | 114 | 1,110 |
| H. Hammill, N.S.W. ... .. | Do. ... ... | 93 | 1,080 |
| R. Burns ... ... ... ... | S.L. Wyandottes ... ... | 107 | 1,067 |
| A. Astill ... ... ... ... | White Leghorns ... . | 109 | 946 |
| R. W. Goldsbury ... ... .. | Do. ... ... | 116 | 936 |
| Mrs. A. A. Carmichael ... ... | Brown Leghorns ... ... | 95 | 897 |
| J. K. Stewart ... ... .. | White Plymouth Rocks (1) | 79 | 734 |
| J. K. Stewart ... ... ... | Do. do. (3) | 75 | 707 |
| J. K. Stewart ... ... ... | Do. do. (2) | 63 | 602 |
| Totals ... ... ... | ... | 2,465 | 26,099 |

## POULTRY-RAISING.

By W. HINDES, Poultry Expert, Queensland Agricultural College.

### BREEDING TABLE BIRDS.

In producing table fowls, the primary consideration is rapidity of growth and the proper distribution and quality of flesh. In this direction first crosses are of great value—*i.e.*, a cross between two pure breeds, which results in strong vigorous chickens able to withstand the amount of forcing necessary to prepare them for the market in the shortest possible time. The more quickly the birds mature, the more profit will be made. The birds should be ready for market at from 16 to 20 weeks from the time of hatching. The temperament of the breeds selected should also be considered—a restless, active breed will not fatten well, and should therefore be avoided. The following will be found among the best crosses for the purpose:—An Indian Game cockerel with any of the following hens: Dorkings, Faverolles, Orpingtons, and Wyandottes. All the above are very docile, and will give excellent results. In selecting the birds, care must be taken to choose those specimens showing the best table properties—viz., short-legged, blocky birds with fine bone and having good round full breasts. The progeny from these will mature much more quickly than those from long-legged, heavy-boned birds. Care must be taken to breed only from strong robust birds, those that mature most quickly, and that have also been bred from quickly maturing ancestors. The above are specially recommended for table birds.

### FEEDING.

To get the quickest returns, the birds should be fed largely on soft food, as it is more easily assimilated than hard grain. For the first week, feed every two hours, hard-boiled eggs, and stale bread crumbs alternately with small seeds, such as panicum or small millets. Then leave off the egg and bread crumbs, and substitute a mash consisting of 1 part bran and 2 parts pollard mixed into a crumbly mass, not sticky, with hot separated milk. After three weeks, a little cracked maize and wheat will be relished by the chickens. Four feeds a day will now be sufficient, two of which should be bran and pollard. A little Sunlight oilcake mixed with the latter every other time will give variety. Feed a little fresh meat or green bone once a day, as nothing else will make them grow so quickly. Give the chickens all the run possible during the first three months, then place them in small yards in limited numbers. This is to retard their exercise; otherwise they will not fatten, and a large amount of food will be utilised in making muscle rather than flesh. Give plenty of green food, lucerne for preference, and as much separated milk as they will drink. Keep clean, cool water always before them. Plenty of good sharp grit and crushed oyster shells are indispensable. Crushed charcoal will also be beneficial in keeping the crops sweet and preventing diarrhœa. During the last fortnight, the birds should be put in coops and fed on soft food only, to which should be added 5 per cent. of coarse fat or suet. This should be fed three times a day, as much as they will eat. The birds should now be kept in semi-darkness between feeds; this will keep them quiet. With the above treatment they should be in prime condition in 20 weeks.

---

## OSTRICH FARMING.

It seems strange that ostrich farming does not appear to appeal to the Queensland settler, seeing that there are large areas of land in various parts of Western Queensland which are eminently adapted for this industry. At the end of 1909 there were 28 ostriches returned for the whole State; and, from the report of the Under Secretary for

Agriculture and Stock for 1910-1911, we note that the numbers remain the same. As lucerne is the most suitable feed for this valuable bird, and as this crop is so readily grown over a large portion of the State, it is difficult to find any reason for the neglect of such a paying industry. How valuable an ostrich farm is, may be shown by the following comparison between the expenses and returns from sheep-breeding and ostrich-breeding, as shown by an ostrich-breeder in South Africa.

He says:—"Referring to the financial side of ostrich farming, take, for example, 5 average feather birds to be grazed continuously on 1 acre of irrigated lucerne, allowing £4 per clip or £6 per annum per bird. This gives the farmer a gross return of £30 per acre. Working expenses would not be more than £4 per annum, which leaves a net profit of £26. Should the farmer chaff the green lucerne, and not allow the birds to graze, at least 10 can be run to the acre, when the net profit would come out at £50 per acre per annum. The price of the clip is purposely under-estimated by the writer, so that the most supercilious critic may be satisfied. Coming now to the increase in chicks: Under ordinary circumstances an average breeding pair should produce, after allowing for all losses, 15 chicks per year under natural incubation (this can be greatly increased by using an incubator), and, at the age of 6 months, these birds would probably be worth, if there was a ready sale for them, about £10 each. The breeding pair would be fenced off on a separate acre, and another acre would be allotted to the chicks. Thus, these 2 acres would return, after deducting working expenses, something like £140.

Comparing ostriches with sheep, the following statement may be interesting:—

Sheep.

| | £ | s. | d. |
|---|---|---|---|
| 150 Ewes off shears, at 6s. .. .. .. .. | £45 | 0 | 0 |
| 1 Ram .. .. .. .. .. .. | 3 | 3 | 0 |
| Expenses droving .. .. .. .. | 1 | 17 | 0 |
| | £50 | 0 | 0 |
| 1 Year's wool, at 4s., off 150 ewes .. .. | £30 | 0 | 0 |
| 80 Per cent. lambs, at 2s. 6d., on 120 lambs, £15, less 20 per cent. loss, £3 .. .. .. | 12 | 0 | 0 |
| 150 Ewes, at purchase price, 6s. .. .. .. | 45 | 0 | 0 |
| 1 Ram, at purchase price .. .. .. .. | 3 | 0 | 0 |
| | £90 | 3 | 0 |

Ostriches.

| | £ | s. | d. |
|---|---|---|---|
| 1 Breeding pair, at £25 .. .. .. .. | £50 | 0 | 0 |
| Feathers from 2 birds, at £6 per annum each .. | 12 | 0 | 0 |
| 15 Chicks' feathers, at 6 months, at £1 per chick | 15 | 0 | 0 |
| 15 Chicks, at £10 per chick .. .. .. | 150 | 0 | 0 |
| | £227 | 0 | 0 |

The area of land required for the sheep would be, at least, 150 acres; while 2 acres of lucerne would be all that is necessary to run the birds.

Does ostrich farming pay? This is the question put by most people visiting an ostrich farm. Readers may be left to decide for themselves as to the profitableness of the industry after digesting the foregoing figures.

Here is another estimate contrasting the profits of ostrich-breeding and lucerne-growing with those of wheat and oat growing in South Africa:—

"Grazing ostriches upon lucerne paddocks is equally as profitable as making butter or fattening sheep upon this crop. In Oudtshoorn, where there are some 25,000 acres of ground under lucerne, the standard or average capacity of lucerne fields for ostriches is considered to be about 10 birds to the morgen, or 5 birds to the acre all the year round. Double this number during the summer could be run on lucerne, but, to be on the safe side, the number is limited to the above. The Oudtshoorn grazing is worthless, and they have to depend entirely upon their lucerne fields for keeping their birds. The statistics for 1898 show that in that year there were 48,888 ostriches in Oudtshoorn, and these *are all entirely dependent on the lucerne.* This represents about one-fifth of the total number of birds in all the other districts of the colony put together. Now, selected birds (having feathers above the average of the ordinary stock of the country) will yield, on lucerne, at least £3 per plucking per bird, clear of marketing fees. As birds running on lucerne can be plucked regularly every 8 months, without any damage to the wing, three pluckings can be got in two years, yielding a total of £9 per bird per two years. This is at the rate of £4 10s. per bird per annum. We may state that our birds have done considerably better than this, but their quality is considerably above the average. Since 1 acre of lucerne will carry 5 birds all the year round, and each bird will yield at least £4 10s. per annum, we have a return of £22 10s. per acre per annum, less 5s. per acre expenses water leading, leaving a clear profit of £22 5s. per acre per annum from ostriches grazed on lucerne. This is between five and six times as much as from wheat-growing. Again, let us take the making of lucerne hay as compared with wheat-growing. One acre will yield from each cutting about 1½ to 1¾ tons of cured hay, which means about 8 tons of hay per acre per annum. But, to be quite within the mark, we take only 5 tons of 2,000 lb. each per acre per annum. Lucerne hay sells in Port Elizabeth at from 4s. to 5s. per 100 lb. Take it at even 4s. per 100 lb. average. At this price the 5 tons would realise £20. Deduct from this the expense of water leading at 5s. per acre, and expense of cutting and curing the 5 tons at 5s. per ton in stack. This would amount to £1 10s. expenses, which, deducted from £20 (amount realised from sale of hay), would leave a clear profit of £18 10s. per acre per annum from making lucerne hay. This is from four to five times as much profit as is derived from wheat-growing, and in weight it is about two or three times as much hay as is obtained from 1 acre of oats."

# State Farms.

## WHEAT EXPERIMENTS AT ROMA STATE FARM.

BY R. SOUTTER.

Amongst other things the work of crossbreeding has been entered into, chiefly in connection with wheat. It is most essential that this branch of work should be fully carried out not only in new countries, but in new districts, for, though a production may appear to be perfect in one, it does not necessarily follow that it nearly approaches it in another. This has been amply illustrated over and over again by varieties of the crop (wheat) we have under consideration, which in some instances have not only not upheld their reputation, when introduced from one district to another, but have failed when placed on different soils or situations in the same district. Of course there are some characteristics desired in all parts, the embodiment of which must result in the plants producing a maximum yield under the conditions under which, it has to be grown, providing the other features (the nature of which is governed by the said conditions) are present. From this it will be seen that it is impossible to produce a variety suitable for everywhere; and likewise one even for a locality, until it is ascertained which of those already in cultivation possess the most desirable qualities and wherein their superiority or deficiencies lie. When this has been ascertained then by judicious mating, which will be guided by a knowledge of the essential features required in a variety, a suitable plant for the particular locality may in time be evolved.

It is not intended at present to go into the details of how to make a cross, or as to the methods employed in the subsequent work emanating therefrom, though it may be stated that the simplest part is the making of the cross and that its whole value depends on, as before stated, judicious mating, and subsequent careful selection.

The evolving of new varieties by crossing was commenced here in 1907, and to date forty-three have been made. Nothing of any value can be said to have resulted from the crosses made in 1907, though one Polish wheat (*Triticum Polonicum*) crossed with Allora Spring gave one of the finest demonstrations that could be conceived of the variations resulting from a cross in the F2 generation. From the results this season the 1907 batch, which comprised the following crosses, may produce something of value:—Bunge No. 1 x Federation, Alpha x Bunge,

Bunge x Cretan, Ward's Poland x Bunge No. 1, Bunyip x Bunge No. 1, Bunge No. 1 x Durum, Bobs x 91, Cretan x Crossbred 50, Federation x Bunge No. 2, Federation x Bunyip, and X 343 x Durum. In addition to these, six crosses were made, for observation purposes, of some of these varieties mentioned, the difference being that the parentage was transposed in each case.

In 1909 no hybridising was done owing to unforeseen circumstances, which in a way was rather a blessing than otherwise, as it permitted more time and attention being devoted to those already under observation. This will be readily understood when it is known that each cross means, two years after being made, 100 plants, from which twenty may be selected, and which, in the following year, will mean 1,000 as worked out here.

In 1910 the following were made, viz.:—Bunge No. 1 x Yandilla King, Bunge No. 1 x J.C. 157, Bunge No. 1 x Nhill, Bunge No. 2 x Nhill, Bunge No. 1 x J. Brown, Bunge No. 2 x Indian Pearl, Bunge No. 2 x Bunyip, Bunyip x Cretan, Bunyip x Nhill, Bunyip x J.C. 157, Bunyip x Hermitage, Bunyip x Ward's Poland, and Federation x Cretan. The plants resulting from the blending of these varieties in some instances were remarkable, more especially the Durum crosses, in which, with the exception of the absence of the beard, all the features of the ordinary bread wheat, with which they had been crossed, were absent (this fact has always been noticed in connection with these crosses); in others, features of both parents were distinguishable, and in one, the colour of the grain was the only character by which the plants could be distinguished from their mother. It is one of the most really interesting parts of this work to trace the various characters of the parents in the plants of the F1 generation.

Last season the following crosses were made:—Bald Medeah x Florence and transposed parentage, Florence x Cretan, Bunge No. 2 x Manitoba, Bunge No. 2 x Emmer, Florence x Bunge No. 2, Ward's Poland x Florence, Bunge No. 2 x Amby and transposed, Belatourka x Florence and transposed, Bishop x Florence and transposed, Bishop x Bunge No. 2, Florence x La Huguenot, B x 91, F3, 19 x Florence.

Of the 1907 and 1908 crosses, the following selections have been made for further testing next year:—Poland x Ward's Prolific, 4 selections; Bunge No. 1 x Federation, 64 selections; Alpha x Bunge No. 1, 7 selections; Bunge No. 1 x Cretan, 30 selections; W. Poland x Bunge No. 1, 27 selections; Bunyip x Bunge No. 1, 9 selections; Bunge No. 1 x Durum, 33 selections; Bobs x 91, 13 selections; X343 x Durum, 22 selections; Cretan x 50, 5 selections; Federation x Bunge No. 2, 10 selctions; Federation x Bunyip, nil.

Of these foregoing selections, sufficient seed—9 of 343 x Durum, 10 of Bunge No. 1 x Federation, 6 of Bobs x 91, 2 of Poland x Ward's Prolific—has been reserved for planting a few drills in the ordinary manner, their characteristics and fixity of type warranting it.

With regard to natural hybrids, it may be stated that a selection made from a crop of J. Brown, in 1909, proved to be one, the plants varying in their height and colour of the chaff, but all were affected with rust and were late in maturing, and consequently will not be proceeded with.

---

## DRY FARMING EXPERIMENTS AT THE STATE FARM, ROMA.

### CAMPBELL'S DRY SOIL SYSTEM.

As a good deal of misunderstanding exists as to the real meaning of the term "dry farming," now the opportunity has presented itself, an explanation of it will be given. The term originated in America, and was used in order to distinguish all farming dependent on rainfall from that carried out with irrigation, the latter being termed "wet farming." Though the meaning is the same, and its application has not been restricted, it is now generally used to designate farming in districts where the rainfall is limited or erratic, and where the energies of the farmer to be successful must be devoted to the conservation of moisture in the soil in such a manner as to be available to the crops when required. There have been, and still are, many systems advised in order to bring about such results, but no hard-and-fast rule can be laid down, as so many factors present themselves which have different influences requiring different methods of procedure.

The remarkable results attained by Professor Campbell with his system led to its being given world-wide publicity, with the result that it came under the notice of the Department of Agriculture, and immediate steps were taken to ascertain by practical application the relative value of the system as applied to Queensland conditions, with the result that a sub-surface packer was ordered, and the present experiments at this farm laid down in 1907.

Up to this last season the results could not be said to bear on the value or otherwise of the system, as the seasons in some instances were excessively wet, in another rust destroyed the crop, and in another hail greatly depreciated the yield. Last season (1911) the conditions were ideal, as from the time the crop was sown until it was out in ear—a period of four months—only eleven falls of rain were experienced, giving a grand total of 1.55 in., equal to .15 each fall. From then until the crop was harvested (17th October), 2.18 in. rain was recorded. The yield was 19.2 bushels to the acre, the variety being Bunge No. 1. The preparation of the seed bed, which was commenced in December, 1909, necessitated the following previous to being sown on 8th May, 1911:—

| | £ | s. | d. |
|---|---|---|---|
| Ploughing, 4 times, at 5s. 9d. per acre .. .. | £1 | 3 | 0 |
| Harrowing 7 times, at 9d. per acre .. .. | 0 | 5 | 3 |
| Cultivating 2 times, at 3s. 2d. per acre .. .. | 0 | 6 | 4 |
| Packing 1 time, at 2s. per acre .. .. .. | 0 | 2 | 0 |
| Total cost preparation .. .. .. .. | £1 | 16 | 7 |

In addition to the preparation, the crop was harrowed twice during growth.

The approximate cost of producing the crop was as follows, per acre:—

| | £ | s. | d. |
|---|---|---|---|
| Preparation of seed bed, per acre .. .. .. | £1 | 16 | 7 |
| Harrowing, twice during growth, 2 at 9d. .. | 0 | 1 | 6 |
| Seed, ½ bushel, at 5s. .. .. .. .. | 0 | 2 | 6 |
| Manure, ¾ cwt., at 6s. .. .. .. .. | 0 | 4 | 6 |
| Drilling rate, 8 acres, day labour— | | | |
| 1 Man, at 6s. 6d. .. .. .. .. | 0 | 0 | 9¾ |
| 3 Horses, at 2s. 6d. .. .. .. .. | 0 | 0 | 11¼ |
| Harvesting rate, 8 acres, day labour— | | | |
| 3 Men, at 6s. 6d. .. .. .. .. | 0 | 2 | 5¼ |
| 3 Horses, at 2s. 6d. .. .. .. .. | 0 | 0 | 11¼ |
| Bags .. .. .. .. .. .. | 0 | 3 | 0 |
| Twine .. .. .. .. .. .. | 0 | 0 | 1 |
| Wear and tear, machinery .. .. .. .. | 0 | 0 | 6 |
| Oil .. .. .. .. .. .. .. | 0 | 0 | 3 |
| Total cost production .. .. .. .. | £2 | 14 | 0½ |
| Value of crop, 19⅕ bushels, at 4s. .. .. | 3 | 16 | 9½ |
| Profit per acre .. .. .. .. .. | £1 | 2 | 9 |

Though, as before stated, the seasons and other circumstances have prevented any real definite results being obtained with this system, this has not prevented a comparison being obtained with other portions worked under methods looked upon as being suitable for this district. So far, the results do not point in favour of the adoption of Campbell's system as advocated, as the annual yields have been equal to and in some instances better than the biennial yields off the Campbell block for half the labour expended in preparation.

Though such is the case, the soil moisture analyses for the twelve months ending November, 1911, of four classes of land, made by the Agricultural Chemist (Mr. J. C. Brünnich), demonstrate the efficacy of Campbell's system as a moisture conserver, as a perusal of the following tabulated list will show:—

| Month. | Grass Paddock—Virgin Soil. | | | | Ordinary Cultivation. | | | | Campbell's Dry System. | | | | Bare Fallow. | | | | Rainfall between samples. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 6″ | 1′ 6″ | 2′ 6″ | 3′ 6″ | 6″ | 1′ 6″ | 2′ 6″ | 3′ 6″ | 6″ | 1′ 6″ | 2′ 6″ | 3′ 6″ | 6″ | 1′ 6″ | 2′ 6″ | 3′ 6″ | |
| December, 1910 ... ... ... | 7·99 | 7·90 | 7·57 | 6·92 | 7·51 | 16·61 | 14·39 | 13·50 | 12·10 | 12·40 | 13·51 | 14·35 | 8·30 | 9·05 | 9·71 | 11·90 | ·77 |
| January, 1911 ... ... ... | 15·6 | 26·6 | 12·6 | 11·45 | 8·7 | 15·2 | 10·5 | 10·7 | lost | 19·2 | 18·05 | 16·9 | 11·1 | 15·1 | 13·9 | 14·1 | 9·72 |
| February ... ... ... ... | 6·30 | broken | 11·60 | 11·62 | 7·03 | 16·55 | 14·75 | 13·92 | 14·79 | 20·02 | 19·10 | 17·55 | 9·52 | 18·56 | 15·64 | 14·35 | 5·39 |
| March ... ... ... ... | 5·08 | 5·44 | 9·45 | 11·04 | 6·70 | 12·71 | 9·90 | 10·42 | 12·36 | 17·43 | 17·11 | 17·84 | 10·64 | 9·65 | 8·99 | 13·19 | 1·14 |
| April ... ... ... ... | 15·84 | 6·77 | 6·96 | 7·90 | 12·20 | 13·76 | 12·75 | 13·02 | 10·45 | 19·19 | 16·75 | 16·56 | 11·40 | 10·42 | 11·50 | 17·25 | ·04 |
| May ... ... ... ... | 10·72 | 10·39 | 9·38 | 6·90 | 7·87 | 15·53 | 14·24 | 13·26 | 12·30 | 17·96 | 16·83 | 15·81 | 10·56 | 11·55 | 11·32 | 12·70 | 1·02 |
| June ... ... ... ... | 1·65 | 7·80 | 7·80 | 9·40 | 4·84 | 12·62 | 12·20 | 11·05 | 8·22 | 14·60 | 15·30 | 12·80 | 4·90 | 14·50 | 14·95 | 14·00 | ... |
| July ... ... ... ... | 2·97 | 9·05 | 8·25 | 8·26 | 6·56 | 8·62 | 9·38 | 11·40 | 4·37 | 13·48 | 11·9 | 13·85 | 7·0 | 11·10 | 12·68 | 13·9 | ·49 |
| August ... ... ... ... | 4·82 | 8·82 | 8·21 | 7·33 | 7·75 | 12·98 | 11·96 | 12·63 | 15·40 | 18·40 | 15·05 | 15·45 | 13·55 | 14·75 | 13·53 | 14·29 | 1·39 |
| September ... ... ... ... | 9·54 | 8·28 | 5·85 | 9·71 | 9·24 | 13·50 | 11·77 | 11·37 | 16·75 | 15·08 | 14·0 | 14·10 | 12·52 | 10·89 | 9·96 | 13·42 | ·74 |
| October ... ... ... ... | 11·45 | 8·45 | 7·43 | 7·34 | 10·36 | 12·30 | 12·40 | 14·20 | 12·48 | 14·51 | 15·13 | 15·63 | 11·83 | 13·63 | 12·52 | 14·81 | ·05 |
| November ... ... ... ... | 1·83 | 5·99 | 7·71 | 6·72 | 4·35 | 7·62 | 10·20 | 9·6 | 6·05 | 6·26 | 11·45 | 12·80 | 9·09 | 14·50 | 13·50 | 13·64 | 1·29 |
| Average ... ... ... | 8·06 | 9·54 | 8·56 | 8·71 | 7·75 | 13·16 | 12·03 | 12·08 | 11·66 | 15·71 | 15·34 | 15·30 | 10·03 | 12·80 | 12·35 | 13·96 | 1·83 |

## BUSH HAY.

BY R. JARROTT.

Perhaps the dry spell we have had in this district may cause some people to endeavour to make provision for a like time in the future. At present, the prospect of making bush hay this season is not a bright one, but if we get good rain soon, there would be time to get a cutting before the frost sets in.

To anyone contemplating saving bush hay, I would advise, weather permitting, to cut the grass when it is in bloom, and not to dry it too much. If cut at this stage, and properly saved, 10 tons will be of more value than twice the amount if allowed to stand until the seed has matured. If the grass has been cut with a mower, and raked up, it should be stacked within two days, if the weather is warm and bright. But, if cut with a binder, it would, of course, require more time. The latter implement has many advantages over a mower. One is that there is not the risk of over-drying to the same extent as there is with loose hay, as only one side of the sheaf is exposed to the sun, and, as no rake is required, there is no rubbish among the hay. Further, the sheaves can be handled in much less time than would be possible with loose hay.

Of course, with the binder, twine is required; but the quality of the hay and the extra amount that can be handled more than compensate for its cost.

To anyone contemplating hay-making with our indigenous grasses, and having neither binder nor mower, I would recommend the use of a side-delivery harvester. This would cost about the same amount as a mower and a rake, and would be less complicated than a binder; and, as it leaves the grass in heaps, the hay could be forked straight on to the drays, when fit.

I shall have something further to say on this matter next month.

---

## NOTES FROM WESTBROOK STATE FARM.

BY J. MITCHELL, Manager.

On date of writing—15th February—there is every indication of a breaking up of the severe drought which we have been experiencing since the end of February last year. For the eleven months ending 31st January, we had only a little over 8 in. of rain. However, during the last fortnight, we have had nearly 3 in., and the farms on the Darling Downs are assuming their natural green appearance, and the farmer is seen everywhere, busy preparing for the coming season's crop.

## FARM-HOUSE SURROUNDINGS.

During the dry spell, and especially about Christmas time, many of the farmers' dwellings and surroundings presented a desolate, barren, dried-up, dust-stricken appearance, nothing indicating to the passer-by that it was the dwelling of a lover of nature and a hard toiler on the soil. On the other hand, and not far away, can be seen the dwelling of the persevering helper of nature, with his home surrounded with trees, shrubs, roses, flowers, and the honeysuckle winding itself round the pillars of his door, endearing him to his own family circle and surroundings. The contrast is very apparent, and I would recommend a start to be made, as soon as convenient, with the planting of hardy and suitable trees as breakwinds, ornamental and useful purposes, such as shade for animals and fruit.

To grow trees successfully on some farms on the Downs will incur a good deal of labour and attention. In many places the trees will require watching and fostering for a considerable time until they get their roots established in the soil and are making a fair growth. To ensure success, draw a little plan of the intended garden, marking where large trees should go. Avoid crowding up, as trees crowded together never make a good effect, except in the case of breakwinds, and it is a mistake to plant them too close. If the trees are to be planted in holes, see that they are not potholes, like basins. Dig out a square or round hole about 6 ft. in diameter and 2 ft. deep, according to the nature of the soil. If a stiff, good retentive soil, dig deep, and put any rough or decaying matter in the bottom; fill up and plant the tree in the soil, not too deep, and in the centre of the elevated soil, which will fall down as it settles. Give the tree a good soaking with water; then put a little decayed grass roots or hay round it to keep the sun from caking the soil or scorching the roots of the plant. If the subsoil should be a stiff clay, dig out a large hole, and leave the centre raised to throw off water which will accumulate during wet spells. If the ground is on a slope, dig out a trench on the lower side and put in a few stones for drainage. Stones or any rough material may be put in the hole under the tree; this will help to keep the soil open, and encourage humus. In filling in, a little good soil may be added, or well-rotted manure. At all times avoid fresh stable manure; it is the death of thousands of plants. Following is a list of hardy, ornamental trees that succeed with fair attention on the Downs:—*Pinus insignis;* Pepper tree (*Shinus Molle*); Camphor tree (*Cinnamomum camphora*); *Pittosporum,* various; *Cedrus atlantica; Ceodara and Libani.* *Cupressus* and *Juniperus* can also be recommended; they are hardy, but do not succeed in all classes of soil. Some very fine specimens are to be seen in and around Toowoomba. Amongst the best deciduous trees to plant are:—*Platanus occidentalis* and *orientalis* (Plane trees), and *Celtis orientalis,* the two principal trees growing on the streets of Toowoomba.

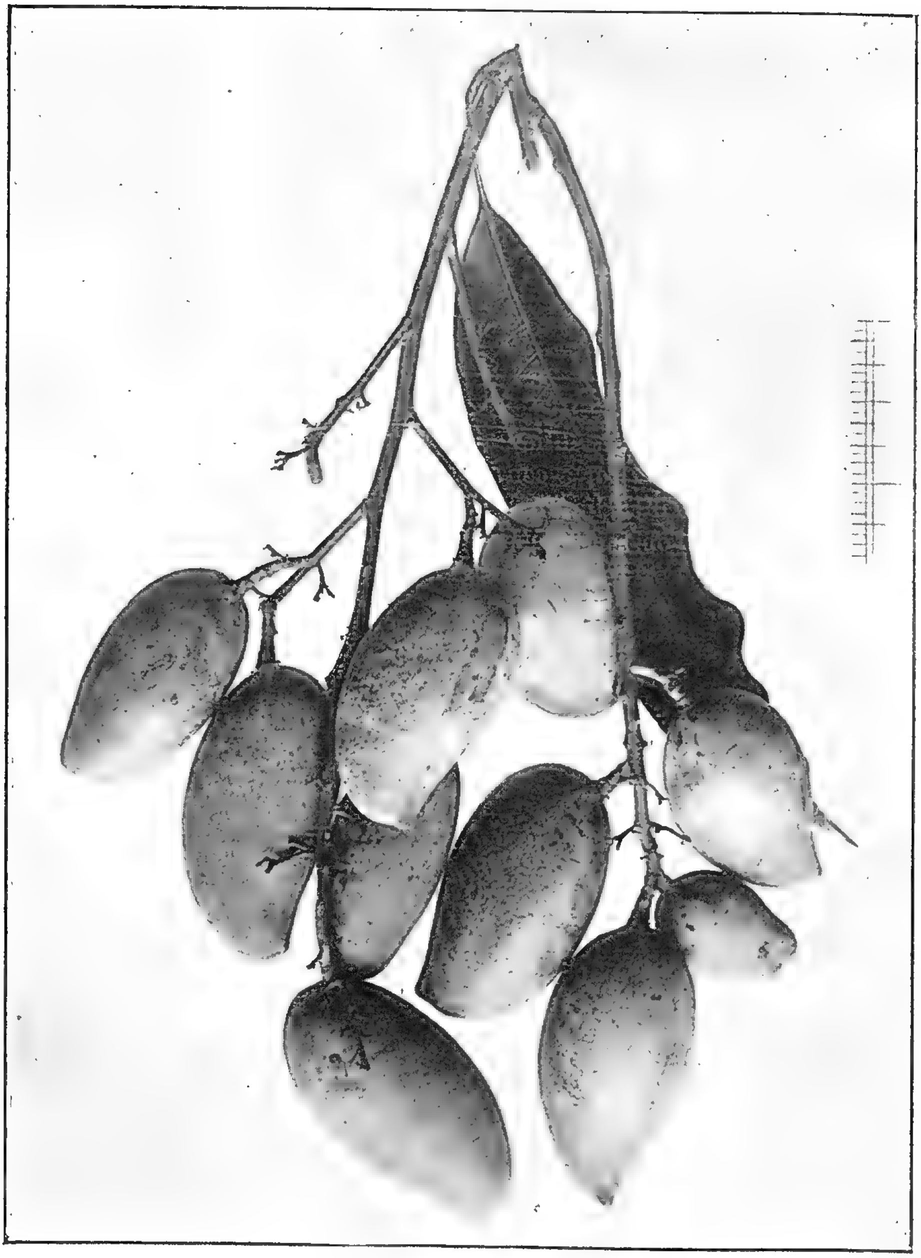


PLATE 47.—GOLDEN CLUSTER MANGO.

# The Orchard.

## THE MANGO.

By D. O'CONNOR.

There is no fruit grown in Queensland of greater, if so great, importance as the mango. It grows to perfection in our coastal district from near our Southern border to the extreme North. I know of no fruit of which we have such an infinite variety, or which varies so greatly in quality—our best deserves a place at the top of our list of fruits, and our worst at the bottom. We need have no bad nor even indifferent

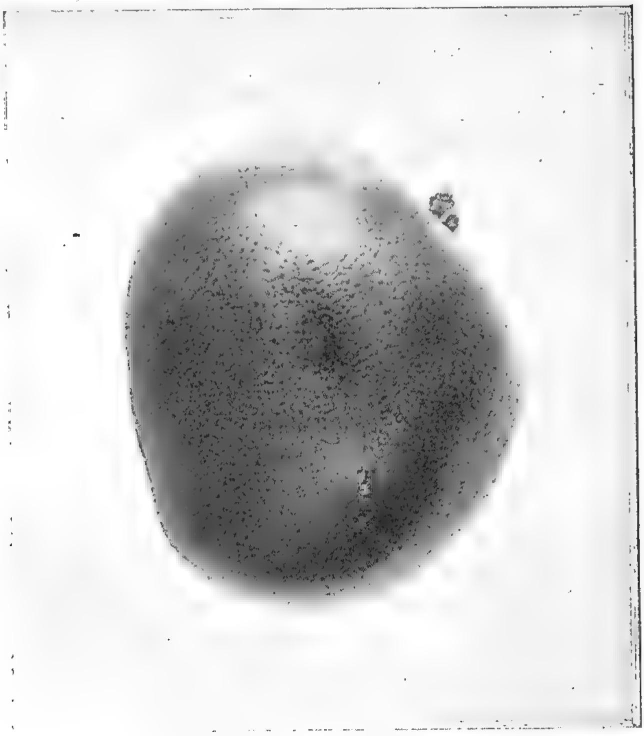


Plate 48.—The Peach Mango.

mangoes, if growers would adopt the budding process discovered by Mr. Horace Knight, of Rockhampton, some years ago. Mr. Knight's method has been tried with complete success by several amateurs in the vicinity of Brisbane. It would be a boon to growers—a numerous class—were you to republish the two interesting articles of Mr. Knight's, which appeared in your journal a few years ago; few persons remember them. Mr. Knight said February was a good month in which to begin operations. It only requires a little energy, enterprise, and perseverance to change our numerous trees that bear inferior fruit into good or even choice fruit bearers. Most of our mangoes remain unnamed; unfortunately, it would be difficult to find anyone capable to undertake the task of nomenclature. Mr. G. M. Woodrow, in his useful little handbook, comments and describes upwards of eighty varieties in India, of which we have not more than half a dozen. Mangoes from seed are liable to sport; I know of only one which turned out distinctly superior to its parent, and only one (Alphonso) that comes true from seed. I have one of the varieties of Alphonso, though probably not the choicest; it is a fruit of the highest excellence; it is, unfortunately, a shy bearer. My tree is one of four generations grown from seed; they differ in no respect.

The best-flavoured mango I ever ate was at St. Helena, South Atlantic; it was taken there by Captain Bligh, of the "Bounty," more than a hundred years ago; it is still bearing. I received seed three times, but they decayed in transit. I hope to try another method.

The two figures accompanying this paper are "the golden cluster," so called from its habit of growth and its colour, being a bright clear yellow without the admixture of any other colour. The small figure (given me by Mr. Peterson, the seedsman of George street) is called "the peach"; it is highly coloured and of good flavour; it is the smallest mango I ever saw.

## MANGO PRESERVE.

Take green mangoes when fully grown, but unripe; peel them; cut off the flesh, which place on a dish; pile on sugar; and bake thoroughly in a not too hot oven. A delicious preserve is the result.

## TIMES OF SUNRISE AND SUNSET AT BRISBANE, 1912.

| Date. | May. | | June. | | July. | | August. | |
|---|---|---|---|---|---|---|---|---|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. |
| 1 | 6·14 | 5·16 | 6·31 | 5·0 | 6·40 | 5·3 | 6·30 | 5·18 |
| 2 | 6·14 | 5·15 | 6·31 | 5·0 | 6·40 | 5·4 | 6·30 | 5·18 |
| 3 | 6·15 | 5·14 | 6 32 | 5·0 | 6·40 | 5·4 | 6·29 | 5·19 |
| 4 | 6·15 | 5·13 | 6·32 | 5·0 | 6·40 | 5·4 | 6·29 | 5·20 |
| 5 | 6·16 | 5·13 | 6 33 | 5·0 | 6·40 | 5·4 | 6·28 | 5·20 |
| 6 | 6·17 | 5·12 | 6·33 | 5·0 | 6·40 | 5·5 | 6·28 | 5·20 |
| 7 | 6·17 | 5·12 | 6 34 | 5·0 | 6·40 | 5·5 | 6·27 | 5 21 |
| 8 | 6·18 | 5·11 | 6·34 | 4·59 | 6·40 | 5·6 | 6·26 | 5·21 |
| 9 | 6·18 | 5·10 | 6·35 | 4·59 | 6·39 | 5·6 | 6·25 | 5·22 |
| 10 | 6·19 | 5·10 | 6·35 | 4·59 | 6·39 | 5·7 | 6·24 | 5·23 |
| 11 | 6·19 | 5·9 | 6·35 | 4·59 | 6·39 | 5·7 | 6·23 | 5·23 |
| 12 | 6·20 | 5·9 | 6·35 | 4·59 | 6·39 | 5·7 | 6·22 | 5·24 |
| 13 | 6·20 | 5 8 | 6·36 | 4·59 | 6·39 | 5·8 | 6·21 | 5·25 |
| 14 | 6·21 | 5·8 | 6·36 | 4·59 | 6·39 | 5·8 | 6·20 | 5·25 |
| 15 | 6·21 | 5·7 | 6·36 | 4·59 | 6·39 | 5·9 | 6·19 | 5·26 |
| 16 | 6·22 | 5·7 | 6 37 | 4·59 | 6·38 | 5·9 | 6·18 | 5·26 |
| 17 | 6·22 | 5·6 | 6·37 | 4·59 | 6·38 | 5·10 | 6·17 | 5·26 |
| 18 | 6·23 | 5·6 | 6·38 | 5·0 | 6·37 | 5·11 | 6·16 | 5·27 |
| 19 | 6·24 | 5·5 | 6·38 | 5·0 | 6·37 | 5·11 | 6·16 | 5·27 |
| 20 | 6·24 | 5·5 | 6·38 | 5 0 | 6·36 | 5·12 | 6·15 | 5·28 |
| 21 | 6·25 | 5·4 | 6·38 | 5·0 | 6·36 | 5·12 | 6·14 | 5·28 |
| 22 | 6·26 | 5·4 | 6·39 | 5·1 | 6·36 | 5·12 | 6·13 | 5·28 |
| 23 | 6·26 | 5 3 | 6·39 | 5·1 | 6·35 | 5·13 | 6·12 | 5·29 |
| 24 | 6·27 | 5·3 | 6·39 | 5·1 | 6·35 | 5·13 | 6·11 | 5·29 |
| 25 | 6·27 | 5·2 | 6·39 | 5·1 | 6·34 | 5·14 | 6·10 | 5·30 |
| 26 | 6·28 | 5·2 | 6·39 | 5·1 | 6·33 | 5·15 | 6·9 | 5·30 |
| 27 | 6·28 | 5·1 | 6·40 | 5·2 | 6·33 | 5·15 | 6·8 | 5·30 |
| 28 | 6·29 | 5·1 | 6·40 | 5·2 | 6·32 | 5·16 | 6·7 | 5·31 |
| 29 | 6·29 | 5·1 | 6·40 | 5·2 | 6·32 | 5·16 | 6·6 | 5·31 |
| 30 | 6·30 | 5·0 | 6·40 | 5·3 | 6·31 | 5·17 | 6·5 | 5·32 |
| 31 | 6·30 | 5·0 | ... | ... | 6·31 | 5·17 | 6·4 | 5·32 |

PHASES OF THE MOON.

| | | H. M. |
|---|---|---|
| 1 May | ○ Full Moon | 8 19 p.m. |
| 9 „ | ☽ Last Quarter | 7 56 „ |
| 17 „ | ● New Moon | 8 14 a.m. |
| 24 „ | ☾ First Quarter | 12 11 „ |
| 31 „ | ○ Full Moon | 9 30 „ |
| 8 June | ☽ Last Quarter | 12 36 p.m. |
| 15 „ | ● New Moon | 4 24 „ |
| 22 „ | ☾ First Quarter | 6 39 a.m. |
| 29 „ | ○ Full Moon | 11 34 p.m. |
| 8 July | ☽ Last Quarter | 2 47 a.m. |
| 14 „ | ● New Moon | 11 13 p.m. |
| 21 „ | ☾ First Quarter | 3 18 „ |
| 29 „ | ○ Full Moon | 2 28 „ |
| 6 Aug. | ☽ Last Quarter | 2 18 p.m. |
| 13 „ | ● New Moon | 5 58 a.m. |
| 20 „ | ☾ First Quarter | 2 57 „ |
| 28 „ | ○ Full Moon | 5 59 „ |

# Viticulture.

## OBSERVATIONS AND CULTURAL NOTES ON GRAPES—No. 4.

By CHARLES ROSS, Instructor in Fruit Culture.

[CONTINUED FROM MARCH NUMBER.]

17. *Henab Turki.*—A beautiful, rose-coloured grape, an oval berry of the largest size with tough skin and brisk, sweet, crackling juice. Large handsome bunches loosely set, varying from a spreading to a tapering form. This is a variety not much known, but is one of the finest grapes in cultivation. It will hang on the vine for a long time, and is a wonderful carrier. It is packed on the backs of camels and brought from the interior of Palestine to the seaport of Beyrout. The vine is strong, vigorous, and of good constitution. The fruit sets fairly well at Westbrook, and is not subject to disease when proper precautions as to treatment are taken.

The variety is not suitable for coastal districts, but ripens perfectly under dry, hot conditions, and would succeed best in the Western districts.

18. *Lady Downe's Seedling.*—A prolific, purplish-black, roundish grape. The flesh is firm, sweet, rich, and sparkling. The skin is tough and leathery, and keeps remarkably well after being cut. The bunches are long and tapering and of good market size. The vine, as grown at Westbrook, is robust and is easily cultivated. The variety is an English seedling raised from Black Morocco crossed by the Sweetwater. The seed from this cross produced two distinct first-class grapes, a black and a white—viz., the subject of the present notes—and Foster's seedling. It is one of the richest and most valuable of the late varieties.

19. *Lady's Finger, syn. Cornichon blanc,* is another valuable late kind. The bunches and berries are of the largest size; the latter are long and pointed. The skin is very tough, yellow tinged with pink, and is very beautiful. The vine is strong and robust, but I found it rather subject to "spot" in wet seasons, but can be thoroughly controlled with proper treatment. Lady's Finger is largely grown in South Australia, and is a popular late market variety, although coarse and of poor flavour.

20. *Madeleine Royal.*—A pretty, greenish white, oval grape of average size. The skin is thin and almost transparent. Flavour briskly sweet and pleasant, but not rich. The bunches are medium-sized, short, and broadly-shouldered. It ripens earlier than other grapes at present cultivated in the State. The past two seasons Madeleine Royal has been first in the Brisbane market. Several cases have been sent down from Roma and marketed on the 9th December, realising 9d. per lb. wholesale. The vine is of French origin, and in that country is said to grow strong; but at Westbrook the canes are slender and attenuated, although vigorous

and fruitful. The Cazenave system of pruning seems to suit it best—*i.e.,* short spurs with an occasional long spur of 6 or 8 eyes.

21. *Madresfield Court.*—A large, oval, black, Muscat grape of first-class quality. The bunches are large and regularly tapering, extremely

PLATE 49.—CINSAUT GRAPE.

handsome when well grown. The berries always set well, are covered with an intense blue bloom resembling Damson plums, with a distinct Muscat flavour, very rich and sweet. The skin, being tough and membranous, constitutes good packing qualities. Madresfield Court takes its name from the estate in England where it was raised, from a cross between Muscat of Alexandria and Black Morocco. It is the easiest of cultivation, possessing a good constitution, but not a rampant grower, a

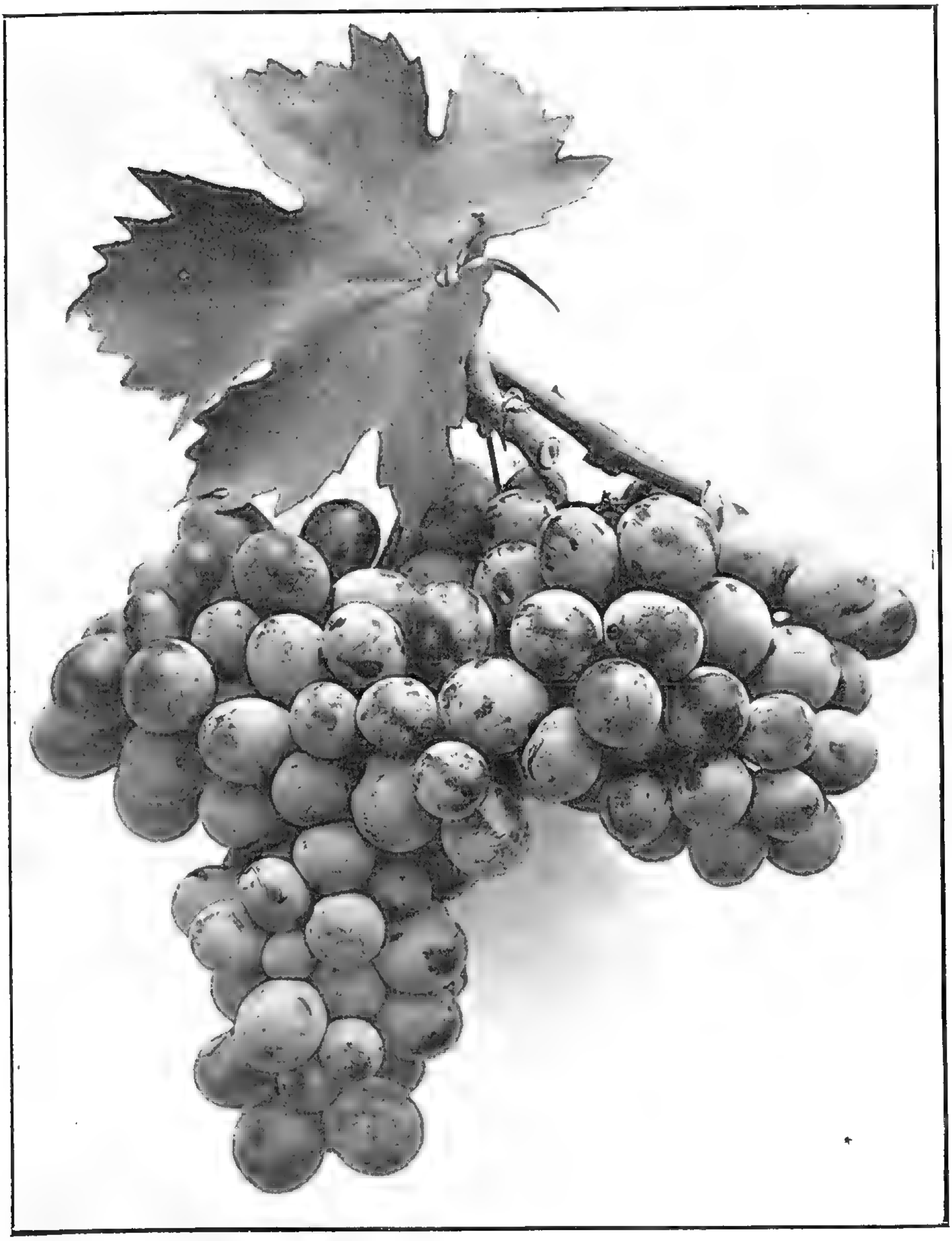


Plate 50.—Black Mammoth Grape.

heavy and consistent bearer, but, if allowed to hang long, the berries are liable to crack, especially if the weather should be wet. The period of ripening is about the same time as Black Hamburg, and may be classed as a second early.

22. *Mrs. Pince's Black Muscat.*—In some respects the description is similar to the foregoing variety. The bunches are large and tapering, but divided or fasciated at the point, and does not set so freely. The berries are medium-sized; the skin is tough and thick, and covered with thick blue bloom. The flesh is rich, sweet, and crackling, with a strong Muscat flavour. This is a late variety, and will hang long after ripening. The vine is strong and vigorous, and the shoots lignify freely; but its cropping is erratic, sometimes liberally abundant, and at others only moderate. It is an English seedling, and was raised by the lady whose name it bears. It is of first-class merit, valuable for late use, and requires the same treatment as Muscat of Alexandria.

# Statistics.

## COMMONWEALTH METEOROLOGY.

### RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

| STATIONS. | 1911. | | | | | | | | | | | 1912. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. |
| *North.* | | | | | | | | | | | | | |
| Bowen ... ... ... | 7·57 | 10·66 | 1·64 | 0·12 | 0·2 | Nil | 0·15 | Nil | 1·5 | 0·19 | 1·32 | 1·56 | 3·15 |
| Cairns ... ... | 27·43 | 35·35 | 52·31 | 2·08 | 1·44 | 1·48 | 0·27 | 0 6 | 0·88 | 1·95 | 0 90 | 4·81 | 16·68 |
| Geraldton (Innisfail)... | 35·51 | 28·39 | 50·53 | 3·58 | 5·10 | 6·20 | 0·79 | 0·30 | 0·73 | 1·61 | 0·75 | 5·50 | 18·24 |
| Gindie State Farm ... | 4·15 | 2·29 | 0·29 | 0·29 | Nil | Nil | 0·49 | ... | 0·81 | ... | 3.50 | 0·68 | 2·59 |
| Herberton ... ... | 13·16 | 15·35 | 14·17 | 0·58 | 0·36 | 0·40 | 0·5 | Nil | 0·9 | 0·62 | 5·36 | 5·29 | 2·82 |
| Hughenden ... ... | 3·76 | 0·17 | 6·29 | 0·4 | 0·2 | 0·2 | Nil | Nil | Nil | 1·37 | 0·69 | 5·78 | 1·84 |
| Kamerunga State Nurs. | 23·08 | ... | 52·28 | 1·51 | ... | ... | ... | ... | ... | ... | ... | | ... |
| Mackay ... ... ... | 13·04 | 14 41 | 3·14 | 0·77 | 0·22 | 0·43 | 0·18 | 0·3 | 0·93 | 0·17 | 0·41 | 2·08 | 8·04 |
| Mossman ... ... | 21·95 | 71·64 | 37·10 | 1·44 | 0 33 | 1·28 | 0·39 | 0·09 | 0 55 | 0·86 | 3 31 | ... | ... |
| Rockhampton ... ... | 21·07 | 6 39 | 1·44 | 0·56 | Nil | 0·24 | 1·17 | Nil | 0·40 | 0·6 | 0·81 | 2·50 | 3·24 |
| Townsville ... ... | 19·24 | 4·24 | 3 02 | 0 7 | 0·11 | Nil | Nil | Nil | 0·39 | 0·31 | 2·84 | 1·64 | 7·57 |
| *South.* | | | | | | | | | | | | | |
| Biggenden State Farm | 7·34 | 6·25 | ... | ... | ... | ... | ... | 0·79 | ... | ... | ... | ... | ... |
| Brisbane ... ... | 5·84 | 4·69 | 0·88 | 0·90 | 0·9 | 1·70 | 2·22 | 0 84 | 4·95 | 0·84 | 1 94 | 1·85 | 2·13 |
| Bundaberg ... ... | 9·75 | 4·31 | 1·46 | 0·56 | Nil | 0·37 | 1·15 | Nil | 2·36 | 1·30 | 2·98 | 3·96 | 2·47 |
| Bungeworgorai ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 0·73 | ... |
| Crohamhurst ... ... | 19·20 | 16·67 | 2·94 | 1·21 | 0·13 | 3·58 | 2·62 | 0·51 | 6·27 | 1·74 | 3·02 | 5·62 | 8·72 |
| Dalby ... ... ... | 2·24 | 3·20 | 0·76 | 0·91 | Nil | 0·68 | 0·43 | 0·42 | 3·45 | 1·99 | 1·55 | 1·76 | 2·58 |
| Esk ... ... | 6·04 | 3 54 | 0·99 | 1·90 | Nil | ... | 1·51 | 2·04 | 4·17 | 0 47 | 0 44 | 1·38 | 8·26 |
| Gatton Agric. College | 3·98 | 2·80 | 1·38 | 0·58 | Nil | 0·72 | 0 90 | 0·96 | 3 77 | 0·49 | 1·90 | 3·56 | ... |
| Gympie ... ... ... | 5·33 | 6·02 | 1·88 | 0·32 | Nil | 0·97 | 0·48 | 0·26 | 2·42 | 0·50 | 2·10 | 2·92 | 4·47 |
| Ipswich ... ... | 4·19 | 2·51 | 1·38 | 0·42 | Nil | 0·59 | 1·12 | 0·34 | 4·71 | 0·25 | ... | 1·87 | 3·00 |
| Maryborough ... ... | 6·58 | 7·20 | 2·61 | 0·16 | 0·11 | 0·62 | 1·47 | 0·9 | 2·81 | 0·90 | 4·98 | 2·39 | 3·93 |
| Roma ... ... ... | 5·94 | 1·25 | 0·14 | 1·13 | Nil | 0·67 | 1·55 | 0·87 | 1·9 | 1·55 | 1·19 | 0·74 | 0·76 |
| Roma State Farm ... | ... | 5·39 | 0·04 | ·02 | ... | ... | 1·39 | 0·74 | 1·31 | 1·29 | 1·45 | ... | 0·60 |
| Tewantin ... ... | 8·50 | 18·11 | 1·78 | 0·57 | 0·22 | 2·53 | 1·07 | 0·4 | 7·48 | 1·14 | 2·13 | 5·60 | 4·25 |
| Warren State Farm ... | 11 75 | 3·17 | ... | ... | Nil | 0·6 | 1·01 | ... | 0·64 | ... | ... | 0 82 | 1·75 |
| Warwick ... ... | 2 01 | 3·12 | 0·74 | 1·04 | Nil | 1·20 | 1·50 | 0·80 | 1·78 | 2·26 | 0·70 | 1·57 | 3·45 |
| Warwick, Hermitage State Farm ... | ... | ... | ... | ... | ... | ... | ... | ... | 0·60 | ... | ... | ... | ... |
| Westbrook State Farm | 3·90 | 1·76 | 5·50 | 0·79 | 0·1 | 1·1 | 0·54 | 0·82 | 1·77 | 2·68 | 0·23 | 1·16 | ... |
| Yandina ... ... | 10·73 | 12·02 | 2·68 | 0· | Nil | 2·43 | Nil | 0·30 | 2·90 | 1·36 | 1·87 | 5·95 | 4·84 |

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND,
Divisional Officer.

## WEATHER CYCLES.

### THE THREE, TEN AND TWENTY YEAR DROUGHT SERIES.

Mr. W. O'Neill, Narromine, writing to the "Farmer and Settler," Sydney, on the subject of weather cycles, says:—In reference to Mr. Stewart's (of Mudgee) statement in your paper about the ten-year cycle, I can supplement his information by taking him back to the years 1861-62. Since that time I have kept a weather diary regularly, so that I have fifty years' records now before me. Within his ten-year cycles are three-year cycles; and there are also twenty-year cycles, from 1861-2 to 1881-2, for instance, and from 1881-2 to 1901-2.

These cycles extend throughout the whole of the wheat belt in the central district from the Namoi to the Lachlan, and spread into the eastern district to the mountains. It looks a formidable situation; but one who has studied the cycles, and knows of their certainty, can be always prepared. To me they afford time to mend my fences and other matters that are subject to wear and tear, and give me time to make provision for the good and medium seasons that I know are coming, for as sure as the sun rises and the tide comes to flood, so sure those cycles will come round with more or less severity to the unsuspecting. Hence my desire to supplement Mr. Stewart's information, as also Mr. Tebbut's (of the Windsor Observatory), and that of the late Mr. Russell, whose belief in those cycles was well known.

"Cycles of seasons," said Mr. Keele, "are as certain as the laws that govern the heavenly bodies, though we have not yet been able to fit their period." When Mr. Keele made that statement, he had not seen my diary of fifty years.

In a paper read by Mr. Russell before the Royal Society (11th October, 1876), he said:—"Surely in meteorology as in astronomy the thing to hunt down is a cycle; each place has its own peculiar period." I hope the people on the land will follow up the following diary:—

Years.

1861-2—Drought
1863—Good season
1864-5—Drought
1866—Good season
1867-8—Drought
1869—Good
1870—Good
1871-2—Partial drought
1873—Good
1874-5—Drought
1876—Medium
1877-8—Drought
1879—Good
1880—Medium
1881-2—Medium
1883-4—Drought
1885—Medium
1886—Medium
1887-8—Drought
1889—Good

Years.

1890—Good
1891-2—Medium
1893—Good
1894-5—Drought
1896—Good
1897-8—Drought
1899—Good
1900—Medium
1901-2—Drought
1903—Good
1904—Drought
1905—Partial drought
1906—Good
1907—First quarter, good; second dry, with grasshopper plague
1908—1st, 3rd, and 4th quarter bad; bad harvest.
1909—Good
1910—Good throughout
1911—Good throughout

# Tropical Industries.

## COFFEE CULTURE IN NORTH QUEENSLAND AS IT WAS AND IS.

By HOWARD NEWPORT, Instructor in Tropical Agriculture.

The prospects of coffee culture in the tropical parts of Australia, especially Queensland, have materially improved during the past few years. This does not mean that they were really bad at any time; for the conditions of climate and soil have not changed, and are, as they were, in advance of those in nearly every country where coffee is being commercially cultivated. The history of this staple in Queensland shows no exemption from the vicissitudes incidental, and which precedent indicates as unavoidable, to the introduction of an industry to a new country and to conditions that involve some change of method or system from that in general use elsewhere and, therefore, considered orthodox.

In North Queensland, fifteen to twenty years ago, there was what may be called a boom in coffee—it was a very mild boom; but public opinion looked upon it particularly favourably at the time, and, having no precedent to go by, hoped great things of coffee culture.

As a matter of fact, the coffee planted in Queensland *did* do well, and amply proved its suitability, with due adaptation, as an industry for the white-people tropics. In the absence, however, of professional guidance by authorities sufficiently thoroughly acquainted with the natural and life history of the plant to appreciate the bearing on its cultivation the conditions of the new country imposed, initial mistakes were made that, owing to the permanent nature of the product, were irremediable in many individual instances. Several fairly large plantations were opened—too large for the available labour supply; and numerous small plantings of 100 or 200 trees were made—too small to receive proper attention. Hill sides, steep slopes, and high elevations were chosen because books said such localities were essential—in some other country—but which only served to increase the cost of production here, where (unlike most other countries) all the conditions necessary for successful cultivation may be found at sea level and on comparatively flat land. The picking of the crop was not understood either, and was found irksome, because totally different to any kind of harvesting previously undertaken. Finally, the prices fell considerably, and droughts, floods, frost, and ticks drove many settlers temporarily away from their selections, where the little coffee patch, though it, in most instances, throve and survived these troubles, yet was not of sufficient extent to solely support the settler and his family—and public opinion no longer looked favourably upon it. With the swing of the pendulum coffee-growing became unpopular, not because of any unsuitability of the staple to the country, but because of just such force of circumstances that every industry must meet with periodically. Had the country been more populated, or had the industry been more established, no doubt these difficulties would have been easily met and satisfactorily overcome, as industrial troubles have been, are being, and ever will be.

Precedent also shows that rises and depressions must and do occur and recur in cycle-like courses, and that, as the metaphorical pendulum swings beyond the normal on one side, so is it inevitable that it shall return. This is now the case with coffee culture in tropical Queensland.

In discussing the industries possible of establishment in this country, coffee has been quoted as one that has been tried and found unsuitable, or, at any rate, has not been hitherto established to any appreciable extent. One or two abandoned plantations have been cited, and what this or that pioneer in the industry has lost has been quoted; and it is implied that, therefore, coffee culture has not now, and never will have, any prospects of being successfully undertaken here. Those that argue on these lines, however, seldom state the whole facts. They are apt to forget to mention that there are any plantations at all that, having avoided (be it by chance or wisdom) the errors of others, have not merely survived, but are doing well and paying well. They omit to draw any attention to the reasons (generally obvious to those who know) of want of success in any particular instance, and it does not at the time occur to them to mention the small but eloquent fact that the price of the raw article was but little more than half what it is now when cultivation of an abandoned plantation was stopped; also, that, in by far the majority of cases, growers discontinued the cultivation of their coffee for totally different reasons than those of price, labour, or amount of crop returns; but that when they had to go, the popularity of the staple having waned, no one was apparently prepared to go on where they left off, even though shown to be payable, and the cultivation of what was considered a "fancy" product simply lapsed.

At the time of the decline in popularity of coffee in Queensland I have stated that prices fell. This was largely (though not entirely) due to Brazilian over-production at the time, and was not, therefore, confined to Queensland. Raw coffee in Queensland reached its minimum at a value of about 4½d. per lb. in the parchment. The pendulum in this matter is now slowly but surely swinging, and the prices of coffee all over the world are gradually rising. The present price in North Queensland for parchment coffee is 7½d. to 8d. per lb. Another point omitted is the statement frequently made to me by growers who have a little coffee, to the effect that now they wish they had more; and by a number of those who had small plantations saying that, if only they could start again *now* with the knowledge and experience they have, how perfectly confident they are of the success they could make of it.

It might be asked where these plantations are that have been referred to as having successfully survived this period of depression and to be now paying so well, and how is it that we hear nothing of them? They exist at Mount Buderim, Mackay (Mount Jukes), Atherton, Kuranda, and are, many of them, giving returns of from 8 to 10 cwt. per acre as an average, and up to 20 cwt. in specially good seasons. Reference to the agricultural statistics as appearing in the last annual report of the Department of Agriculture and Stock (1911) will show that the average returns for the two districts of Mackay and Herberton were 2,304 lb. and 1,046 lb., respectively, per acre; and everyone knows that a district average must include at least a percentage of indifferently worked, as well as the properly worked, plantations. Unfortunately for the country, very little is heard of these successful plantations—not half as much as of the failures. Most of these growers are manufacturing their own coffee and find a ready *local* sale for it, and that within a radius of a few miles only. Their product, therefore, is seldom shipped south to the big markets of the Commonwealth—often not shipped at all, and, while there is an absolute consumption of every iota produced, the amount is insufficient to materially affect the market. Hence Melbourne and Sydney and the South generally know little and hear less of what coffee is being produced.

This is, I think, sufficient to indicate that as times have advanced conditions have changed, and, as far as coffee culture is concerned, have improved with the advancement, and that public opinion is recognising this and has good reasons for doing so.

The want of success in individual instances years ago cannot rightly be taken as any criterion on which to base an assumption that coffee culture is not now worthy of attention. As a matter of fact, if we accept the simile of the pendulum, which is amply corroborated, a period of prosperity for the industry, more or less commensurate with the depression now past, is commencing.

The main points of difference between coffee culture as a business proposition fifteen years ago and now are—Increased settlement of the country; greater facilities of transport; improvement of prices; a spirit of more open-mindedness, though perhaps of greater caution (and, therefore, more business-like and sound), towards the subject; and a fuller knowledge of the requirements of the staple in this country obtained from the experience of the earlier growers.

I would submit that all these are important factors; but, as the increase in the price of the raw article will probably appeal most strongly, from this point of view if no other, the subject is worthy of renewed attention and close study, both as a business investment and a means of increasing settlement.

Let us, therefore, shortly consider the culture of coffee under present-day conditions as a business proposition.

## COFFEE CULTURE AS A BUSINESS PROPOSITION.

It must be admitted that the policy of the country more especially encourages the individual settler producing for himself and by himself. This being so, the large estates and plantations commonly existing in (usually black labour) countries where coffee is grown are not adapted to Queensland, and the plantations must be limited in area practically to what one settler can manage. Let the area then be limited, for the purpose of this paper, to, say, 15 acres.

The cost of the opening may be put down at—Land, £5 per acre (outright purchase); falling, £2; clearing, £2; plants, £1; planting, £2;

total, £12 per acre; and for 15 acres £180; buildings and machinery necessary for a plantation of this size, £250. Add to the capital the cost of upkeep, until in bearing, one man's wages at 8s. a day for three years, £375, involving a total investment of a capital of £805. This is an outside estimate in that new scrub land is allowed for, and outright purchase instead of selected Government land and long terms. The capital investment necessary may be very materially reduced by an individual worker in many ways, as, for instance, taking up some of the already cleared and stumped banana land (perfectly suitable for coffee), which would not only probably cost less, but save several pounds per acre in felling and clearing; and by possibly not drawing to the full extent on the 8s. a day set aside as cost of living, inasmuch as a great deal might be produced on the farm to reduce this cost, and in growing catch crops, such as bananas or vegetables, between the coffee during the initial period of waiting; also, the interest accruing on £150 of the £250 set aside for buildings (which would not be required until the estate came into bearing) would be of some assistance during the first three years.

In the matter of returns the first and possibly second crops would but cover expenses. Once in full bearing and properly opened, an average crop of 10 cwt. per acre may be safely anticipated. With this, as with other staples, its successful production depends very largely on the cost of harvesting; 1d. per lb. is admitted generally as a fair price to pay for the picking of coffee berries. Indeed, it is a high price when it is considered that this amounts to more than half and almost two-thirds of its value; but it were better to overstate than understate this unavoidable item in the production. One penny per lb. means that a man labourer must pick 96 lb. per day to make wages—say, 100 lb.; but the work requires no special strength or effort, and is therefore suitable for youths, boys, and girls, who can often earn comparatively high wages. I have already mentioned the record of a boy picking 190 lb. in a day. Ripe coffee berries (or cherry) produce one-fifth to one-fourth of their weight in dry marketable produce called "parchment." Let us take the lesser figures, and so leave a still broader margin. A return of 10 cwt. (parchment) per acre would, therefore, involve a cost of harvesting for the whole plantation of not more than £350, and to this must be added the cost of annual upkeep of £125, making a total of £475. The 7½ tons at, say, 7½d. per lb., would be worth £525, to which must be added the Federal Government bonus of 1d. per lb. of clean coffee, equal to £7 per ton in parchment, amounting to £52 15s., making a total gross annual return of £577 15s., and net returns of £102 15s.

This, it may be said, discloses no fortune—it does not, but it must be borne in mind that minimum averages rather than maximum returns have been taken, and also that allowance for the living of the grower at 8s. a day has already been made and the £100 odd means therefore *profit*, and represents a rate of interest on the greatest amount of capital invested of some 12 per cent.

There is no reason why the area under cultivation should not be increased beyond the 15 acres suggested according to the capacity of the settler, more especially if the coffee be grown under shade, reducing the amount of pruning, weeding, and field attention necessary.

The larger the area the greater the rate of profit, as the cost of the buildings and plant need not increase; but the obtaining of sufficient labour for harvesting would become a matter of some moment if the area were very materially increased.

The harvesting of a 10-cwt. crop spread over four months would require just over one hand for every 2 acres; so a 10-acre plot, although the total returns are not so large, can often be harvested by the grower's own family.

To newcomers to the colony with small capital, with or without a family (but especially to the family man), the cultivation of coffee in North Queensland offers excellent investment and prospects of an independent and healthful life in the production of a commodity the market for which is rising as well as increasing locally—a plantation of which, sufficient to return an income of £4 per week, need not exceed an area that the owner can himself manage (with the exception of the harvesting only), and which, once established, requires no replanting, remaining a source of income for the rest of his life.

## TOBACCO-GROWING.

By R. S. NEVILL, Tobacco Expert.

From inquiries coming to this office it appears that many people are under the impression that tobacco is a winter crop, but I wish to impress upon them that it is not, as will be seen in the article in the February (1912) number of this journal, where I have given the time for seed-sowing and transplanting it in all parts of Queensland. Another fact I wish to impress upon intending growers is that the earlier the tobacco is transplanted between October and February, the more valuable will be the crop. The reason for this is that the cool weather and heavy dews of the later autumn have a tendency to thicken the tobacco, and make it grow heavy, and such tobaccos do not usually cure uniformly and never cure bright; whereas the tobacco that is harvested early, during hot weather, if properly handled, will cure bright and silky, and, while it will be lighter in body, at the same time this will be more than made good by the enhanced value of the product, and there is a more ready demand for such tobacco.

When we consider the high price which the tobacco produced in Queensland is now fetching, the highest in the world for the same quality, an average of 8½d. for pipe tobacco, it is a matter of surprise that people do not go in for the growing of it more extensively, for, after the crop is once in the field, the work, though constant, is light, such as children, both boys and girls of 12 and 15 years of age, can do, just as well as a man, with the exception of the plough work. The yield of the pipe tobacco in the Texas and Inglewood districts is not far from a half-ton per acre, and sometimes, with exceptionally good seasons, more, and the price something near £80 per ton, and an industrious man can take care of something like 4 to 5 acres. Thus it will be seen that, to the man who is not afraid of farm work, it offers special inducements. Other crops can also be grown at the same time on the farm, such as corn, potatoes, &c., which will further add to the farmer's income. The Inglewood and Texas districts so far have grown the best of these tobaccos, and there is plenty of land available; the railway reaches the country about Inglewood, and there are large rehandling houses at Texas, where the farmer can sell and deliver his tobacco, see it weighed, and get his money at once.

Another question is often asked: "How much capital is needed to go into the business?" To this I can only answer: "It depends on the man himself." Some men will make a failure at anything with an abundance of money behind them; others make a success of whatever they undertake with no money; but, in a general way, I should say a man would need enough only to buy teams, farming implements, and harness. Of course he can get terms on land; and the clearing and preparing for cultivation, and building post-and-rail fence and humpy, he can do himself.

---

## BANANA-GROWING AT BUDERIM MOUNTAIN.

### THE VALUE OF FERTILISATION.

The accompanying photographs of bananas taken at Buderim Mountain by Mr. Reg. G. Bartlett, head teacher of the local State school,

Plate 51.—Mr. Stanley Townsend's Plantation. 4 Bunches on new Scrub Land, Buderim Mountain.

afford ample evidence that the experiments with various fertilisers, which have been for some time carried out by Mr. J. C. Brünnich in the above district, have been well availed of by the banana-growers. Nos. 1 and 2 show some fine fruiting plants growing on new scrub land owned

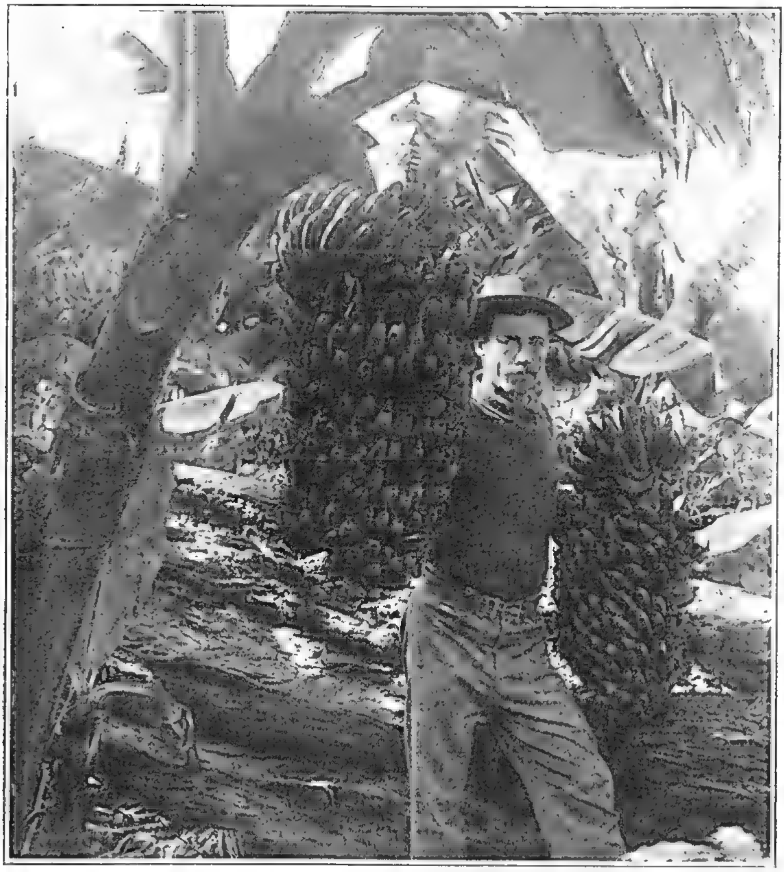


PLATE 52.—NEARER VIEW OF LARGE BUNCH OF BANANAS GROWN ON MR. STANLEY TOWNSEND'S PLANTATION, BUDERIM MOUNTAIN.

and worked by Mr. Stanley Townsend. The second photograph gives a nearer view of two of the same plants. The great size of the bunches may be realised by noting the position of Mr. Townsend, whose height is 6 ft. No. 3 shows a very large bunch of bananas grown by Mr. H. Collard. This is the direct result of experiments with artificial fertilisers —blood, superphosphate, and sulphate of potash.

No. 4 is interesting, showing a very large bunch, and an extra tall sucker as shown by the man standing in front of it. This thriving plantation is owned by Mr. Bert Burnett, and the excellent results are due to heavy and frequent application of stable manure. It is interesting to note the heavily bearing coffee bushes which are grown between the rows of bananas, and form a very paying catch crop. The Buderim district has long been famous for the excellent coffee produced there, for which the highest market price has always been obtained. Mr. Brünnich's experiments with fertilisers for bananas are still being carried on, and evidently the growers are deriving great benefit from following the methods adopted by him to ensure heavy crops. A full Progress Report on these experiments will be published next month.

PLATE 53.—LARGE BUNCH OF BANANAS GROWN WITH ARTIFICIAL FERTILISERS BY MR. H. COLLARD, BUDERIM MOUNTAIN.

PLATE 54.—BANANAS AND COFFEE ON MR. B. BURNETT'S PLANTATION, BUDERIM MOUNTAIN.

# THE GROS MICHEL BANANA IN NORTH QUEENSLAND.

## SOME OF THE FIRST FRUITS.

By HOWARD NEWPORT, Instructor in Tropical Agriculture.

The importation of Gros Michel banana suckers by the Department of Agriculture, which were distributed in August, 1910, has been referred to as not having been a complete success. Owing to the distance the suckers had to travel, there is no doubt that many of them were not in the best of condition; nevertheless, they were by no means all failures. In this, as in many similar matters, the public is apt to hear much more from the unsuccessful growers of their failure, and the ostensible reason for it, than from or of the successful ones. Some of the suckers, when received, were undoubtedly partially decayed; but the Musa family is a hardy one, provided at least the requisite temperature and sufficient moisture are available, and, as was clearly demonstrated at the Kamerunga State Nursery, there was yet vitality in many apparently perished corms for those who knew how to treat them and to nurse them into growth. Many of the partially damaged or softened suckers were, seemingly, thrown away as hopeless and useless; whereas, had the bruised and perished portion been scraped away, and dry earth or powdered charcoal been applied and the plant set, shaded and sufficiently but not over watered and watched, a healthy young plant might have been raised that, even had it produced but an indifferent bunch itself, would, nevertheless, have grown valuable suckers for further planting out. In view of further distributions from importations now being made, these points are worth noting by applicants in the North.

Whether special care was taken or not, a number of those who received these Gros Michel banana suckers succeeded in raising from 25 to 50 per cent. of them, and some of the most successful of these applicants were in the Cardwell district.

These first plants were much slower in attaining maturity than were the Cavendish, which is not surprising considering the check the long journey must have been to the suckers.

The progeny of these original plants are, however, coming on much more quickly than did their parents, and are proving quite as rapid in growth as the varieties already here.

From the original (and now parent) plants of the Gros Michel bananas some very satisfactory bunches of fruit have been obtained and marketed, and the results of these "first fruits" will be of interest to many. The bunches, on the whole, were not large. This may be accounted for by the fact already mentioned—*i.e.*, the check in growth the sucker was unavoidably subjected to in being imported—or it may be that the bunches naturally do not carry as many individual fruit as the Cavendish.

A number of bunches inspected in the Cardwell district were what may be called fair average. The fruit were rather better filled when cut than is usual with the Cavendish, and the characteristics mentioned in an earlier note on these fruit—viz., the greater space between the individual fingers and the tougher skin—were maintained.

Some bunches were cut and despatched early in February by Mr. Brice Henry from his plantations on the Tully River, the returns for which are, of course, not yet available, but the comparison with similar (average) bunches of Cavendish cut at the same time and from the same plantation, as depicted in the illustration, will do doubt be of considerable interest.

PLATE 55.—MR. BRICE HENRY'S BANANAS, TULLY RIVER. GROS MICHEL ON LEFT OF FIGURE, CAVENDISH ON RIGHT.

PLATE 56.—MR. P. T. HOGG'S BANANA AND RUBBER PLANTATION, CARDWELL.

Several similar bunches were, however, sent down about a month previously by Mr. P. T. Hogg from his plantation on Saltwater Creek, near Cardwell, and realised 4s. 6d. per bunch as against 3s. 6d. per bunch for Cavendish in the same consignment, which is very satisfactory. Mr. Hogg, incidentally, is making a very good demonstration of what the white man can do with banana culture with energy and application, and is attaining no inconsiderable success as well with his bananas as with the Pará rubber trees he is growing between them. Needless to say, the greatest care is being taken, by these and other growers in the vicinity, of all the young Gros Michel banana suckers, and the area under them is being rapidly extended.

While the primary producer is being called upon to grow a species or variety that is hardier and able to withstand the rough treatment meted out to the fruit in general in course of transport to market, rather than steps being taken by the carriers to meet the difficulty by improving methods of transport of the admittedly good varieties already in universal cultivation, it is significant that prices in the London markets, although they vary from time to time, during the past season, at least, ruled considerably higher for the Cavendish than for the Gros Michel fruit. This may be taken as a fair criticism of the two varieties, from the point of view of flavour as a table fruit, when transported under similarly favourable conditions. In the London market, the Gros Michel banana is known as "Jamaican," and, latterly, quotations have been given by the ton, while quotations for Cavendish are per bunch or case (of 9 dozen), &c., rendering absolute comparison difficult.

However this may be, the fact remains that, if the Commonwealth market requires the coarser but better-looking (and travelling) fruit, the growers of the Commonwealth can supply them. So far, the production of Gros Michel or "Fiji" bananas is almost entirely confined to the white growers of bananas, who as yet are in the minority; but not only are the white cultivators rapidly increasing in numbers, but it may be anticipated that, within a year or so, where the Gros Michel plants are now counted in hundreds they will exist in thousands, and that a steadily increasing proportion of the consignments from the North will, from this on, be of the new variety.

# Botany.

## CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, C.M.G., F.L.S., Colonial Botanist.

### Order CRUCIFERÆ.

Tribe Cakilineæ.

RAPISTRUM, Desv.

Silicle 2-jointed; lower joint ovate, rough, with a solitary seed in each cell; the seed in the upper joint erect, that in the lower one pendulous. Cotyledons oblong, folded together. Leaves not fleshy; lower ones stalked, pinnatifid or somewhat lyrate; upper ones oblong toothed. Racemes elongated, somewhat paniculate, pedicels filiform, erect. Annuals or perennials, branched, pubescent or hairy herbs with yellow flowers.

**R. rugosum** (*Berg. phyt.* 3, *p.* 171 *with a fig.*; *All. fl. pedem.* 1-25). A downy or almost glabrous, erect annual; the lower leaves lyrate, upper ones lanceolate, more or less toothed. Flowers yellow. Pods villose, with a longish, persistent style; the lower joint often more or less abortive, indehiscent; the upper one globular and much wrinkled lengthwise.

Hab.: Throughout Middle and South Europe. Introduced into Queensland with bird seed; and around the houses where birds are kept I have seen plants growing for the past thirty years or more.

### Order MYRTACEÆ.

PSIDIUM, Linn.

**P. Araca.** *Raddi.* Opusc. Scientif. IV., 854. Branchlets terete, hairy. Leaves oval or oblong, hairy. Peduncles axillary, 1 to 3 flowered. Fruit ovoid, of a greenish-yellow outside, lighter inside. *P. guineense*, Swartz. In cultivation often known as the Green Guava. This fruit—a native of South America—has become naturalised in some of the Queensland scrubs.

**P. littorale.** *Raddi.* Opusc. Scientif. IV., 254. Shore Guava. A small tree. Branchlets terete or nearly so. Leaves oval-oblong, coriaceous, attenuated at the base, bluntly acuminated at the apex, glabrous on both sides, shining above. Pedicels 1-flowered, longer than the petioles. Fruit pear-shaped, greenish-yellow.

Hab.: The seashores of Brazil; now naturalised in our scrubs.

### Order MELASTOMACEÆ.

MELASTOMA, Linn.

**M. malabathricum.** var. **nanum,** *Bail. n. var.* This small variety—flowering when a few inches high—forms a neat plant suitable for the bush or glass house; but otherwise does not differ from the common variety met with in most of our scrubs.

Hab.: Kuranda, *Dr. F. Hamilton Kenny.*

### Order COMPOSITÆ.

SENECIO, Linn.

**S. spathulatus,** *A. Rich,* Sert Astrol., 25; *Benth.,* Fl. Austr. III., 665. Diffuse and much-branched. Leaves from narrow-oblong to almost obovate, irregularly toothed or crenate; the lower ones narrowed into a petiole; the others stem-clasping and often auriculate; all rather thick and fleshy; mostly ¾ to 1½ in. long. Flower heads rather large, in an irregular leafy corymb. Involucre campanulate, the bracts about 4 lines long, with a few very small outer ones. Ray-florets about 12 to 20; ligulæ long and spreading. Disk-florets numerous, exceeding the involucre. Achenes quite glabrous in some specimens, pubescent in others.

Hab.: Coolangatta, *C. T. White*; South Queensland, *Rev. B. Scortechini.*

CENTIPEDA, Lour.

**C. racemosa,** *Hook.,* var. **lanata.** *Bail, n. var.* Differs from the normal form only in its more or less woolly covering.

Hab.: Herberton, *Dr. F. Hamilton Kenny.*

### Order PIPERACEÆ.

PIPEROMIA, Ruiz et Pavon.

**P. Johnsonii,** C.DC., in Ann. Conserv. et du Jardin, Bot. Genéve, 1898 (286) (*Johsonii*). Plant erect 5-6 in. high, shortly branched, leaves ternate, shortly petiolate, cuneate at the base, oblong-ovate, glabrous on both sides, flower spikes slender, terminal or in the upper axils, pedunculate; peduncles about 5 lines long, bracts orbicular, ovary exserted.

Hab.: Mount Bartle Frere (altitude 5,000 ft.), *Stephen Johnson.*

### Order ORCHIDEÆ.

CALANTHE, R. Br.

**C. veratrifolia** *R. Br.,* var. **Kennyi,** *Bail., n. var.* The present plant is our old friend in miniature; thus it need only be stated that the plate given (Fig. I.) represents the natural size of the plant. By bringing this new variety to our notice from its northern recesses, Dr. Kenny has rendered a service to all those who take a pride in the cultivation of our native orchids. The small neat habit of this variety points to its coming into use where the ordinary plant could not be grown for want of space; and persons who cultivate these plants for sale would do well to work up a stock. Fig. II. on the plate represents a flower natural size of the normal form.

Hab.: Lake Eacham, *Dr. F. Hamilton Kenny.*

### Order TRIURIDEÆ.

Slender, leafless, coloured annuals. Stems subsimple, filiform, with a few distant scales. Flowers unisexual, small, in terminal corymbs or racemes; pedicels decurved, bracteate. Perianth inferior, 6-8-partite or

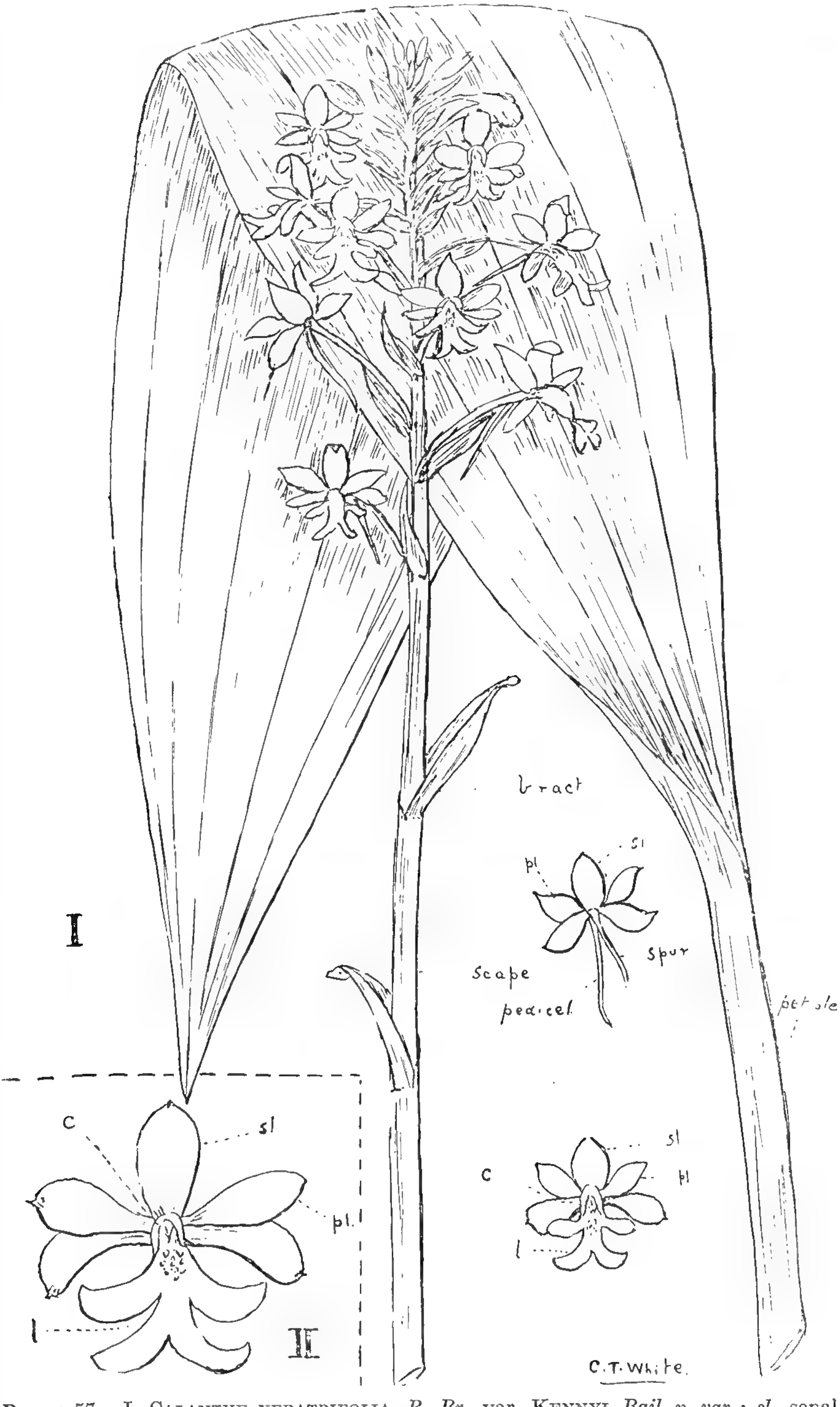



PLATE 57.—I. CALANTHE VERATRIFOLIA, *R. Br.*, var. KENNYI, *Bail. n. var.*: *sl.*, sepal; *pl.*, petal; *l.*, labellum; *c*, column. All nat. size.
II. FLOWER OF NORMAL FORM. Nat. size.

lobed; lobes ovate-lanceolate or subulate, valvate in bud. Male flowers: Stamens 2-6, hypogynous or perigynous; anthers free or immersed in a thick disk; cells 2, confluent, slits extrorse; pistillodes 3, subulate, or wanting. Female flowers: Staminodes none or few. Carpels many, sessile on a receptacle, 1-celled; style terminal, lateral, or basal, persistent; stigma acute, clavate, or penicellate. Ovules solitary, erect, anatropous. Achenes in a globose head, obovoid, coriaceous or fleshy, nucleus hard. Genera 2. Tropical America, Asia, Malya, and now Australia.—Hook, Flora British India, vi., 558.

SCIAPHILA, Blume.

Perianth 3-8-partite or lobed. Anthers sessile at the base of the perianth. Style ventral or basilar.

**S. australasica.** *Hemsl.*, Kew Bull. I. (1912), 44. A leafless saprophyte, uni- or bisexual. Stems erect, slender, about 4 in. high, simple or few branched. Flowers small, racemose, often diœcious, rarely monœcious; if monœcious, the upper male. Bracts lanceolate, about 1 line long, persistent. Pedicels very slender, 1 in. or less long. Perianth of the male flowers deeply 5-lobed, the lobes ovate-lanceolate, nearly $\frac{1}{2}$ line long, obtuse, without appendages, incurved. Stamens 3, subsessile; anthers with a transverse dehiscence. Perianth of female flower mostly 6-lobed, lobes lanceolate, about $\frac{1}{2}$ line long, obtuse without appendages, at length recurved. Carpels numerous. Style above the middle of the ventral side, filiform; 1 to $1\frac{1}{2}$ lines long, mature carpels fleshy, globose-obconic, $\frac{1}{2}$ to $\frac{5}{8}$ line long, smooth, 1-seeded; seed fusiform, $\frac{3}{8}$ to $\frac{1}{2}$ line long, obtuse at both ends; testa longitudinally finely striate.—W. Botting, Hemsley l.c.

Hab.: Bellenden-Ker, at an altitude of about 3,300 ft., *Dr. K. Domin.* It was found growing in a dense mass of the roots of other plants.

## Order CYPERACEÆ.

ARTHROSTYLIS, R. Br.

**A. Kennyi,** *Bail. n. sp.* Stems tufted from a hard woody rhizome, terete, about 1 line diameter, 1 to $1\frac{1}{2}$ ft. high; leafless except the sheathing scales, like those of a *Caustis* or *Restiaceaceous* plant. Sheathing scales at the base thin and scarious, older ones dark brown. Leaf-sheaths reddish-brown, produced into erecto-patent narrow green laminæ of 3 to 6 lines. Terminal head of spikelets, globular, 4 to 5 lines diameter, with sometimes a secondary much smaller one below it. Involucral bracts 0. Spikelets numerous, 1 to 2 lines long. Glumes white, hyaline. Stamens 6, all long with a few imperfect, sometimes 3 shorter (apparently perfect). Anthers linear. Style slender; stigmatic branches 3, recurved, pubescent. Nut small, light-brown, oval, and reticulately pitted.

Hab.: Herberton, *Dr. F. Hamilton Kenny.*

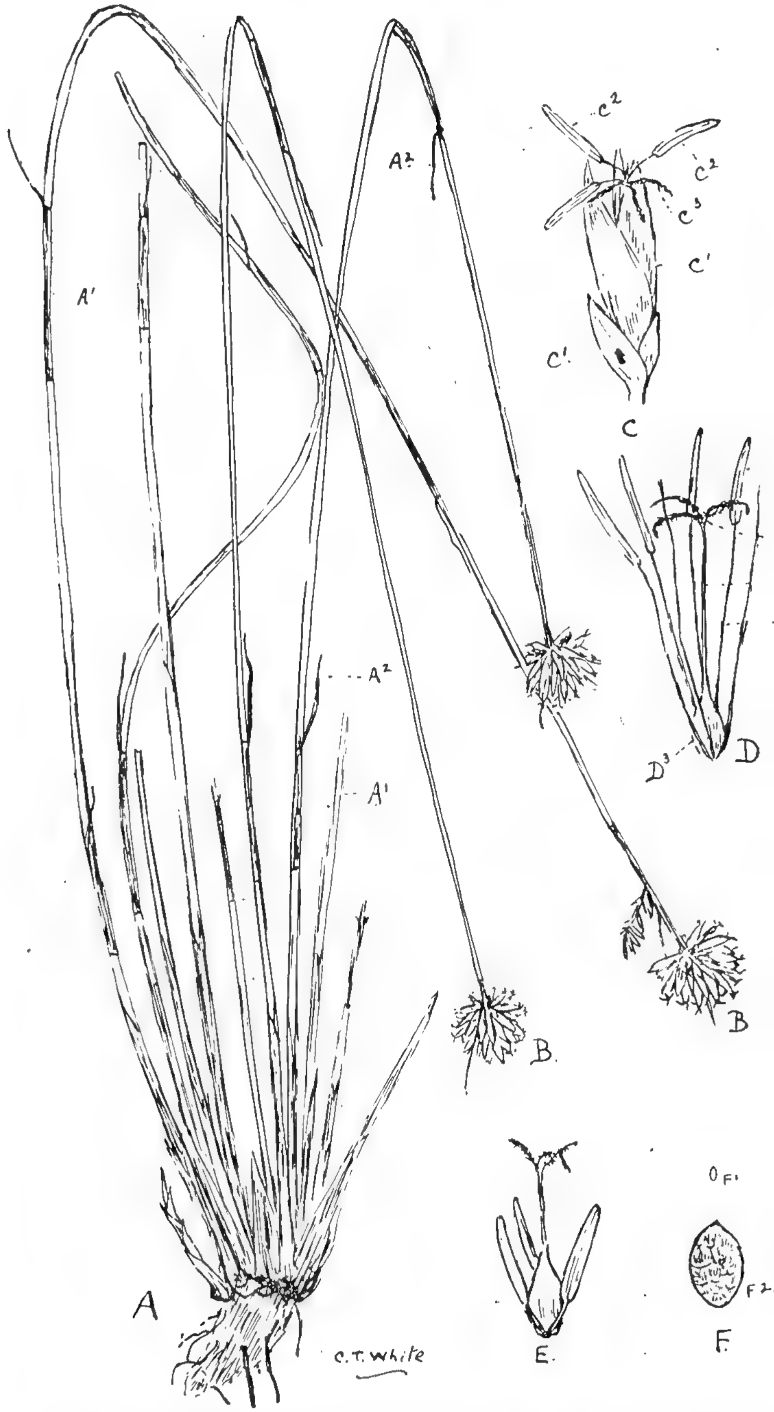



PLATE 58.—ARTHROSTYLIS KENNYI, *Bail. sp. nov.* A, plant nat. size. A¹, leaf-sheaths; A², laminæ of leaf-sheaths; B, terminal head of spikelets; C, spikelet; C¹, glumes; C², stamens; C³, stigmatic lobes; D, stamens and pistil; D¹, filaments; D², anthers; D³, ovary; D⁴, style; D⁵, stigmatic lobes; E, pistil, and three short stamens (C—E enl.); F¹, seed, n.s.; F², seed, enl.

## Order FUNGI.

The following additions to our Fungi have been determined by Mr. Geo. Massee, of Kew, England:—

### MELIOLA, Fries.

**M. microthecia,** *Theum,* in Flora, 1876, p. 569. Spots very small, usually on the under surface of the leaf, rarely on both sides, orbicular, radiating, black. Threads simple, rarely septate, 8 $\mu$ diameter; perithecia compressed, orbicular, black, asci 6-spored, hyaline, 40 by 4 to 6 $\mu$, broadly clavate, narrow at the base, apex rotund; sporindia ovate, 8 by 4 to 6 $\mu$, hyaline.

Hab.: On living leaves of *Medicosma Cunninghamii,* Goodna Scrub, *C. T. White.*

### CLADOSPORIUM, *Link.*

**C. epiphyllum** (*Pers.*), Mart. Erl., p. 351. Tufts effused in a circle, olive, then blackish, large, thick; threads at first erect, then declining, branched, very intricate, pale olive. Conidia copious, then falling away; at first simple, then two or more celled.

Hab.: On dead leaves of camphor laurel (*Cinnamomum camphora*), Brisbane River, *C. T. White.*

---

## BRISBANE BOTANIC GARDENS SECTION.

### INDIGENOUS SHADE TREES.

By J. F. BAILEY, Director.

In last month's issue descriptions were given of a few indigenous trees having showy flowers, and it is now intended to follow this up in the present article by giving a few of those growing in these or other Brisbane gardens which would prove useful for shade purposes. The various kinds of Figs have been omitted with a view of being included in a special article in a future issue.

*Aleurites moluccana* (the Candle Nut) is a quick-growing tree with large handsome leaves and wide-spreading head. The nuts are eaten by the natives when fresh, but are said to be deleterious if left for any time after being plucked.

*Brassaia actinophylla* (the Umbrella Tree) is a unique-looking plant, with handsome foliage. If not growing in good soil, however, it is subject to attacks from scale insects. When cut back, the tree forms a fine compact head.

*Callitris columellaris* (the Cypress Pine of Moreton Bay; the Pooragri of the blacks) is a dense-growing tree with the habit of some kinds of Cupressus. The foliage is of a dark-green colour, and the tree when in full growth forms a conspicuous object in the landscape. It seems to thrive in almost any soil, whereas its ally, the Cypress Pine of our western country (*C. robusta*), prefers a sandy soil.

*Cupania anacardioides* is a close-growing tree of medium height, with dark-green foliage, and thrives best when given a situation not far removed from the river or seashore.

*C. pseudorhus* is one of the handsomest trees in the Gardens, its elegant foliage and compact growth making it highly ornamental. The flowers are inconspicuous, but the young capsules, which are velvety and of a rich purple colour, lend an additional attraction to the tree.

*Cryptocarya australis, C. glaucescens,* and *C. obovata* are species which form well-shaped heads; but the first mentioned is of rather slow growth.

*Diploglottis Cunninghamii* (the Native Tamarind) is a tall-growing tree with large leaves which give the tree a distinct appearance.

*Eucalyptus.*—It would not be right when on this subject to exclude the representatives of this well-known genus, a number of which form excellent shade trees, especially when kept cut back. Two of the best for the purpose are the Tallow Wood (*E. microcorys*) and the Moreton Bay Ash (*E. tessellaris*).

*Flindersia australis* (the Crow's Ash) is admirably adapted as a shade tree, forming a fine-shaped tree, as the accompanying illustration of one of the plants in these Gardens will show. In the Southern States it is extensively used. Its ally, *F. pubescens,* is also a serviceable tree, and forms a shapely head. It has been used by our City Council with good effect in some of the streets and parks.

*Gmelina Leichhardtii* (the Queensland Beech) is of spreading habit, throwing out horizontal branches in a manner somewhat similar to that of some of our Figs. The tree is a striking object when in fruit, which is of a blue colour.

*Harpullia pendula* (the Tulip Wood) has of late years become a favourite, its light-green foliage, clean appearance, and compact growth making it eminently suitable for street and park planting.

*Macaranga Tanarius* (the Tumkullum of the Moreton Bay blacks) is a tree with large peltate leaves. It is an excellent tree for seaside situations, and may be seen growing to great advantage in the streets of some of our seaside resorts.

*Macadamia ternifolia* (the Queensland Nut) is of slow growth and of compact habit, and seldom looks shabby.

*Nephelium tomentosum* is a medium-sized tree with toothed leaflets, and is well adapted as a shade tree, being of shapely growth and well foliaged.

*Podocarpus elata* (the She Pine) is a thickly-foliaged tree which thrives well about Brisbane, but is of rather slow growth.

*Pongamia glabra* forms a shapely tree, and is possessed of large, glossy, compound leaves. It is useful for seaside planting, being found in such situations in its native haunts.

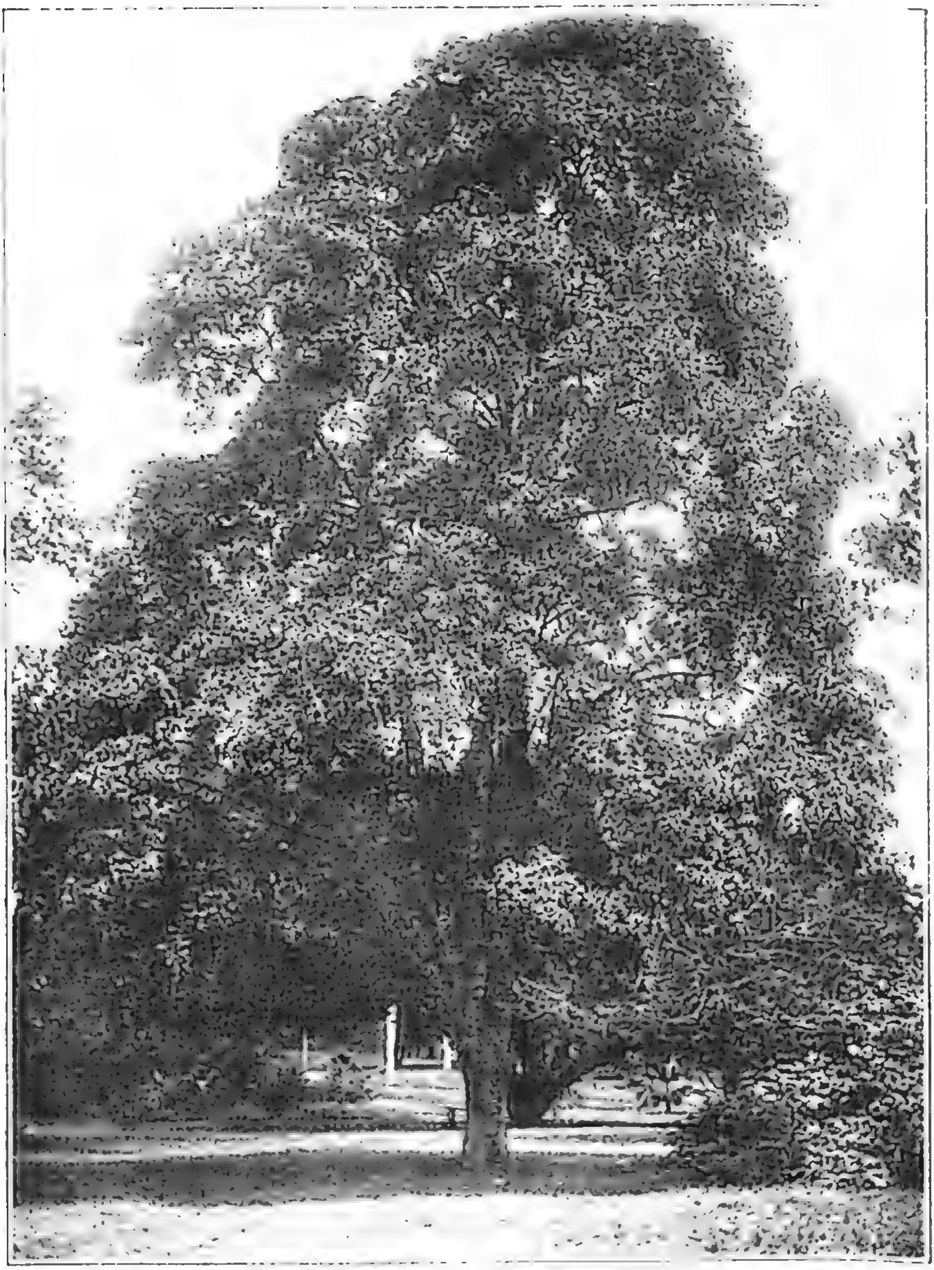


Plate 59.—Crow's Ash, Flindersia australis, R. Br.

*Sarcocephalus cordatus* (the Leichhardt Tree, or Canary Wood), an inhabitant of North Queensland, is a noble-looking tree, being thickly covered with large handsome leaves. *S. Bartlingii*, from the same place, is very similar in appearance, and is represented in the Gardens by two fine specimens, one of which is shown in the accompanying illustration.

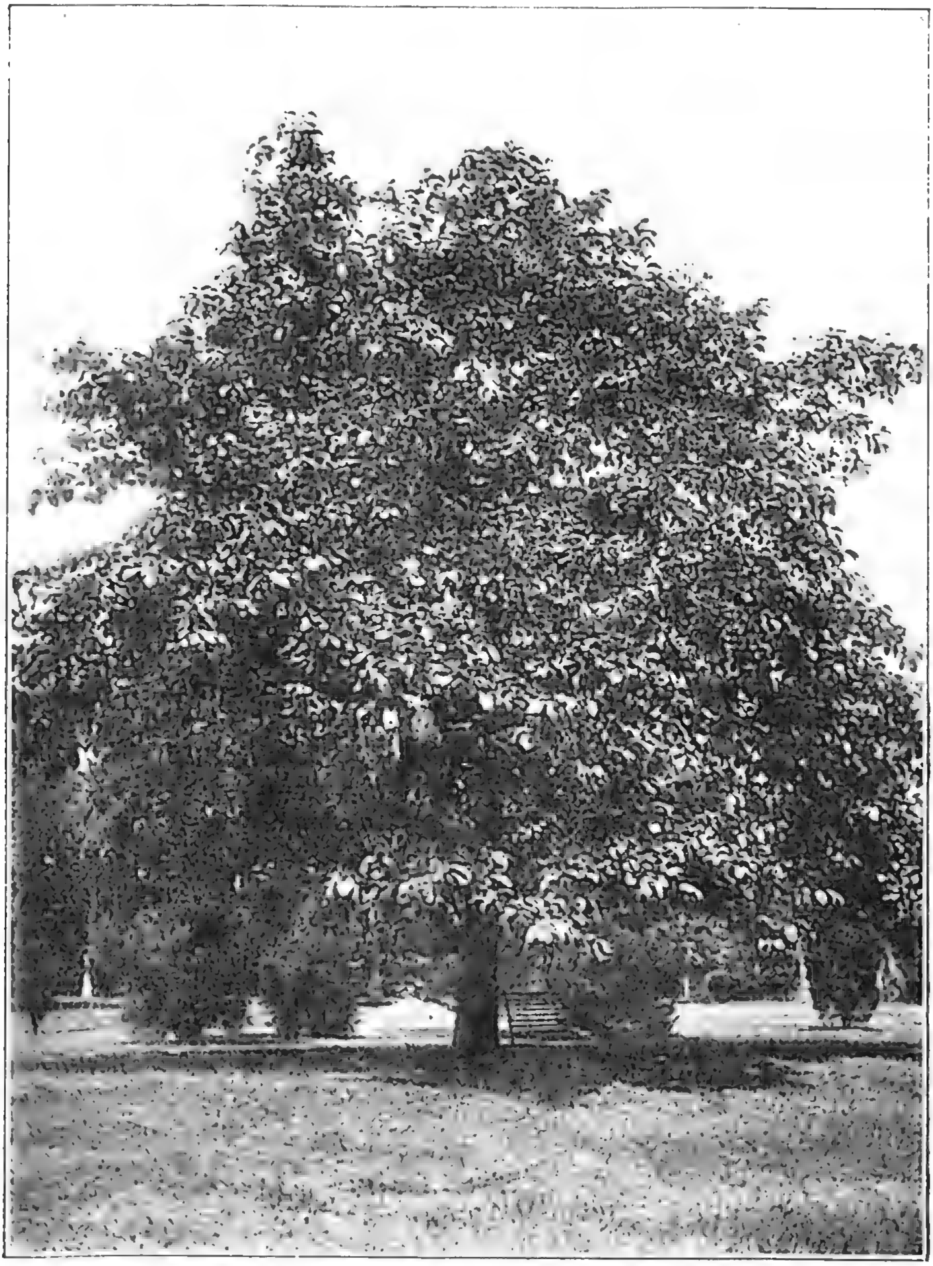


PLATE 60.—SARCOCEPHALUS BARTLINGII, MIQ.

*Sterculia diversifolia* (the Currajong of our Downs country) is not used to the extent so useful a subject deserves. In Adelaide it is used extensively in the streets and parks, likewise in Los Angeles, where its merits are recognised. *Sterculia quadrifida* is also a tree which grows well about Brisbane. Its fruit is of a bright crimson when ripe, and the black seeds are excellent eating, resembling in flavour that of a filbert.

# Plant Pathology.

## NATURAL ENEMIES OF THE BANANA OCCURRING IN QUEENSLAND.*

By HENRY TRYON, Government Entomologist and Vegetable Pathologist.

(CONTINUATION.)†

### PART III.

### ROOT DESTRUCTION BY FUNGUS MYCELIA.

(1) STONE FUNGUS.—Occasionally the soil of banana cultivations, and that may be otherwise of a free nature, will be found to be compacted together in large irregularly shaped masses that have an almost stone-like density and consistence. These masses are due to the fact that some foreign material, of a white colour, has filled every interstice and cavity of the volumes of earth that they comprise, and invested whatever root-fibres or foreign bodies they may contain. Thus, on breaking one of these across, they will exhibit a white mottled appearance. The same operation, too, will show also that the outer surfaces of these masses are defined by a thin dense almost black layer, to which soil fragments are closely adherent externally. Closer examination will indicate that the white cementing matter is composed of the vegetative growth (mycelium) of some soil-loving fungus, and that the dark-coloured investment is principally formed by iron that the organic matter present—in the form of this fungus-matter—has caused to be segregated around it. It has been inferred, on good grounds, that these masses of soil and fungus-threads may attain, by gradual growth, very large dimensions. It has also been found that when they involve the roots of growing plants, such as those of the banana, these succumb to their attacks, and the plants themselves fail to thrive. Quite recently, Mr. J. C. Brünnich, Agricultural Chemist, has directed our attention to an instance of damage to banana plants, arising in this way, yielded by an occurrence at Buderim Mountain; but, as this soil agglutinating fungus mycelium is by no means rare, injury may be occasioned by it more frequently than is generally recognised.

It is not definitely known which particular fungus is associated with this rich development of soil-frequenting growth. Messrs. D. McAlpine and J. G. O. Tepper have described a fungus that is allied to *Polyporus,* and that they name *Laccocephalum basilapoides.* This they have met with in South Australia. It is a fungus that possesses "a basal stone-like portion," that "resembles a concretion of ferruginous sandstone in appearance and almost in density . . . being apparently composed of the firmly agglutinated grains of the sandy soil in which it

* This general account of the Banana Maladies of Queensland is reproduced from a Bulletin "The Banana in Queensland," by A. J. Boyd; Department of Agriculture and Stock, Brisbane; by authority, Oct., 1910 (*Op. cit.*, pp. 15-29).

† *Vid.* Queensland Agricultural Journal, XXVIII., Pt. 3., pp. 178-183, March, 1912.

was formed, and thus fixed by the mycelium."* The fungus (or fungi) concerned in producing these masses in Queensland may be quite distinct, however, from the South Australian one.

When these masses are detected in the soil, they should be dug out and thrown upon a fire, so as to raise them to a high temperature. A solution of sulphate of iron applied to the soil in which they occur may, too, destroy the fungus growth on which their existence and harmfulness are dependent.

(2).—Another fungus attacks the banana again through its root system. This apparently is an agaric allied to *Armillaria mellea*, that commonly occasions Tree Root Rot; but, the sporiferous or mushroom condition not having yet been noted in connection with it, this identification is open to considerable doubt. In this case the plant ceases to thrive, the stems are short and slender, and the foliage yellowish and unhealthy looking. On digging up the stool, the soil is not hard and compact, but rather the reverse, and white threads (strands of mycelia or rhizomorphs) are seen traversing it in all directions. Again, it has a decided fungus-odour. A section of the stool itself will discover these threads also occurring within the tissue of the older portions, small cavities now occurring, being white in consequence. These parts, too, are dead and of a brown colour, with numerous dark particles disseminated throughout them, composed of an indurated gum-like substance.

When this trouble occurs, the plant should be dug out and burnt, and the soil for a foot or two around also removed and sterilised by heat, or receive a generous application of fresh lime that is to be dug well in.

As a rule, this root-fungus only occurs where—as commonly happens—the bananas have been planted in newly-felled scrub land, and, originating in certain decaying roots that still lie in the soil, it passes from this source to the root-stocks of its victims, being enabled to establish injurious relations with these, when growth has been interfered with by dry weather or other physical causes.

As a rule, too, it has a very scattered occurrence, and is more frequently rare than prevalent. However, it commonly persists for a long time in a spot in which it has once manifested itself, attacking plant after plant, as healthy bananas have been substituted for unhealthy ones.

### FRUIT ANTHRACNOSE OR BLACKENING, RIPE ROT.

This disease, as its designations imply, principally affects the ripe or ripening fruit, and is recognised by the areas of black discolouration that mark its presence. It is due to the attacks of a fungus named *Glœosporium musarum*, Cke. and Mass., that may be found occurring, throughout the areas referred to, in the form of a pinkish dust-like substance that is closely sprinkled over them. This matter is really composed of the massed seeds or spores of the organism, that—adherent one to the other—issue through little point-like orifices in the skin, and are connected with spawn-threads (mycelium) occurring in the adjacent tissue. These spores

* McAlpine (D.) and Tepper (T.G.O.): "A New Australian Stone-making Fungus." Trans. Roy. Soc., Victoria, 1894, pp. 166-168, 3 Plates.

are elongate-ellipsoidal with rounded ends and are without divisions, measuring from 10-12 by 4 to 5 microns. The Ripe Rot is noteworthy since it not only renders fruit unsightly and unmarketable, but is a trouble that will spread from " finger" to " finger" in a bunch after this has been gathered. N. A. Cobb has also pointed out that it may often extend to the fruit-stalks and even to the main stem of the bunch, and, moreover, occurs on immature bananas. In describing one of these bunches of bananas that had in consequence failed to set and ripen, he adds:—" As soon as the fruits reached a length of about two inches, and sometimes earlier, they began to change colour and to shrivel, passing through greenish-yellow, yellow-brown, or French gray to almost black. At the brown stage the colour became pruinose, and the final blackening was accompanied by a pinkish eruption of Glœosporium spores. The spores occurred on all parts of the fruit. They were most abundant on the basal half, being particularly abundant at the very base of the stem. . . . Later the fungus fruited freely on the main stem of the bunch."

This malady was originally described as occurring in ripe bananas at Brisbane, and afterwards met with in the United States (*G. Massee*).

Usually, as the name *musarum* (*Lat.*, of the banana) implies, the fungus occasioning it was considered to be restricted to a single plant-host, but Dr. Cobb has shown that it is a very general feeder, being even partial to the apple.*

In coping with the presence of Ripe Rot it is recommended that in packing the fruit care be taken to exclude " fingers" that are disfigured by being marked with " black patches," since not only will these decay themselves, but will serve to infect sound fruit that may be associated with them; the spores becoming readily detached, promptly sprouting under damp conditions, and sending, too, their germ tubes into the injured or ripe surface tissue.

FRUIT—INTERIOR BROWNING (*vid.* No. 2 Root Disease, page 118).

FRUIT—TISSUE-HARDENING (*vid.* No. 1 Root Disease, page 116).

### PLANT STERILITY.

Banana plants occasionally grow without, however, producing fruit. This sterility on their part appears to arise in these cases principally from unsuitable soil conditions—especially deficiency in nutrients.

During hot dry weather, when transpiration is excessive and the root system under the soil-conditions obtaining is not equal to maintaining it, the lower leaves may fall downwards from the stem, the elder ones even dying. This state of things is, however, rarely realised.

## INJURIOUS INSECTS.

### INSECTS DAMAGING THE STOOLS.

*Beetle Borers. Sphenophorus spp.* [*Fam. Curculionidæ.*]

1. *Sphenophorus obscurus.*—This insect is a large Weevil, having in some respects the appearance of an immense Grain Weevil, it measuring about half an inch in length. In its young state it is a white, footless,

* Cobb (N.A.)—Letters on the Diseases of Plants." (Second Series.) Misc. Pub., No. 66, Dept. of Agr., N.S.W., p. 12, Fig. 45 (1904).

singularly stout-bodied grub. It may occur in all stages of development in the Banana stool, boring the base of the stem through and through, whilst it is also wont to tunnel in the central shoot. It also attacks the sugar-cane plant, to which it is very partial, and not only this but several members of the palm tribe. In Queensland it is met with in some of our northern plantations, but, so far, attacks the sugar-cane only; but, as indicated, it is by no means so restricted in its dietary elsewhere—*i.e.*, in Papua, and the Sandwich, Solomon, Society Islands, and other places where it occurs.

2. *Sphenophorus sp.*—The insect here referred to generally resembles the preceding (but, unlike it, is uniformly coloured.) Moreover, the habi s of the two are much the same, especially so far as relates to their relations with the Banana plant. However, the one under notice restricts, as far as is known, its attentions to the latter. It was received, as a banana-destroying insect from the coastal area of Mackay in 1896, and was still to be met with there in later years. The suckers of the plant under consideration may, as the writer has observed, succumb to its attacks.*

The detection of these injurious insects in Banana plants, if not numerous, is often a matter of extreme difficulty; and, as they breed rapidly, and are capable of considerable damage, it is incumbent on banana-growers to look carefully for their presence, wherever sick or dying plants occur, and so endeavour to detect them early; whilst, at the same time, they should adopt the only effectual method of destroying them—*i.e.*, the eradication and burning of the plants in connection with which they occur. M. Mazo, writing of the St. Thomas Banana *Sphenophorus*, recommends disinfecting the roots and the lower parts of the stems of affected plants with petroleum (kerosene), and painting with whitewash to a height of 40 cm. from the soil. It does not appear that this course—if indeed practicable—would be adequate to cope with these injurious insects generally.

## INSECTS DAMAGING THE FOLIAGE.

BANANA APHIS.—Occasionally, in Southern Queensland, Banana plants harbour *Aphides* in large numbers, and in the Cairns district we have met them on the plants under consideration also. They—when prevalent—congregate in immense hordes on the surfaces of the young leaves before these have fully unfolded. In addition to the Queensland occurrence, mention may be made to the record of *Aphides* being found in Fiji on Banana also. (Agricultural Gazette, New South Wales, II., p. 623). However, we have not found that any material injury is occasioned by their presence. Dusting the shoots with Tobacco Dust appears to be adequate for securing their destruction.

---

* This Mackay insect is identical with one that has been found damaging Banana plants, received here from Jamaica on two occasions, as well as with others, found in them, on their arrival from the Straits Settlements. The Banana-loving *Sphenophorus* of the West Indies is usually named *Sphenophorus sericeus*, and that of the Straits Settlements *S. sordidus*; but it is doubtful whether the one under notice—identical with individuals from both these sources—belongs to either. The last-mentioned—*i.e.*, *S. sordidus*—has on its part been received in Banana plants from Fiji; and what appears to be still another representative of the genus has been found at large in Brisbane, having doubtless also been imported from without. Other specifically determined kinds of *Sphenophorus*, affecting the Banana, are *S. lyratus*, Coquerel, from Martinique; *S. striatus*, Fahræus, from the Gulf of Guinea and from Madeira; and *S. musæcola*, Fairmaire, from Madagascar; whilst what apparently are two other kinds occur respectively in Papua and Brazil.

GRASSHOPPER (*Cyrtacanthacris sp.*)—Occasionally Bananas growing in Southern Queensland have the leaf blades eaten right back to their midribs by a large and voracious member of the grasshopper tribe—Acrididæ. This is, however, too unusual an occurrence to call for further remark on this occasion.

### INSECTS DAMAGING THE FRUIT.

FRUIT-GNAWING CATERPILLARS.—In the Northern coastal districts the green fruit is injured by caterpillars of two distinct kinds, neither of which, so far, has been identified.

(*a*) A larger insect that gnaws through the skin of the fruit, and erodes the flesh beneath;

(*b*) A smalled insect that removes only the epidermis, in meandering tracks that unusually ultimately coalesce, so that large patches—almost the entire surface at times—is eroded. This injury—in its general features—recalls the appearance of some fungus attack, especially as it is generally repaired by cork-tissue that causes the damaged area to be actually raised above the surrounding surface, and this becomes soon dead and discoloured, and, at times, supports a growth of some saprophytic fungus. The brown marking, being in strong contrast to the general bright green of the uninjured surface, is quite conspicuous. Usually the caterpillars implicated in this work reside in the more or less obscure interspaces between the " fingers " of the several " hands " of the fruit bunch.

FRUIT PUNCTURING INSECTS.—These comprise insects belonging to three different families:—(1) Plant Bugs (*Hemiptera*); (2) Moths *Lepidoptera*); and (3) Flies (*Diptera*).

1. PLANT BUG.—An undetermined insect of this class was received a few years since from plantations near the Johnstone River district. It was reported, concerning it, that it punctured the fruit freely, so that it became brown speckled in consequence of its attacks. Apparently it is not very prevalent, even where it was met with, or constant in its attacks.

2. SUCKING MOTHS (*Ophiderinæ*).—Ripe Banana fruit offers an especial attraction for moths, and especially does this apply to members of the Noctuid family. The present insects are, however, exceptional, insomuch as they are endowed with a peculiarly terminally-armed proboscis that enables them to probe sound and relatively dense tissue. As, however, they seldom injure the fruit in this manner before it is ripe, and it is not usual to leave it upon the plant till this process is taking place, the damage resulting from the attacks of these insects that would otherwise be very great is but little experienced. The nature of this article does not require that the subject of these insects and their habits be fully entered into in it. This is a topic, moreover, that the writer has fully dealt with elsewhere.*

---

* Tryon (H): Orange-piercing Moths. Fam. *Ophiderinæ*. *Queensland Agricultural Journal*, Vol. II., Pt. 4, April, 1898. Separate pp. 1-8. Pl. XVIII-XXIIA. [illegible]

(*To be continued.*)

# General Notes.

## BANDICOOTS.

BY AN OLD COLONIST.

In continuing my remarks I would like to mention that I noted the bandys were very numerous at one corner of a large block of 1st ratoons, and immediately after the cane was cut and the trash burned off I noticed that the bandys made a large number of fresh holes every night. I used the scarifier between the rows of young cane at this spot, and with the implement mentioned filled in hundreds of "little diggings," but still the hole-sinking went on.

Now, any observant person would at once form the idea, on seeing those holes, that they were dug either for pleasure or "grub"; and I took it that the latter was the object, because there was absolutely nothing there to dig for, there being nothing but red soil and the young cane on the whole block, with the exception of the grubs under the roots, and, as I before pointed out, neither the cane nor the roots of it (with perhaps a little displacement of the latter) were in any way interfered with. Further, at one particular spot in another block, where the cane had been attacked by grubs, the bandicoots had been very industrious indeed, and I believe, if they were sufficiently numerous, all the grubs would have been eaten and none of the plants destroyed. I saw several bandicoots on that farm, and they all appeared to be plump and in good condition. I have heard that bandicoots, if caught and killed when young and properly cooked, are very nice to eat—superior to young rabbit, in fact. [That is so. Ed.]

I remember the cook in a camp belonging to a party of which I was a member stewed one, and I tasted it, but I cannot say that the flavour of it "took my fancy"; and that reminds me that, although I have in my boyhood been in the blacks' camps at their feeding time, I never saw any of them tackling bandy. I have seen them devouring plenty of other bush animals, in addition to reptiles and fish, but never a "coot." Of course, they may have feasted on them, but not when I was present. Kangaroo rats were the chief delicacy of the blackfellows, and I'll admit that I have a very great respect indeed for a well-cooked kangaroo rat. Now, please allow me to digress for a moment. Why was that animal ever dubbed "kangaroo rat"? It is a silly misnomer; the creature has nothing whatever in common with, and, being marsupial, in no way resembles, a "rat" in the slightest degree. It feeds on the choicest grass, and has a particular weakness for maize and sweet potatoes, is easily domesticated, and will then speedily fatten on a diet of milk, corn, porridge, bread, or wheat, and become very tame. When nicely stewed, the aroma and flavour are very appetising and enticing, and I am quite sure if their good qualities were more generally known they would speedily create a very large demand, especially if a few were exported and an experienced chef prepared them for the table, but not whilst their designation is "rat"! Why not coin a new name for them and let their good qualities become widely known? What is wrong with the term "kangaret"? I have no hesitation in saying that I believe they would, under the circumstances I have indicated, create a new industry. In conclusion, I would like to say that if, after experiment, it can be clearly demonstrated that the bandicoots live on the cane grubs (and I believe it can), then I reckon the way is pretty clear to cane-growers to get rid of the grub pest. The animal is small, and nocturnal in its habits, and, if they become too numerous, can easily be held in check, as they live above ground, not under it, as the rabbit, &c. I need scarcely mention that it is far better to deal with the grub pest by means of the bandys than by the introduction of *any* form of parasite, which later on may become a worse menace than the grubs; and I think that if this article, per medium of your widely circulated and highly esteemed journal, is the means of effectively pointing out the way to deal with a pest that causes large annual losses to cane-growers, and of introducing a really palatable animal of a little known variety to our epicures and connoisseurs, who are always on the lookout for something new and good, then the object in writing the above will be attained, and the beneft to all will be very considerable indeed.

[The term "kangaroo rat" was, we believe, given owing to the smallness of the breed, just the same as there is said to be a still more diminutive marsupial called locally the kangaroo mouse.—Ed. "Q.A.J."]

## AN EFFECTIVE STUMPING MACHINE.

Much interest was shown by farmers and others in a simple gear for extracting stumps, devised by Mr. W. E. Thomas, of Diddilibah, which we illustrated and briefly described in our issue of 1st January, 1903. At that time we had seen the device at work at Petrie's Creek, Maroochy, and noted its simplicity and the ease with which two large green stumps were extracted at once. Since then, Mr. Thomas has improved the machine, and has forwarded us the plan here reproduced. The price of the machine was originally from £10 to £12. Mr. Thomas has not mentioned any price for the improved gear, but probably there will be no considerable increase. A few details are needed in describing the construction of the machine and the application of the power.

The framework is made of silky oak, or of any similar light, tough woods; and the windlass barrel and lever of nut-wood, usually known as crow's ash. A ⅝-in. wire rope is sufficient for winding on the barrel, and a 1-in. for the leading rope. A strong block may be cheaply made from a piece of old 6-in. by ½-in. iron wagon-tyre, doubled back and welded. Two holes are drilled in it—one for the pin of the sheave, the other for the shackle. If care is used in doubling back the iron, these holes may be punched out before welding. To make double or treble blocks, it is only necessary to make them wider, and to insert thin sheet-iron plates between the sheaves. The same kind of block is

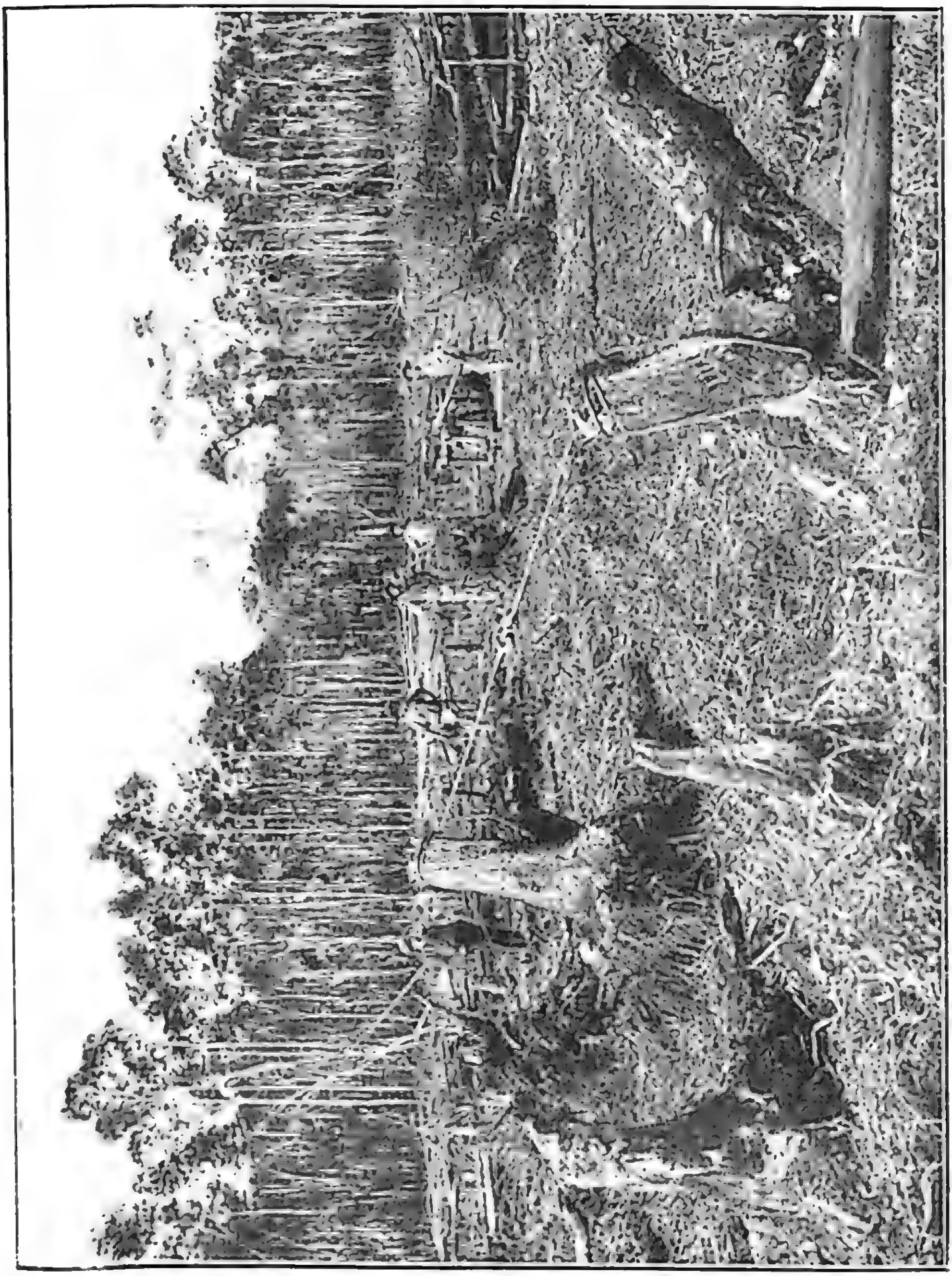
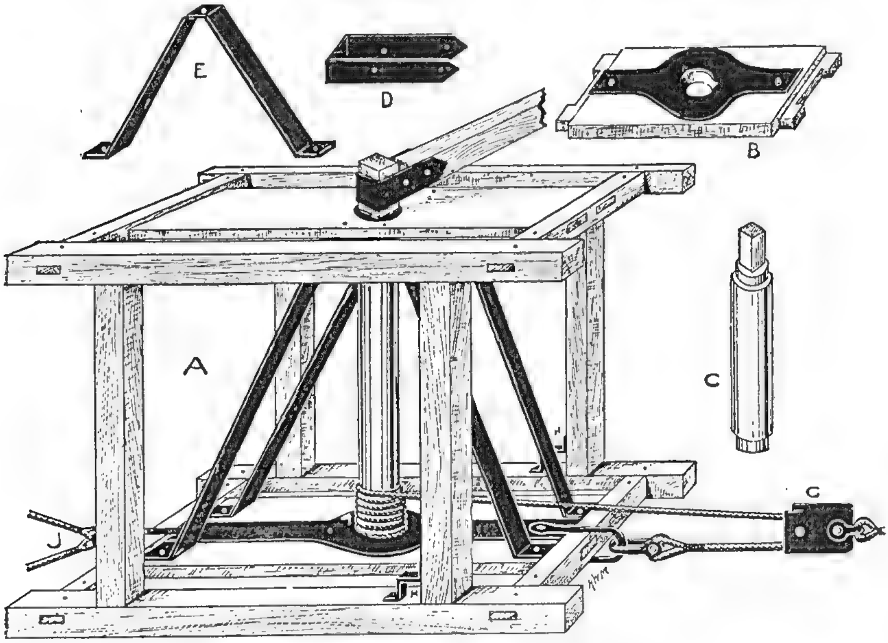


PLATE 61.—THOMAS' STUMPING MACHINE AT WORK.

used for a snatch or leading-block when pulling stumps near the machine, or, when tree-pulling, to keep the falling tree away from the machine, as it was found that to get a snatch-block strong enough to stand the strain it has to be very heavy and too cumbersome for convenience of handling. The sheaves must be very solid to stand the heavy strain. The anchor sling is kept as low on the anchor stump as possible, to prevent canting; and it will be found that if a piece of 3-in. by 3-in. hardwood, or a sapling, be run through brackets, called a balancer, and allowed to project 3 or 4 ft. on either side of the machine, it will greatly help in this respect. The eyes for the wire rope require to be very heavy, and have a side measurement of 6 in. by 4 in., with 1½ in. of tread. Much greater power may be developed by using a single or double block or a double and treble block, instead of bolting to the shackle and using single blocks as shown in the plan. Only one man is needed to work the windlass.




DETAIL OF THOMAS' STUMPING MACHINE.

REFERENCE TO DIAGRAM.

Scale, 2 in. to 1 ft.

Parts, 1 in. to 1 ft.

Ironwork and wire rope, coloured black.

A, complete machine; B, bottom slab, top side showing straight plate of 4-in. by ½-in. iron; hole in plate, 5½ in. in diameter; C, barrel or roller.

D, lever iron; E, diagonal stay.

G, side view of single block; H, I, balancer brackets.

J, anchor stump slings.

The framework is strengthened by ¼-in. bolts at the junction of the timbers.

# Answers to Correspondents.

## A HOME-MADE WATERPROOF COAT.

NEW CHUM HOUSEWIFE, CAIRNS.

Yes; it is quite possible for you to make a waterproof coat yourself. Here are two simple recipes, which are given by "The Farmer and Settler" (a Sydney paper) :—

A really strong mackintosh that will stand any amount of hard wear and remain waterproof to the last is quite expensive to buy, and a reliable method of making one for herself is sure to be a welcome suggestion to any woman whose purse is slender.

First, buy some strong unbleached calico at about 7d. a yard, and get a good pattern of a loose rainproof coat, which can easily be obtained —publications devoted to matters of feminine interest giving patterns. The pattern should be carefully studied before setting to work, as the discouraging experience of many an amateur dressmaker is but the result of lack of attention in this respect. Do not stint the stuff, as it is better to have such a coat too loose than too tight.

When completed, dampen it thoroughly and roll up for a few hours. Now take 2 lb. of white lead paint ready mixed (at about 4d. per lb.), and to thin it down to the right consistency add to it a pint of raw linseed oil (6d. per pint). The mixture should be liquid, but do not, however, make it as weak as water. Apply one coating, and lay out the coat on a flat surface for about an hour, then hang it up to finish drying.

Repeat the process three or four times, allowing each coating of paint to dry thoroughly before adding another. After this treatment, the coat should be soft, pliable, as well as rainproof, and as durable as if it bore the label of a good house of waterproof makers.

Perfect waterproof can also be obtained by soaking any woollen material for 24 hours in a liquid prepared by adding 1 gallon of cold water to ½ lb. each of sugar of lead and alum. Stir in the alum and sugar of lead, and allow to stand, stirring occasionally all day. Then pour off into a clean pail or tub, and into this put the garment. At the end of the 24 hours do not wring, but merely hang up in the shade and allow to drip dry. The process does not in any way stiffen the material. The quantity given would be sufficient to waterproof a skirt. For a mackintosh it would be well to double the amount, as there should be sufficient liquid to entirely cover the stuff.

Riding habits thus made rainproof, at the cost of a few pence, are invaluable in the country.

## STUMPING MACHINE—WALLABY TRAP.

NEW CHUM, Taringa.

(1) You would find it cheaper to purchase one of the Forest Devils now on the market than to manufacture one for yourself. See Trewhella Bros.' advertisement in this journal. A few years ago an effective machine was invented by Mr. W. E. Thomas, of Diddilibah. You will find particulars of this machine in another part of this issue.

(2) The simplest Wallaby Trap consists of a yard of any size which may suit the selector. In one side of the close-paling fence there are two openings about a couple of feet wide. These openings are fenced on each side, and run diagonally for a distance of about 6 yards into the yard, where they terminate in a narrow opening sufficient to allow a wallaby to pass into the yard, but not large enough for him to return, even if he could find the opening by which he entered. This plan is worth trying. Perhaps some of our readers could suggest a better means of trapping the wallaby.

## GRASS-TREE GUM.

SUBSCRIBER, Proserpine—

In reply to your request for information concerning grass-tree gum, firms who purchase it, and market price, we fear we cannot give you any encouragement to undertake its collection. About the year 1884 there was a move made by some people to collect the gum in the neighbourhood of Brisbane (Nundah), where the grass tree abounded; but the collectors never obtained more than a few ounces per day, and the business was abandoned. Later, it was stated that a very large area of grass-tree land, near Beerburrum, Blackall Range, had been leased to a Southern syndicate for the purpose of gum-collecting. Nothing was done in the matter. The cost of collection has always been found greater than the return to the collector. It has never proved a paying industry in Queensland. Some parcels were shipped to Europe from Western Australia for several years. Had this business been remunerative, we should have heard more about it, as the industry would have grown. The price of grass-tree gum in the Southern States ranges from £12 to £15 per ton. There is a good demand for it in Sydney. If samples are sent, each sample should be at least 2 lb. in weight. The gum is sold to the trade when procurable in bags containing 28 lb. or 56 lb. each.

We believe that Messrs. H. H. Groth and Co., 329 George street, Sydney, and Mr. J. Stevens, 17 Castlereagh street, Sydney, are (or were) buyers; and we would advise you to communicate with them.

# The Markets.

## PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR MARCH, 1912.

| Article. | | MARCH. Prices. |
|---|---|---|
| Bacon, Pineapple | lb. | $8\frac{1}{2}$d. to 10d. |
| Bran | ton | £6 |
| Butter | lb. | 1s. 2d. |
| Chaff, Mixed | ton | £5 to £6 10s. |
| Chaff, Oaten (Victorian) | " | £5 to £6 10s. |
| Chaff, Lucerne | " | £4 5s. to £6 |
| Cheese | lb. | 6d. to 9d. |
| Flour | ton | £9 10s. |
| Hay, Oaten (Victorian) | " | £7 10s. |
| Hay, Lucerne | " | £3 15s. to £5 10s. |
| Honey | lb. | $1\frac{1}{4}$d. to $2\frac{1}{2}$d. |
| Maize | bush. | 5s. to 5s. 1d. |
| Oats | " | 4s. 3d. |
| Pollard | ton | £6 to £7 |
| Potatoes | " | £10 to £13 |
| Potatoes, Sweet | cwt. | 5s. 9d. to 6s. 6d. |
| Pumpkins | ton | £5 10s. to £7 |
| Wheat, Milling | bush. | 4s. 9d. |
| Wheat, Seed | " | 5s. 3d. |
| Onions | ton | £13 |
| Hams | lb. | 1s. $1\frac{1}{2}$d. |
| Eggs | doz. | 1s. 5d. to 1s. 7d. |
| Fowls | pair | 2s. to 3s. |
| Geese | " | 5s. to 5s. 6d. |
| Ducks, English | " | 3s. |
| Ducks, Muscovy | " | 3s to 4s. |
| Turkeys (Hens) | " | 7s. to 8s. 6d. |
| Turkeys (Gobblers) | " | 10s. to 18s. |

## SOUTHERN FRUIT MARKETS.

| | |
|---|---|
| Apples (Choice), per case | 9s. to 13s. |
| Apples (Cooking), per case | 5s. to 5s. 6d. |
| Bananas (Queensland), per bunch | 4s. 6d. to 5s. |
| Bananas (Queensland) per case | 10s to 10s. 6d. |
| Bananas (Fiji), G.M., per bunch | 5s. to 10s. |
| Bananas (Fiji), G.M., per case | 14s. 6d. to 17s. |
| Cocoanuts, per dozen | 2s. 6d. to 3s. 6d. |
| Grapes, per box | 3s. to 6s. |
| Lemons (Italian), per packer | 17s. |
| Lemons (local), per gin case | 11s. |
| Mandarins (local Emperors), per case | 8s. to 12s. |
| Oranges (local), per gin case | 3s. to 8s. |
| Passion Fruit (local), per gin case | 3s. to 7s. 6d. |
| Peaches, per half-case | 5s. to 10s. |
| Peanuts, per lb. | $5\frac{1}{2}$d. |
| Pears, per gin case | 6s. to 12s. |
| Persimmons, per half-case | 2s. to 3s. 6d. |
| Pineapples (Queensland), common, per case | 6s. to 7s. |
| Pineapples (Queensland), Ripley's, per case | 6s. to 7s. |
| Pineapples (Queensland), Queen's, per case | 5s. to 6s. |
| Plums, per half-case | 3s. 6d. to 5s. 6d. |
| Quinces, per gin case | 4s. to 5s. |
| Rockmelons, per gin case | 3s. to 3s. 6d. |
| Tomatoes, per half-bushel case | 2s. 6d. to 3s. 6d. |
| Watermelons, per dozen | 4s. to 8s. |

## PRICES OF FRUIT—TURBOT-STREET MARKETS.

| Article. | MARCH. Prices. |
|---|---|
| Apples (Eating), per case | 5s. to 12s. |
| Apples (Cooking), per case | 6s. to 7s. |
| Apricots, per case | ... |
| Bananas (Cavendish), per dozen | 3d. to 3½d. |
| Bananas (Sugar), per dozen | 2d. to 3d. |
| Cape Gooseberries, per case | ... |
| Cherries, per quarter-case | ... |
| Citrons, per cwt. | ... |
| Custard Apples, per quarter-case | ... |
| Grapes, per lb. | 4d. to 8d. |
| Lemons (Italian), per case | 20s. to 25s. |
| Lemons (local), per case | 8s. to 10s. |
| Mandarins, per case | ... |
| Mangoes, per case | 2s. to 3s. 9d. |
| Nectarines, per quarter-case | ... |
| Oranges (Navel), per case | ... |
| Oranges (Other), per case | ... |
| Papaw Apples, per quarter-case | 3s 6d. to 6s. |
| Passion Fruit, per quarter-case | 2s. 6d. to 3s. 6d. |
| Peaches, per quarter-case | 4s. 6d. to 6s. |
| Peanuts, per lb. | 3½d. |
| Pears, per case | 9s. to 14s. |
| Persimmons, per quarter-case | 2s. to 3s. |
| Plums, per quarter-case | 3s. to 4s. 6d. |
| Pineapples (Ripley), per dozen | 3s. to 4s. |
| Pineapples (Rough), per dozen | 1s. to 2s. 6d. |
| Pineapples (Smooth), per dozen | 2s. 6d. to 4s. |
| Quinces, per case | 4s. 6d. to 6s. |
| Rockmelons, per dozen | ... |
| Strawberries, per dozen boxes | ... |
| Tomatoes, per quarter-case | 2s. to 3s. 6d. |

## TOP PRICES, ENOGGERA YARDS, FEBRUARY, 1912.

| Animal. | FEBRUARY. Prices. |
|---|---|
| Bullocks | £9 to £10 17s. 6d. |
| Cows | £5 10s. to £7 17s. 6d. |
| Merino Wethers | 20s. 6d. |
| Crossbred Wethers | 21s. |
| Merino Ewes | 16s. |
| Crossbred Ewes | 20s. 3d. |
| Shropshire Ewes | 21s. 3d. |
| Lambs | 16s. 6d. |
| Pigs (Baconers) | ... |
| Pigs (Porkers) | ... |

# Orchard Notes for May.

## THE SOUTHERN COAST DISTRICTS.

The advice given respecting the handling and marketing of citrus fruits in the last two numbers of this journal applies with equal force to this and the following months. Do not think that you can give the fruit too much care and attention; it is not possible, as the better they are handled, graded, and packed the better they will carry, and the better the price they will realise.

Continue to pay careful attention to specking, and fight the blue mould fungus everywhere. Don't let mouldy fruit lie about on the ground, hang on the trees, or be left in the packing-shed, but destroy it by burning. Keep a careful lookout for fruit fly, and sweat the fruit carefully before packing. If this is done, there will be little fear of the fruit going bad in transit or being condemned on its arrival at Southern markets. Where the orchard has not been already cleaned up, do so now, and get it in good order for winter. Surface working is all that is required, just sufficient to keep moisture in the soil; keep down undergrowth, and prevent the packing of the surface soil by trampling it down when gathering the fruit.

Keeping the orchard clean in this manner enables any fallen fruit to be easily seen and gathered, and it need hardly be stated, what has been mentioned many times before, that diseased fruit should on no account be allowed to lie about and rot on the ground, as this is one of the most frequent causes of the spreading of many fruit pests.

May is a good month to plant citrus trees, as if the ground is in good order they get established before the winter, and are ready to make a vigorous growth in spring.

Don't plant the trees, however, till the land is ready, as nothing is gained thereby, but very frequently the trees are seriously injured, as they only make a poor start, become stunted in their growth, and are soon overtaken by trees planted later, that are set out under more favourable conditions. The land must be thoroughly sweet, and in a good state of tilth—that is to say, deeply worked, and worked down fine. If this has been done, it will probably be moist enough for planting; but should there have been a dry spell, then when the hole has been dug and the tree set therein, and the roots just covered with fine top soil, 4 to 8 gallons of water should be given to each tree, allowed to soak in, and then covered with dry soil to fill up the hole. In sound, free sandy loams that are naturally scrub, holes may be dug and the trees planted before the whole of the ground is brought into a state of perfect tilth. It is, however, better to do the work prior to planting, as it can then be done in the most thorough manner; but if this is not found possible, then the sooner it is done after planting the better. If the land has been thoroughly prepared, there is no necessity to dig big holes, and in no case should the holes be dug deeper than the surrounding ground either is or is to be worked. The hole need only be big enough to allow the roots to be well spread out, and deep enough to set the tree at the same depth at which it stood when in the nursery. Plant worked trees 24 to 25 ft. apart each way, and seedlings at least 30 ft. apart each way.

Towards the end of the month cover pineapples when there is any danger of frost; dry blady grass or bush hay is the best covering. Keep the pines clean and well worked—first, to retain moisture; and, secondly, to prevent injury from frost—as a patch of weedy pines will get badly frosted when a clean patch alongside will escape without any serious injury.

Slowly acting manures—such as meatworks manure when coarse, boiling-down refuse, farm manure, or composts—may be applied during the month, as they will become slowly available for the trees' use when the spring growth takes place; but quickly-acting manures should not be applied now.

## THE TROPICAL COAST DISTRICTS.

May is a somewhat slack month for fruit—pines, papaws, and granadillas are not in full fruit, the autumn crop of citrus fruit is over, and the spring crop only half-grown. Watch the young citrus fruit for Maori, and when it makes its appearance spray with the sulphide of soda wash. Keep the orchard clean, as from now till the early summer there will not be much rain, and if the orchard is allowed to run wild—viz., unworked and dirty—it is very apt to dry out, and both the trees and fruit will suffer in consequence.

Bananas should be kept well worked for this reason, and, though the fly should be slackening off, every care must still be taken to prevent any infested fruit being sent to the Southern markets.

Citrus fruits can be planted during the month, the remarks *re* this under the heading of the Southern Coast Districts being equally applicable here.

## THE SOUTHERN AND CENTRAL TABLELANDS.

Get land ready for the planting of new deciduous orchards, as, although there is no necessity to plant so early, it is always well to have the land in order, so as to be ready to plant at any time that the weather is suitable. The pruning of deciduous trees can commence towards the end of the month in the Stanthorpe district, and be continued during June and July. It is too early for pruning elsewhere, and too early for grapes, as a general rule. Keep the orchard clean, particularly in the drier parts. In the Stanthorpe district grow a crop of blue or grey field peas or a crop of vetches between the trees in the older orchards as a green manure. The crop to be grown as a green manure should have the soil well prepared before planting, and should be manured with not less than 4 cwt. of phosphatic manure, such as Thomas phosphate or fine bonedust, per acre; the crop to be ploughed in when in the flowering stage. The granitic soils are naturally deficient in organic matter and nitrogen as well as phosphoric acid, and this ploughing in of a green crop that has been manured with a phosphatic manure will have a marked effect on the soil.

Lemons will be ready for gathering in the Roma, Barcaldine, and other districts. They should be cut from the trees, sweated, and cured down, when they will keep for months and be equal in quality to the imported Italian or Californian fruit. If allowed to remain on the trees, the fruit becomes over-large and coarse, and is only of value for peel. Only the finest fruit should be cured; the larger fruit, where the skin is thicker, is even better for peel, especially if the skin is bright and free from blemish; scaly fruit—scabby, warty, or otherwise unsightly fruit—is not suitable for peel, and trees producing such require cleaning or working over with a better variety, possibly both.

The remarks *re* other citrus fruit and the work of the orchard generally, made when dealing with the Coast Districts, apply equally well here, especially as regards handling the crop and keeping down pests.

# Farm and Garden Notes for May.

FIELD.—During this month the principal work in the field will be the sowing of wheat, barley, oats, rye, and vetches. There is no time to lose now in this work. Potatoes should be hilled up. Cut tobacco. The last of the cotton crop should now be picked, the bushes being stripped daily after the dew has evaporated. Growers are notified that Messrs. Kitchen and Sons, in the Valley, Brisbane, and Messrs. Joyce Brothers, of Ipswich, are buyers of seed cotton, so that a sure means of disposing of the crop is available. Every effort should be made to ensure feed for stock during the winter, by utilising all kinds of green fodder, in the form of ensilage or hay. Those who own dairy stock will be wise to lay down permanent grasses suitable to the climate and to their particular district and soil. A few acres of artificial grass will support a surprisingly large number of cattle or sheep in proportion to acreage. Couch grass in the West, as has been proved at Barcaldine, will carry 10 or 12 sheep to the acre. Coffee-picking should now be in full swing, and the berries pulped as they are picked. Strawberries may be transplanted. The best varieties are Pink's Prolific, Aurie, Marguerite, Hautbois, and Trollope's Victoria. The Aurie is the earliest, and the Marguerite next. In some localities strawberry planting is finished in March, and the plants bear their first fruits in August. In others, fruit may be gathered in July, and the picking does not end until January.

KITCHEN GARDEN.—Onions which have been planted in seed beds may now be transplanted. The ground should have been thoroughly cleaned, pulverised, and rolled previous to transplanting. Onions may still be sown in the open on clean ground. In favourable weather plant out cabbages, cauliflowers, lettuce, leeks, beetroot, endive, &c. Sowings may also be made of all these, as well as of peas, broad beans, kohl-rabi, radishes, spinach, turnips, parsnips, and carrots. Dig and prepare beds for asparagus.

FLOWER GARDEN.—Transplanting and planting may be carried out simultaneously during this month in showery weather; the plants will thus be fully established before the early frosts set in. Camellias and gardenias may be safely transplanted, also such soft-wooded plants as verbenas, petunias, penstemons, &c. Cut back and prune all trees and shrubs ready for digging. Dahlia roots should be taken up and placed in a shady situation out of doors. Plant bulbs, such as anemones, ranunculus, snowflakes, freesias, ixias, iris, narcissus, &c. Tulips and hyacinths may be tried, but success in this climate is very doubtful. All shades and screens may now be removed to enable the plants to get the full benefit of the air. Fork in the mulching, and keep the walks free from weeds. Clip hedges and edgings.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXVIII. MAY, 1912. PART 5.

## THE ELEMENTS OF SHEEP-CLASSING FOR BEGINNERS—No. 2.

BY W. G. BROWN, State Sheep and Wool Expert.

[CONTINUED FROM MARCH NUMBER.]

### THE SHEARING SHED.

To the small owner as well as to the large proprietor, one of the most important events of the year is the shearing. It is as important to him as is the harvest to the agriculturist, for it is the sum of all his work and care for the past twelve months, so that ignorance or mismanagement may result in serious loss.

It is the object of this article to give, in as clear and simple a manner as possible, the essentials of shearing-shed management, which includes the get-up of a small clip—say that of 4,000 merino sheep of mixed sexes and ages.

I am a strong advocate of the small owner having a shearing plant of his own, or, in the alternative, a share, as one of a group of fellow-selectors, in such.

There is no need to particularise the advantages of machine-shearing over hand-shearing, for hand-shearers good, bad, and indifferent are nearly extinct. The advantage to the selector in having easy access to machinery lies in the fact that the best preventive to the ravages of the maggot fly is crutching by machinery.

A four-stand plant, with oil engine, head plank, and all appurtenances complete, costs approximately £100 f.o.b. Brisbane; and the various makers of that class of machinery send experts to any holding to erect and teach the running of machinery at actual cost of his wages and expenses. Over hand-shearing, too, there is an estimated balance in favour of machines of 6d. per sheep in returns. Crutching by hand involves recrutching six weeks or so later, during the fly season, which may be said to extend from May to August, while the closer-cut of machines sees the winter well through. It is, therefore, necessary that an owner crutch his sheep by machinery, and, if he have his own plant, it can be done at a minimum of cost. One man can crutch 400 sheep per day, and there is no mystery to a man with common sense in running the plant himself after a little instruction from a qualified expert.

Assuming, then, that the owner possesses his own plant and is able to run it himself, What are the essentials to successful shed management?

Taking the processes in due order, they consist of—penning up, shearing, picking up, woolrolling, woolclassing, and pressing.

*Penning Up.*—The duty of the penner-up in a small shed is so light that for three parts of his time he should be available for any other work in the shed. He should see that there is no undue delay in filling the catching-pens, and that the sheep are not injured or smothered in the pens.

*Shearing.*—With the Arbitration Court award before him, the owner will have very few contentious matters to deal with. If he be fortunate enough to have four good men, supervision will be very pleasant work. On the other hand, if he have even one "snagger" (*i.e.*, duffer), his pocket and temper will suffer. For that reason it would be wise for him to arrange his shearing time for the early or the late months of the year. From July to October most of the big sheds are in full swing, and there are greater inducements for fast, good men to go there than to shear a small cut of, say, 1,000 per man. In that connection it is well to remember, provided the sheep be strong, that Queensland can shear at any time in the year without loss of stock from the cold. The big losses through inclemency of weather generally occur in the months of October and November. A good, fast man has learned—and he is fast because he *has* learned—that the shortest way round a sheep is "on the skin"; that going back for a second cut is waste of time; therefore he gets all the wool first time. Holding a sheep easily and comfortably prevents the animal from kicking, and so prevents delay; and he has learned to know the tool with which he earns his living. In consequence he is rarely seen near the expert, but is shearing away merrily, while the average man is waiting for repairs. The average man only knows whether his machine is going well or ill, or at least very little more, while the "snagger" is always in trouble. These last do not know their tools of trade.

The owner will know that he is getting good shearing when he sees that there are comparatively few "second cuts" in the fleeces; that there are no loose trimmings on legs or head; no dead or injured sheep in the counting-pens; and no knees jammed into the flanks of the sheep on the "long blow."

A good shearer rarely cuts a sheep. It is generally by accident if he do so. A serious cut should be sewn at once, and a proper antiseptic applied to all cuts. It is the picker-up's duty to see that such is placed in a handy tin on the board ready for accidents, and to apply it. A good shearer is a joy; a bad one should be prosecuted for obtaining money under false pretences.

*Picking Up.*—It is the duty of the picker-up to take the belly wool—which is removed first by the shearer—pick the stained part from it in the case of wethers being shorn, and place it in the appointed receptacle. When the shearer has finished his sheep and "lets go," the picker-up should put the fleece aside on a clean place, for a moment, and sweep back the locks so that the next sheep may be shorn on a clean board. It is imperative that the "board" be kept clear of locks, otherwise the fleece wool will become full of locks and fribs, necessitating extra work by the woolrollers in picking them out, or else dirty fleeces going into the bins. One source of loss in price is when the valuer sees "fribby" fleeces. When the floor is swept clean, the picker-up takes the fleece and throws it on the wool table with the breech at the end nearest him, and the neck away from him. Good picking up is a big factor in good woolrolling. A clean "board" is imperative in a well-managed shed. A good picker-up is usually the hardest worked rouseabout in a shed.

*Woolrolling.*—Four good shearers will shear an average of 400 to 600 sheep according to sex. Two men at the woolrolling tables are necessary to handle that number of fleeces. The table should be 4 ft. wide and not less than 10 ft. long. This is somewhat longer than is usual in most woolrooms.

The ordinary method of dealing with the pieces is as follows:—The fleece is thrown out by the picker-up, and the woolrollers immediately skirt off the pieces, throwing them on the floor with all their excellences and imperfections. A man with a broom sweeps them over to a piece-picking table, where the now thoroughly mixed wool is unmixed or sorted. This kind of piece-picking requires skilled men; it is really a woolsorter's job. If they be unskilled, the result is bad work, and consequent loss in value. If skilful, yet slow, there is very soon an accumulation of back work, and more expensive labour is required to keep pace with the shearers. Mostly the work is slummed.

The method I have advocated, and used successfully for the past twenty years does away with the mixing process. It is as follows:—When the picker-up throws out his fleece, the woolrollers take off—first the stained pieces; then the points and edges of flanks (*alias* 1st pieces), and finally the broken fleece. As they are taken off, each sort is thrown into a basket or other place, and the fleece is then shaken to dislodge fribs and locks, rolled, and then placed in its proper bin. There is no wool lying on the floor; each sort of pieces is taken off by itself, and there cannot be any slumming or back work. In short, instead of a single skirting, there are three—stains, points or 1st pieces, and broken fleece. This method is just as applicable in a shed of 40 shearers as in one of 4. All the men, excepting the sweepers, are on the woolrolling tables, doing work that is easily supervised, and intelligible. A day or two after the start, the ordinary woolroller drops into the method as if he had done nothing else all his life. Piece-pickers in the old sense are unnecessary. A good woolroller shakes his fleece before rolling it, and picks out any inferior pieces from the fleece when he sees them. A bad one puts in the day. Send him on the track.

In regard to skirting, clear bright fleeces, free from seed, should be very lightly skirted. The points of shoulder and breech and very little shoulder or neck wool are taken off. If the fleeces be seedy on the skirts, the seed should be removed, leaving the fleece as free from seed as possible. Sheep that have been running in mulga country often have discoloured wool on the necks, which is full of small twigs and seeds. This wool should be cut out, and, in the case of a small clip, well shaken and placed with the 1st pieces. Most of the sticks will fall out if the wool be well shaken. If the owner have much of it, let him keep it for "wet sheep" days, and put all hands on the job.

*Woolclassing.*—There is an old story told of a blackfellow who was put on to class wool on a station where there were few white men. He made two classes and called them "budgeree" and "baal budgeree" (good, and not good). It is told that the wool sold well.

The story may not be true, yet "*si non é vero, é ben trovato,*" and the application of it lies in this:—4,000 merino sheep of regular breeding, and not consisting of dealers' lots, will cut about 20 bales of 350 lb. each per 1,000—that is, 80 bales. It would be foolish to cut that small clip into more than two fleece classes, with a possible "cast" for very short, shabby, cotty, inferior wool; therefore, "budgeree" and "baal budgeree" will fill the bill in respect of qualities. Two classes are ample in most small merino clips. The top class should be the lightest, brightest, and *best-looking* fleeces. (I am writing for the tyro, remember.) The second should take in all the heavy, dull, short, and shabby wools, and it will depend upon the judgment of the owner where to draw the line. If he class his fleeces to condition, he will not be far wrong. Anyhow, it will be better to underclass than have too many sorts. Besides these, he will have broken, 1st pieces, stained pieces, bellies, and locks, as described in the woolroolling part of this article. Of course it is difficult to say what should be done with any clip without inspection, but "budgeree" and "baal budgeree" is a good working rule. He should keep the fleeces clean of locks, stain, and fribs. If the wool be not seedy or burry, he should skirt as lightly as possible. If in doubt whether a fleece is good enough for the top class, he should put it down. He should keep the colour as even as possible in the top sort, and get advice from any person who he has reason to believe knows more of wool than himself. The above is not the whole of woolclassing, but it is a big percentage of it. He will make two sorts of lambs only. The longest and brightest tops; the short wools, bellies and locks together (2nd lambs). I find that I have nearly reached the limits of the space at my command, so, without comment, I shall give a few rules which have borne the test of time, and conclude.

Take the woolpacks, and turn them inside out. Clip all the loose ends of jute to be found in most packs, shake, and turn them back again. Do not make the bales too heavy, nor too light—350 lb. for fleece wool; 400 lb. for 2nd pieces; 500 lb. for locks; not less than 200 lb. in any sort.

Put the seam side of the bale next the fixed sides of the press, and sew the tops neatly. There is nothing looks so shabby as an ill-shaped, ill-sewn bale.

The bales should be branded on the narrow side, and the baler should avoid saying, "First," "second." Say "A," "AA," as the case might be. He should also brand with initials, and also the name of the holding beneath the initials; the quality next; sex below; and the number lowest of all. He should also brand the initial name of holding and the number on the bottom of the bale. He should see that there is no string lying about the floor, and he should provide a bag wherein to place odd ends of string, &c. He should keep the floor clean, the shearing-board clean, the fleeces clean of locks and fribs, and keep an eye on everybody and everything.

The above are essentials in running a shed; there are many more things which will be spoken of later, but which are not so necessary to know as the above.

[TO BE CONTINUED.]

# Agriculture.

## LIME AND ITS APPLICATION TO THE SOIL.

The old question as to whether lime is a manure and acts as plant food, or whether its action is merely mechanical, continues to be occasionally brought up. Some declare that it is in no sense a plant food; others that it acts both chemically and mechanically; whilst a writer in the "Florida Agriculturist" says that "lime enters into the composition of all plants, and is undoubtedly as much a plant food as potash, phosphoric acid, or nitrogen."

A plant will not grow in the absence of lime, but this substance is so widely distributed in Nature that, practically, all lands contain sufficient lime to supply the needs of the plants that may be grown on it. Some time ago a paper was read by Mr. W. H. Harrison, M.A., before one of the South Australian Agricultural Societies, on the subject of the application of lime to the soil, and the reasons for so applying it:—

"Lime is very extensively used as a fertiliser, but its action is not generally well understood, and serious mistakes often occur from its indiscriminate use. Most soils contain all the elements of plant food in varying quantities, but, however abundant the presence of most of these essential constituents, if any one of them be absent, the soil is perfectly barren, and if present in insufficient quantity the resulting crops are unsatisfactory to the extent of that deficiency. Lime cannot be classed among these deficient substances, for, although it enters into the composition of almost all forms of vegetable life, its various compounds are so widely and generally distributed that it would be a very rare circumstance for any sample of ordinary soil to be found on analysis not to contain sufficient lime for the requirement of any cultivated plant. Then it may be asked, How is lime a fertiliser? Anything is a true fertiliser which causes a plant to make more vigorous growth and yield a better crop; and lime does this in a twofold manner—viz., chemically and mechanically. First, as to its chemical action. All plant food to be available must be in a soluble condition. Otherwise it is like human food under lock and key. All soils contain animal and vegetable matter in varying proportions and in various stages of decomposition. Now lime, in its caustic condition, is one of the most powerful agents of decomposition, and where from defective drainage or other causes the land is 'sour,' and where organic matter does not readily decompose, the application of caustic lime often works wonders, causing these previously inert substances to yield an abundant supply of available plant food. Probably this use of lime on land damaged by seepage would act beneficially. Again, lime and its compounds sometimes react with injurious mineral substances producing useful or harmless compounds—*e.g.*, the action of gypsum on carbonate of soda. The mechanical action of lime on heavy clay lands is an important aid to fertility, causing the soil to become friable and thereby giving free access to air and water. This mechanical action is shared by several of its compounds, such as gypsum, powdered chalk, pulverised shells, &c. The common mistakes in the application of lime as a fertiliser are the following:—When its *chemical* action is required on sour, boggy land, it should be spread and ploughed in as soon as possible after being slacked. It is often allowed to lie in heaps for weeks and months, when it absorbs carbonic acid from the atmosphere and becomes gradually converted into carbonate of lime or chalk. When spread and allowed to remain for some time before being ploughed in, the mischief is still greater. Considerable damage sometimes occurs from over-liming. Since caustic lime greatly promotes decomposition, there is a danger of bringing too large a proportion of plant food into available form, resulting in a heavy crop in the ensuing season and comparative barrenness for several years after. It is a common practice to add lime to nightsoil and other animal manures. Caustic lime sets free the ammonia, thus depriving the manure of one of its most valuable constituents."

---

## A PROMISING GRASS.

In our issue of February last, Mr. G. B. Brooks, Instructor in Agriculture, drew attention to a grass much resembling Rhodes Grass, which is found in several localities along the Northern Coast of Queensland, and which has, during the past few years, been finding its way inland, and it has firmly established itself at Prairie (208 miles west of Townsville), where Mr. J. R. Chisholm found that it spread and grew luxuriantly on claypan land. In one part near the homestead—an old stocked plain eaten bare before this grass appeared—it made splendid growth; and Mr. Chisholm, when he put the mowing machine into it, thought it would be too stalky to make good hay, but when it was put before bush horses they quickly ate every vestige of it. Mr. F. M. Bailey, Colonial Botanist, identified it as *Chloris barbata,* var. *decora.* On being analysed by Mr. J. C. Brünnich, Agricultural Chemist, it was pronounced to compare well with Rhodes Grass, and to possess a fair nutritive or albuminoid ratio. The grass (Mr. Brünnich said) appears to be well worth cultivating on a larger scale.

Mr. Chisholm, referring to what has already appeared in the Journal on the subject of this grass, now writes:—" The great value of *Chloris barbata* is beyond doubt. I had recognised this practically, but Mr. Brünnich's analysis indicates [proves] it to be of even greater value than I knew, as shown by its containing 2.11 per cent. of oil and fat, as against 1.20 per cent. in the imported Rhodes Grass; and only 17 per cent. of fibre as against 24 per cent. in the Rhodes shows surely wonderful feeding value. The accompanying illustration, taken by Miss I. Chisholm, will give some idea of the manner in which the grass encroaches on the land (claypan) in Figs. 1 and 2. Fig 3 shows the plant with the roots at each joint. Fig. 4 shows the mowing machine at work.

PLATE 62, FIG. 1.—THE PLAINS, PRAIRIE, N.Q.
This photo. shows the *Chloris barbata* taking hold of claypan land. It is, however, kept cropped off short by sheep.

PLATE 63, FIG. 2.—THE PLAINS, PRAIRIE, N.Q.
*Chloris barbata* encroaching on claypan land. It is kept close cropped, however. If protected, it spreads rapidly in favourable seasons.

PLATE 64, FIG. 3.—CHLORIS BARBATA.

Note the roots from each joint.

PLATE 65, FIG. 4.—THE PLAINS, PRAIRIE, N.Q.

This photo. is taken on an old stocked plain near our home. When I put the machine into it, I thought it would be too stalky to make good hay; but, when put before bush horses, they ate every vestige of it quickly. This plain was bare land, eaten out, before the *Chloris* came.

## TOBACCO GROWING.

By R. S. NEVILL, Instructor in Tobacco Culture.

Persons desiring to experiment in tobacco-growing should not lay too much stress on the fact that it is growing wild about their place. This is not because the plant is indigenous to the district, but only shows that seed by some means has been sown there, and, as is shown in the February number of this journal, it will grow anywhere, but not always of desirable quality. Persons wishing to try the experiment should, in asking for information, always state where their land is located, as some districts grow one sort and some another. It is best to leave the selection of the seed to this office, the intending grower stating plainly his location, character of soil, elevation, and rainfall. Such persons should send in a sample of the tobacco after it is cured, stating how much they have, and we will endeavour to secure for them a market. New land is usually preferred for tobacco, as on such we usually get the finer and silkier product, but not quite such large yields. When only experimenting, only a small area should be planted—say, ¼ or ½ acre—such as can be cured in the outhouses and sheds about the farm. The curing tobacco should have plenty of ventilation, but well protected from hard drying winds.

If the weather is suitable, it is well to scaffold it for some days before putting it in the shed, but it should not be allowed to get rained on. Unfortunately, we are out of tobacco literature, but hope to have fresh printed before a great while, when it will be for distribution to intending growers.

## THE TESTING OF GRASS AND OTHER SEEDS.

By G. B. BROOKS, Instructor in Agriculture.

When Paspalum grass was first introduced, a good deal of trouble was experienced in getting a good "stand," mainly owing to the use of immature seed, and also, in a small measure, to planting at the wrong season of the year. The vitality of the seed was often so low that it took several months to germinate, and in many instances did not show up until the following year. Complaints on this score were so numerous that many growers guaranteed their seed as being "only the best hand-shaken."

Now that Rhodes grass is fast coming into favour, the farmer who is about to put his land under this grass should make certain that the seed he purchases will give a sufficiently high percentage of germination to ensure a good "strike" the first season. The failure to secure such not only means the loss of the seed, but, if sown on newly burned off scrub lands, replanting cannot be carried out until the following season. This necessarily means much extra expense in keeping down weeds, &c., that should have been kept under by the crop of grass, and, moreover, the conditions of soil are not then so favourable for a good stand even by the use of the best seed.

In visiting districts where fairly extensive areas are being put under Rhodes grass, I find that many complaints are made by farmers to the effect that, although planting under the most favourable conditions, the results obtained have not been satisfactory.

These unfavourable results in regard to inferior seed have been borne out from tests made from time to time by this Department. Many of these tests did not reach 10 per cent., and very few over 30 per cent. of fertile seed.

The amount of Rhodes grass seed sown per acre varies from ½ lb. to 4 lb. The former amount is quite ample, providing the seed be of good quality, which would give approximately 80 seeds per square yard. The latter amount (4 lb.), makes provision for the poorest class of seed, and would, with even only 1 per cent. germination, give a good stand.

The cause of the low vitality so common in Rhodes grass is not due to adverse climatic conditions, but to either ignorance or carelessness practised in harvesting the seed. In many instances I have seen the crop being cut while the plant is yet in flower, and in some instances it had not even reached that stage.

The excuse generally put forward by the grower is that, if left to ripen, a good deal of seed is lost, and that, while working single-handed on a large patch, it is necessary to make an early start.

Rhodes grass seed invariably changes hands at so much per lb., irrespective of quality. There is no reason why this and other seeds should not be bought according to their true value, and to arrive at this value is, for the farmer, a comparatively easy matter.

In addition to the question of vitality, a farmer should also pay particular attention to the purity of the seeds he purchases. As a rule, he can generally tell at a glance whether a sample contains impurities. This foreign matter is mostly in the form of chaff, sand, immature or diseased seeds, and weed seeds. Particular attention should be directed to the latter, bearing in mind the old adage, "One year's seeding, seven years' weeding." Seeds containing a large percentage of weeds should be rejected.

An effort should be made to determine the various weeds, and for this purpose a name set card—that is, a card on which are mounted seeds of the various noxious weeds—would be helpful.

To make a correct purity test it is necessary to take a given weight of seed, this weight to be according to size of seed and scales available. There should, however, be at least 200 to 300 seeds in the sample. Spread these on a paper, and with a penknife separate all weed seeds and foreign matter. By weighing these impurities, the percentage of pure seed will be ascertained.

## VITALITY TEST.

To return to the vitality test. A rough-and-ready method is to level off a square yard of ground in a warm corner adjacent to the house. Place the seeds to be tested on the surface and cover with a wet corn


PLATE 66.—TESTING SEEDS.—Name Set Card.

sack. See that the soil is moist; if dry, water, for preference some hours previous to putting the seeds down. By lifting the bag from day to day, a fairly good idea can be had as to the vitality of the seed.

Seed testers are invariably used in determining the germinating power of the seed. There are several simple ways of fixing up a tester that will give reliable results. All that is necessary is to supply the seeds with a certain amount of moisture and warmth. Darkness is also desirable.

For this test a sample should be taken—preferably 100 seeds—from those selected for the purity test.

The following is a short description of various testers, illustrations of which appear in the adjoining page:—

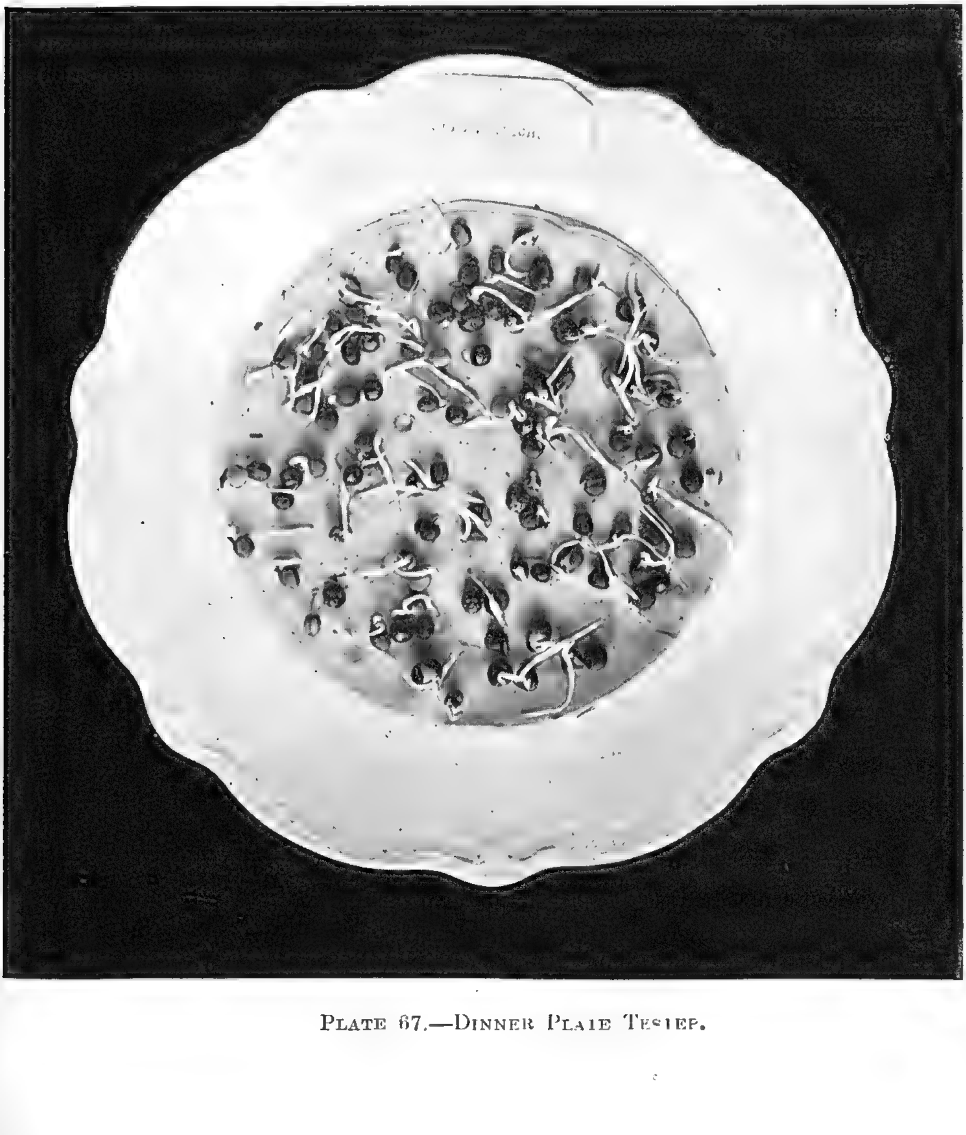


PLATE 67.—DINNER PLATE TESTER.

## DINNER PLATE TESTER.

This is made by placing a double thickness of flannel or blotting-paper on a plate. Soak with water, place the seed on the wet flannel, and cover with another plate.

The chief drawback to the above is its liability to dry out, and care should be taken to keep the flannel, &c., moist.

## TRAY TESTER.

This tester is practically similar to the above, but provision is made for a self-regulating supply of moisture. A tray cut out of the side of a kerosene tin, about 2 inches in depth, makes a convenient sized tester. A piece of wood, 1½ inches square, is placed in each end, upon which is rested a sheet of glass or thin board, cut slightly smaller than the tray. This is covered with a piece of flannel or with a double thickness of blotting-paper sufficiently large to overlap the sides and reach the bottom of the dish. Fill the tray with water to a depth of 1 inch. The tester is now ready for the seed. The blotting-paper can be lined off so as to keep varieties separate. The flannel can be used in 1-inch strips, using a strip for each variety of seed.

## GENEVA TESTER.

In the case of large seeds requiring a plentiful supply of moisture, the Geneva tester is very useful. An easy way to make this tester is to cut the side out of a 1-gallon oil tin, as illustrated. Strips of flannel,

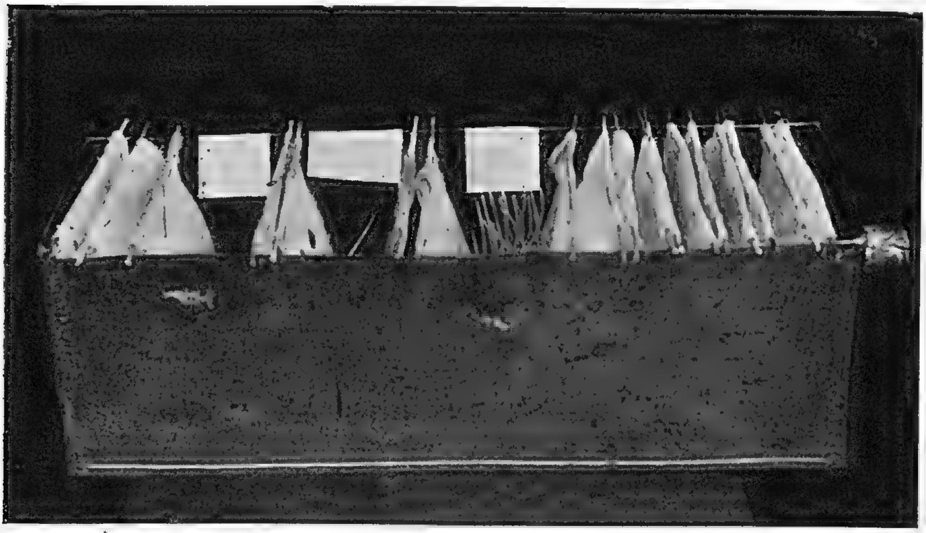


PLATE 68.—GENEVA TESTER.

the width of the tin and 8 inches long, are looped and attached to a wire which rests on the top of the tin. The seed to be tested is placed in the fold, and just enough water poured into the tin to reach the flannel.

## SAND TESTER.

This tester is also used for large seeds. A dish 4 to 6 inches in depth is filled with sand, and sufficient water added to keep it moist throughout the test. The seeds should be buried half their depth in the sand.

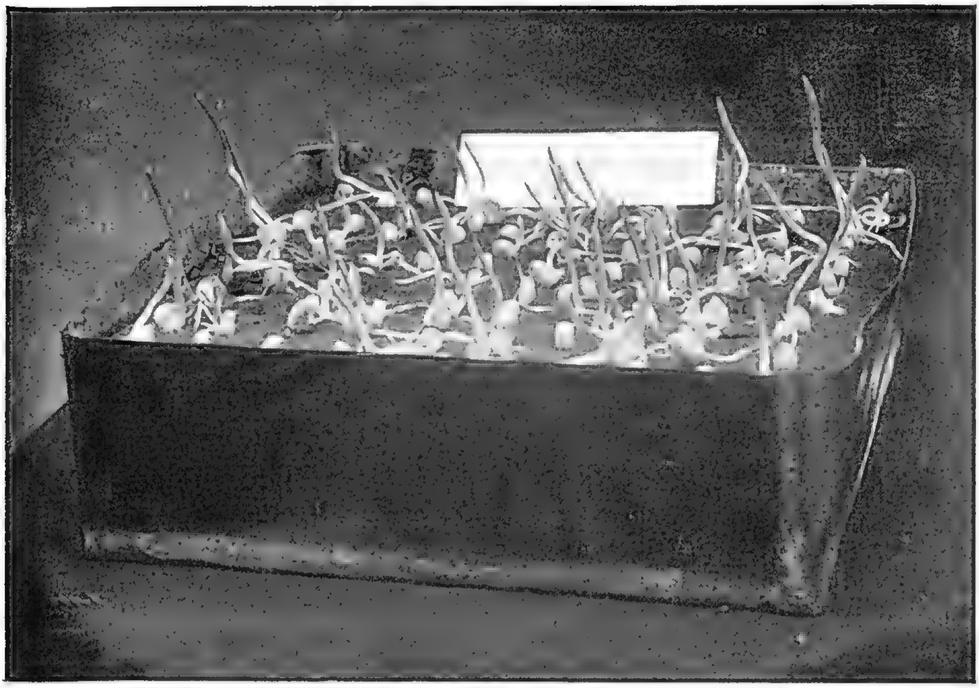


PLATE 69.—SAND TESTER.

## POROUS TILE TESTER.

This is a tester I had made at James Campbell and Sons' potteries, and which has proved very successful. For convenience of arriving at results, the tile is divided into 100 squares, the divisions consisting of a slight projection. A seed is placed in each square. Two sizes were made, one 4 x 4 inches for small seeds, and the other 8 x 8 inches for large seeds. In the accompanying illustration, both these sizes appear in use in the one dish.

The tile is made of sufficiently porous material, so that, when placed in a tray containing water, it will absorb sufficient moisture to germinate the seeds. This tester has the merit of being both cheap and effective.

## DURATION OF TEST.

If conditions are favourable for germination—that is, a temperature of from 60 to 80 deg. Fahr.—the following may be taken as a general rule as to when the test should be stopped:—

| | |
|---|---|
| Lucerne, maize, panicums, turnips, and most vegetables | 7 days. |
| Sorghums, mangels, beetroot, cereals .. .. .. | 10 days. |
| Grasses in general .. .. .. .. .. .. | 14 days. |

### RECORDS.

A record should be kept as to when the test started, and a note made every second day of the number germinated. Seeds that are unduly slow in sprouting are generally old or immature, and should, therefore, be avoided.

In calculating the true value of a sample, multiply the percentage of good seed in the purity and vitality tests and divide by 100.

Example:—

| Purity. | | Vitality. | | | |
|---|---|---|---|---|---|
| 75 | × | 85 | ÷ | 100 = | 63.7 per cent. true value. |

It may be mentioned that when purchasing paspalum and various other grass seeds, and having no opportunity of making a test, place a number of seeds on a piece of glass or other hard substance, and cut with a fairly sharp knife. The good seeds will cut hard, while the immature seed will feel quite soft to the touch.

# Statistics.

## COMMONWEALTH METEOROLOGY.

### RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

| STATIONS. | 1911. | | | | | | | | | | 1912. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. |
| *North.* | | | | | | | | | | | | | |
| Ayr ... ... ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 3·53 |
| Bowen ... ... ... | 10·66 | 1·64 | 0·12 | 0·2 | Nil | 0·15 | Nil | 1·5 | 0·19 | 1·32 | 1·56 | 3·15 | 1 86 |
| Cairns ... ... ... | 35·35 | 52·31 | 2·08 | 1 44 | 1·48 | 0·27 | 0 6 | 0·88 | 1·95 | 0 90 | 4 81 | 16·68 | 5·95 |
| Geraldton (Innisfail)... | 28·39 | 50 53 | 3·58 | 5·10 | 6·20 | 0 79 | 0·30 | 0·73 | 1·61 | 0·75 | 5·50 | 18·24 | 6·01 |
| Gindie State Farm ... | 2·29 | 0·29 | 0·29 | Nil | Nil | 0·49 | ... | 0·81 | ... | 3.50 | 0·68 | 2·59 | 1·88 |
| Herberton ... ... | 15·35 | 14·17 | 0·08 | 0·36 | 0·40 | 0·5 | Nil | 0·9 | 0·62 | 5·36 | 5·29 | 2·82 | 1·47 |
| Hughenden ... ... | 0·17 | 6·29 | 0·4 | 0·2 | 0·2 | Nil | Nil | Nil | 1·37 | 0·69 | 5·78 | 1·84 | 3·52 |
| Kamerunga State Nurs. | ... | 52·28 | 1·51 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Mackay ... ... ... | 14 41 | 3·14 | 0·77 | 0·22 | 0·43 | 0·18 | 0·3 | 0·93 | 0·17 | 0·41 | 2·08 | 8·04 | ·93 |
| Mossman ... ... | 71·64 | 37·10 | 1·44 | 0 33 | 1·28 | 0·39 | 0·09 | 0 55 | 0·86 | 3 31 | ... | ... | ... |
| Rockhampton ... ... | 6 39 | 1·44 | 0·56 | Nil | 0·24 | 1·17 | Nil | 0·40 | 0·6 | 0·81 | 2·50 | 3·24 | ·14 |
| Townsville ... ... | 4·24 | 3 02 | 0·7 | 0·11 | Nil | Nil | Nil | 0·39 | 0·31 | 2·84 | 1·64 | 7·57 | 6·35 |
| *South.* | | | | | | | | | | | | | |
| Biggenden State Farm | 6·25 | ... | ... | ... | ... | ... | 0·79 | ... | ... | ... | ... | ... | ... |
| Brisbane ... ... | 4 69 | 0·88 | 0·90 | 0·9 | 1·70 | 2·22 | 0 84 | 4·95 | 0·84 | 1·94 | 1·85 | 2·13 | 1·03 |
| Bundaberg ... ... | 4·31 | 1·46 | 0·56 | Nil | 0·37 | 1·15 | Nil | 2·36 | 1·30 | 2·98 | 3·96 | 2·47 | ... |
| Bungeworgorai ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 0·73 | ... | 2·19 |
| Crohamhurst ... ... | 16·67 | 2·94 | 1·21 | 0·13 | 3·58 | 2·62 | 0·51 | 6·27 | 1·74 | 3·02 | 5·62 | 8·72 | 31·73 |
| Dalby ... ... ... | 3·20 | 0·76 | 0·91 | Nil | 0·68 | 0·43 | 0·42 | 3·45 | 1·99 | 1 55 | 1·76 | 2·58 | ·53 |
| Esk ... .. ... | 3 54 | 0·99 | 1·90 | Nil | ... | 1·51 | 2·04 | 4·17 | 0 47 | 0 44 | 1·38 | 8·26 | ·22 |
| Gatton Agric. College | 2·80 | 1·38 | 0·58 | Nil | 0 72 | 0 90 | 0·96 | 3 77 | 0 49 | 1·90 | 3·56 | 3·31 | 7·86 |
| Gympie ... ... ... | 6 02 | 1·88 | 0·32 | Nil | 0·97 | 0·48 | 0·26 | 2·42 | 0 50 | 2·10 | 2·92 | 4·47 | ·15 |
| Ipswich ... ... | 2·51 | 1·38 | 0·42 | Nil | 0·59 | 1·12 | 0·34 | 4·71 | 0·25 | ... | 1·87 | 3·00 | ·41 |
| Maryborough ... ... | 7·20 | 2·61 | 0·16 | 0·11 | 0 62 | 1·47 | 0·9 | 2·81 | 0·90 | 4·98 | 2·39 | 3 93 | ·11 |
| Roma ... ... ... | 1·25 | 0·14 | 1·13 | Nil | 0·67 | 1·55 | 0·87 | 1·9 | 1·55 | 1·19 | 0·74 | 0 76 | ·85 |
| Roma State Farm ... | 5·39 | 0·04 | ·02 | ... | ... | 1·39 | 0·74 | 1·31 | 1·29 | 1·45 | ... | 0·60 | ... |
| Tewantin ... ... | 18·11 | 1·78 | 0·57 | 0·22 | 2·53 | 1·07 | 0·4 | 7·48 | 1·14 | 2·13 | 5·60 | 4·25 | ·85 |
| Toowoomba ... ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ·52 |
| Warren State Farm ... | 3·17 | ... | ... | Nil | 0·6 | 1·01 | ... | 0·64 | ... | ... | 0 82 | 1·75 | 2·04 |
| Warwick ... ... | 3·12 | 0·74 | 1·04 | Nil | 1·20 | 1·50 | 0·80 | 1·78 | 2·26 | 0·70 | 1·57 | 3·45 | ·56 |
| Warwick, Hermitage State Farm ... | ... | ... | ... | ... | ... | ... | ... | 0·60 | ... | ... | ... | ... | ... |
| Westbrook State Farm | 1·76 | 5·50 | 0·79 | 0·1 | 1·1 | 0·54 | 0·82 | 1·77 | 2·68 | 0·23 | 1·16 | 2.33 | 4·48 |
| Yandina ... | 12·02 | 2·68 | 0· | Nil | 2·43 | Nil | 0·30 | 2·90 | 1·36 | 1·87 | 5·95 | 4·84 | ·95 |

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND, Divisional Officer.

# Dairying.

## THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF MARCH, 1912.

| Name of Cow. | Breed. | Date of Calving. | Total Milk. | Test. | Commercial Butter. | Remarks. |
|---|---|---|---|---|---|---|
| | | | Lb. | % | Lb. | |
| Nellie II. ... | Shorthorn ... | 1 Feb., 1912 | 1,122 | 3·9 | 48·82 | |
| Glen ... | ,, ... ... | 30 Sept., 1911 | 832 | 5·0 | 46·92 | |
| Helen ... | Ayrshire ... ... | 7 Jan. ,, | 809 | 4·9 | 44·72 | |
| Lark ... | ,, ... ... | 29 Nov. ,, | 965 | 4·1 | 41·26 | |
| Lavinia's Pride | ,, ... ... | 23 Feb., 1912 | 1,035 | 3·8 | 43·83 | |
| Lady Mereton | Shorthorn... ... | 9 Feb. ,, | 964 | 3·7 | 39·68 | |
| Davidina ... | Ayrshire ... ... | 29 Dec., 1911 | 920 | 3·8 | 38·95 | |
| Queen Kate | ,, ... ... | 9 Feb., 1912 | 869 | 3·9 | 37·82 | |
| Linda .. | ,, ... ... | 3 Mar. ,, | 886 | 3·8 | 37·52 | |
| Burton's Maid | Shorthorn... ... | 2 Feb. ,, | 852 | 3·9 | 37·07 | |
| Butter ... | ,, ... ... | 10 Nov., 1911 | 865 | 3·8 | 36·63 | |
| Lerida ... | Ayrshire ... ... | 4 Mar., 1912 | 837 | 3·9 | 36·42 | |
| Honeycomb | Shorthorn ... | 29 Aug., 1911 | 765 | 4·2 | 35·99 | |
| No. 6 ... | ,, ... ... | 27 Jan., 1912 | 827 | 3·7 | 34·04 | |
| Dilly ... | ,, ... ... | 9 Feb. ,, | 779 | 3·8 | 33·08 | |
| Flora ... | Jersey ... ... | 10 Feb. ,, | 616 | 4·7 | 32·59 | |
| Mist ... | Holstein ... ... | 20 Oct., 1911 | 745 | 3·9 | 32·42 | |
| Lass ... | Ayrshire ... ... | 16 Oct. ,, | 702 | 4·0 | 31·37 | |
| Miss Lark ... | ,, ... ... | 17 Jan., 1912 | 688 | 4·0 | 30·74 | |
| Duchess Fanny | Shorthorn ... | 24 Aug., 1911 | 695 | 4·0 | 29·45 | |
| Daisy ... | Holstein ... ... | 2 Feb. ,, | 654 | 4·0 | 29·22 | |
| Careless ... | Jersey ... ... | 16 Dec., 1910 | 524 | 4·7 | 27·72 | |
| Burton's Lily | Shorthorn ... | 7 Dec. ,, | 621 | 3·9 | 27·02 | |
| Dewdrop ... | Holstein ... ... | 3 Nov. ,, | 616 | 3·9 | 26·80 | |
| Cocoa ... | Jersey ... ... | 1 May, 1911 | 436 | 5·0 | 26·12 | |
| Silver Nell... | Shorthorn... ... | 13 Dec. ,, | 600 | 3·8 | 25·41 | |
| Bluebelle ... | Jersey ... ... | 20 April ,, | 486 | 4·6 | 25·15 | |
| Countess of Brunswick | Shorthorn .. | 28 Feb., 1912 | 593 | 3·8 | 25·10 | |
| Pauline ... | ,, ... ... | 7 Nov., 1911 | 559 | 4·0 | 24·98 | |
| Norma ... | ,, ... ... | 12 Aug. ,, | 572 | 3·9 | 24·88 | |

Nellie II., Butter, and No. 6 were each fed on the following ration daily:—20 lb. lucerne chaff, 3 lb. bran, 3 lb. pollard, 1 lb. oilcake. The other cows on natural pasture.

---

## ADVICE ON THE ROUTINE OF THE DAIRY.

BY E. GRAHAM, Dairy Expert, Department of Agriculture and Stock.

[CONTINUED.]

Under usual conditions, the cowyard is a serious handicap to good dairy products. In reasonably dry weather the yard is so dusty that the milk must of necessity be drawn in surroundings certain to assist contamination of the milk, while during the rain the yard becomes so muddy that it provides a positive source of further infection of the milk supply.

The cowyard should be set upon a well-drained piece of land with the slope away from the milking-shed and dairy.

The use of gravel is to be recommended, and some have employed concrete to make sure that the cows are kept free from mud and filth.

With large herds it becomes somewhat expensive to gravel or concrete the whole of the receiving yards, but it is practicable to subdivide the yard, and gravel or concrete a portion wherein the cows can stand in comfort during wet weather, and cast off much of the mud before they are driven into the bails.

The yard should be kept clean and the manure removed promptly and conserved at some considerable distance from the milking-shed or dairy premises.

This precaution will also greatly help in keeping down the number of flies.

The practice of milking in unsuitable surroundings is possibly doing more to retard progress in dairying than any other existing custom.

When the milk drawn from dairies faulty in the above direction is tendered at the cheese factory, it produces a "gassy" curd and a low-grade cheese.

Cream from a similar source produces an indifferent butter of imperfect flavour and poor keeping qualities, and is not at all suitable for the local or export market requirements.

A specific legislative measure dealing with this matter would do much to improve the quality of the raw product, upon which hinges the success of dairying.

The milking-shed and bails must be substantial and well built. Drainage, light, ventilation, protection of the persons milking and the cows from the prevailing winds, ease of cleaning, and good facilities for handling the cows are the main considerations.

Fortunately, these can be accomplished at a much less expense than is usually believed. Concrete floors and gutters with ample fall are recognised as essential to a well-ordered milk-shed and bails.

Not only do these assist in securing good sanitary conditions, but they make it possible to effectively save all the fertility in the manure, as well as contributing to the comfort of those carrying out the work of milking.

Some dairymen feed their cows in the bails, but the ideal is to have independent and separate feeding stalls.

The use of odourless disinfectants in the milk sheds at frequent intervals is desirable, as it is unreasonable to expect that the broom alone will keep the milk shed as clean as is necessary.

The periodic use of lime wash is essential as a disinfectant, both to present and maintain a cleanly appearance throughout the shed.

Unslacked lime sprinkled on the floor is most advantageous; the whole of the milking routine to be so planned as to have all operations that tend to raise the dust take place after the actual milking of the cows is completed.

In some ways the quality of the milk is dependent to a very great extent upon the person drawing the milk. His personal habits go a long way towards determining the cleanliness of the products. He should be personally clean—have cleanly habits and enjoying perfect health. In no other form of farm work does health count so much.

Unless the regular clothing is above suspicion, it will pay to furnish each milker with a frequently laundered outer garment to be worn only at milking time. Milking with dry hands is essential, or, if this is not possible, a minute quantity of vaseline or crude castor oil may be used, but there must never be any such excess of these substances as will permit of any moisture from the milker's hands reaching the milk pail.

The practice of wetting the hands in the milk is the most repulsive possible, and should disqualify any milker employed on a dairy where the owner has any interest or regard for his business. A properly equipped washbowl is an inexpensive accessory to the milk shed, as the milker's hands will require frequent washing even under the best of conditions.

Much is gained by milking in a quiet manner, both as to cleanliness and the amount and quality of the milk extracted.

Of recent years milking machines have been improved and rendered much more perfect in their work. In considering the installation of milking machines, the two chief matters for thought are the likelihood of damage to the quality of milk by infection, and the economic advantages to be gained over hand-milking methods.

The process of milking by means of machines has not yet become general, but enough studies have been made to throw some light upon the relation between machine milking and the keeping properties of the milk. While there still exists a diversity of conclusion as to the economic advantages, the general consensus of opinion seems to be—that the machines may be regarded as a paying investment, and that their more general use in the future will be almost a necessity, especially if present tendencies prevail.

The machines, at present, exhibit an abundance of rubber tubing and numerous intricate devices that are more or less difficult to cleanse. Any mechanical appliance for milking cows that offers further means of contaminating the milk has little chance to survive. Nevertheless, with thorough care, the various parts and tubings need not be the cause of further contamination, as it has been shown that they may be kept in a perfect state of cleanliness.

Much depends upon the individuality of the operator. Some dairymen can, with apparent ease, keep the milking machine and its parts quite clean, while others fail to maintain even a milk can in a fit state of cleanliness.

In the hands of a careful operator the milk extracted by a modern machine will show less bacteria than average milk drawn in the ordinary manner of hand milking.

The protection of the milk from exposure in the milking-shed, which the machine offers, is an important item if the interior surface of the apparatus is clean.

Experience has taught that aeration of the milk, or of the cream from the milk, drawn by the machine, is absolutely indispensable if good quality and flavour are sought.

The milk being extracted in a partial vacuum no doubt explains the need for the subsequent aeration, for in hand milking the milk receives a crude kind of aeration as it is forced from the teat to the milk pail, and even this partial aeration does not occur in machine milking.

All rules relating to the care, operation, and washing of the milking machines and instructions given by the installing agent must be religiously followed.

There are also included in the dairy plant many necessary utensils which play a part in deciding the quality of the products.

The use of sound utensils free from rust and kept in a cleanly condition is an essential to good and pure milking.

Battered or dented buckets, pans, &c., with seams that are not flushed with solder, cannot be thoroughly cleansed. The uneven surfaces and crevices harbour germs and invite contamination that is readily imparted to the milk, though the latter may be subjected to it only momentarily.

Such utensils are employed at the expense of the quality of the milk.

Milk and cream cans with narrow necks are to be avoided, and it is false economy to purchase utensils bearing any of the above defects.

Seamless milk and cream cans give the most satisfaction, and well repay for the slightly higher initial cost.

An essential requirement in any utensil used for containing milk is accessibility in cleansing, to which should be added durability.

[TO BE CONTINUED.]

---

## DESTRUCTION OF HOUSE FLIES.

### FORMALIN (IN LIQUID).

This is the method recommended by the Board of Public Health, London, and is carried out as follows:—Put one teaspoonful of "formalin" into a cup, filling it three-quarters full with water, and stirring well, so as to mix the chemical with the water; now add a little milk, and about a teaspoonful of sugar. Pour a small quantity of this solution upon, say, a piece of scrap linoleum or other suitable material, and place in a position where the flies are troublesome. The flies sip this fatal solution, and die in great numbers not far from the poison. An objection to this system of destruction is the dead bodies of the flies scattered over the mantelpiece, table, food, or floor.

# Poultry.

## REPORT ON EGG-LAYING COMPETITION, Q.A. COLLEGE, MARCH, 1912.

The 1911-12 competition closed on 31st March. J. Gosley's White Leghorns win the monthly prize with 121 eggs. J. F. Dalrymple wins the first prize for the twelve months with 1,391 eggs. J. Gosley is second with 1,344, and J. Holmes takes third place with 1,342 eggs. A detailed report on the whole competition will be issued later. The following are the individual records:—

| Competitors. | Breed. | March. | Total. |
|---|---|---|---|
| J. F. Dalrymple, N.S.W. ... ... | White Leghorns ... ... | 94 | 1,391 |
| J. Gosley ... ... ... ... | Do. ... ... | 121 | 1,344 |
| J. Holmes ... ... ... ... | Do. ... ... | 106 | 1,342 |
| E. A. Smith ... ... ... ... | Do. ... ... | 81 | 1,336 |
| Yangarella Poultry Farm ... ... | Do. ... ... | 80 | 1,316 |
| Cowan Bros., N.S.W. ... ... | Do. ... .. | 98 | 1,312 |
| S. Chapman ... ... ... ... | Brown Leghorns ... ... | 117 | 1,310 |
| A. Hollings, N.S.W. ... ... | White Leghorns ... ... | 119 | 1,301 |
| A. J. Cosh, S.A. ... ... ... | Do. ... ... | 101 | 1,285 |
| Range Poultry Farm ... ... | Do. ... . | 69 | 1,277 |
| Jas. McKay ... ... .. ... | Do. . .. | 81 | 1,247 |
| Mrs. A. E. Kinnear, S.A. ... ... | Do. ... ... | 91 | 1,243 |
| Alex. Smith ... ... ... ... | Do. ... ... | 60 | 1,236 |
| A. H. Padman, S.A. ... .. | Do. ... ... | 82 | 1,226 |
| R. Burns ... ... ... ... | Do. ... .. | 51 | 1,210 |
| J. Zahl ... ... ... ... | Do. ... ... | 90 | 1,200 |
| R. Burns ... ... ... ... | S.L. Wyandottes ... ... | 86 | 1,153 |
| H. Hammill, N.S.W. ... .. | White Leghorns ... . | 72 | 1,152 |
| A. Astill ... ... ... ... | Do. ... ... | 93 | 1,039 |
| R. W. Goldsbury ... ... .. | Do. ... ... | 82 | 1,018 |
| Mrs. A. A. Carmichael ... ... | Brown Leghorns ... ... | 87 | 984 |
| J. K. Stewart ... ... .. | White Plymouth Rocks (1) | 35 | 769 |
| J. K. Stewart ... ... ... | Do. do. (3) | 31 | 733 |
| J. K. Stewart ... ... ... | Do. do. (2) | 29 | 631 |
| Totals ... ... ... | ... | 1,956 | 28,055 |

## POULTRY ON THE FARM.

A well-known Canadian professor at Ottawa, in reply to the question, "Why is poultry valuable to the farmer?" gave the following reasons:—

1. Because he ought by their means to convert a great deal of the waste of his farm into money in the shape of eggs and chickens for market.

2. Because with intelligent management they ought to be all-year revenue producers, with the exception of perhaps two months during moulting period.

3. Because poultry will yield him a quicker return for his capital invested than any of the other departments of agriculture.

4. Because the manure from the poultry-house will make a valuable compost for use in either vegetable garden or orchard. The birds themselves, if allowed to run in plum or apple orchard, will destroy all injurious insect life.

5. Because, while cereals and fruits can only be successfully grown in certain sections, poultry can be raised for table use or layers of eggs in all parts of the country.

6. Because poultry-raising is an employment in which the farmer's wife and daughters can engage and leave him free to attend to other departments.

7. Because it will bring the best returns in the shape of new-laid eggs—during the winter season—when the farmer has most time on his hands.

8. Because to start poultry raising on the farm requires little or no capital. Under any circumstances, with proper management, poultry can be made with little cost a valuable adjunct to the farm.

---

## GENERAL REPORT—QUEENSLAND AGRICULTURAL COLLEGE EGG-LAYING COMPETITION, 1911-1912,

The eighth egg-laying competition was brought to a close on 31st March last. Twenty-nine entries were received, but, owing to various causes, five were withdrawn, leaving twenty-four competitors. These were made up as follows:—

| | |
|---|---|
| White Leghorns .. .. .. .. | 18 pens. |
| Brown Leghorns .. .. .. .. | 3 pens. |
| Silver Laced Wyandottes .. .. | 1 pen. |
| White Plymouth Rocks .. .. .. | 3 pens. |

The total number of eggs laid was 28,055 during the twelve months—an average of 194.8 per bird, or 1,169 per pen. The first prize was won by Mr. J. F. Dalrymple, Bexley, N.S.W.; the second by Mr. J. Gosley, Childers; the third by Mr. J. Holmes, Toowoomba—all with White Leghorns. The following competitors won monthly prizes:—

J. F. Dalrymple—June (123 eggs), July (129), October (151).

J. Gosley—November (151), February (130), March (121).

J. Holmes—September (148).

A. Hollings—May (108).

E. A. Smith—April (99).

A. H. Padman—December (131).

Range Poultry Farm and Mrs. Kinnear—August (137 eggs each).

R. Burns and Cowan Bros.—January (130 each).

The weather conditions were very erratic; long spells of drought were experienced; and during December the weather was very hot, the maximum temperature ranging from 100 degs. to 107 degs. for the greater part of the month. This continuous heat caused the birds to fall off considerably in their laying, and they never recovered from the effects. Broodies were more numerous than in any previous competition, and breeders will do well to keep out of their stud pens any birds that are inclined to become broody, as they lose too much time to allow of big scores being recorded. Some of the Leghorns even were broody on six occasions, whilst one was out of the pen seven times.

The feeding has been conducted on the same lines as in previous competitions, except that a little more desiccated meat was used; but towards the close of the competition, this food being unprocurable, green bone was substituted. The morning meal consisted of bran and pollard (equal parts), with 1½b. Sunlight oilcake or 1 quart of desiccated meat on alternate days, mixed into a crumbly mass with hot water in winter and cold in summer, at 6.30. The birds were fed as much as they would eat up eagerly. At midday they were given chaffed green lucerne and a little soup meat when available. The evening meal consisted for the most part of wheat, with an occasional feed of oats or maize by way of variety, the latter being fed in winter, the oats in summer. They were fed as much as they would eat about 5 o'clock. Seashell grit and fresh clean water were always available. The mortality has been the smallest on record here. Only 3 birds died from natural causes during the year, 1 was killed by a carpet snake, making 4 deaths in all out of a total of 144 birds.

The following are the individual records of eggs laid during the twelve months:—

| Competitors. | Breed. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Totals. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J. F. Dalrymple, Bexley, N.S.W. ... ... | White Leghorns ... ... | 55 | 77 | 123 | 129 | 135 | 145 | 151 | 135 | 121 | 119 | 107 | 94 | 1,391 |
| J. Gosley, Childers ... ... ... .. | Do. ... ... | 42 | 33 | 78 | 118 | 132 | 146 | 147 | 151 | 120 | 126 | 130 | 121 | 1,344 |
| J. Holmes, Toowoomba ... ... .. ... | Do. ... ... | 86 | 70 | 73 | 114 | 136 | 148 | 141 | 125 | 136 | 109 | 108 | 106 | 1,342 |
| E. A. Smith, Paddington, Brisbane ... ... | Do. ... ... | 99 | 70 | 74 | 121 | 134 | 137 | 144 | 131 | 117 | 116 | 112 | 81 | 1,336 |
| Yangarella Poultry Farm, Indooroopilly ... | Do. ... ... | 92 | 90 | 103 | 115 | 112 | 121 | 140 | 126 | 124 | 117 | 95 | 80 | 1,316 |
| Cowan Bros., Burwood, N.S.W. .. ... | Do. ... ... | 50 | 78 | 90 | 118 | 118 | 132 | 138 | 136 | 117 | 130 | 107 | 98 | 1,312 |
| S. Chapman, Murphy's Creek ... ... ... | Brown Leghorns ... ... | 31 | 60 | 62 | 117 | 134 | 138 | 144 | 130 | 126 | 123 | 128 | 117 | 1,310 |
| A. Hollings, Eastwood, N.S.W. ... ... | White Leghorns ... ... | 65 | 106 | 94 | 78 | 119 | 117 | 135 | 126 | 111 | 112 | 119 | 119 | 1,301 |
| A. J. Cosh, Normanville, S.A. ... ... | Do. ... ... | 94 | 50 | 57 | 116 | 113 | 132 | 136 | 131 | 120 | 112 | 123 | 101 | 1,285 |
| Range Poultry Farm, Toowoomba ... ... | Do. ... .. | 88 | 84 | 86 | 125 | 137 | 133 | 139 | 108 | 106 | 108 | 94 | 69 | 1,277 |
| J. McKay, Gatton ... ... ... ... .. | Do. ... ... | 84 | 62 | 62 | 115 | 119 | 129 | 139 | 137 | 105 | 106 | 108 | 81 | 1,247 |
| Mrs. A. E. Kinnear, Hyde Park, S.A. ... | Do. ... ... | 77 | 57 | 72 | 98 | 137 | 141 | 141 | 119 | 100 | 109 | 101 | 91 | 1,243 |
| Alex. Smith, Goodna ... ... ... ... | Do. ... ... | 86 | 67 | 99 | 112 | 118 | 129 | 137 | 131 | 105 | 111 | 81 | 60 | 1,236 |
| A. H. Padman, Adelaide, S.A. ... ... ... | Do. ... ... | 59 | 92 | 64 | 78 | 86 | 136 | 132 | 138 | 131 | 118 | 110 | 82 | 1,226 |
| R. Burns, Warwick ... ... ... ... | Do. ... ... | 19 | 67 | 72 | 115 | 116 | 144 | 147 | 135 | 123 | 130 | 91 | 51 | 1,210 |
| J. Zahl, Boonah ... ... ... ... ... | Do. ... ... | 57 | 19 | 63 | 93 | 101 | 138 | 148 | 139 | 129 | 109 | 114 | 90 | 1,200 |
| R. Burns, Warwick ... ... ... ... | S.L. Wyandottes ... ... | 33 | 28 | 60 | 116 | 113 | 128 | 135 | 124 | 106 | 117 | 107 | 86 | 1,153 |
| H. Hammill, Kogarah Bay, N.S.W. ... ... | White Leghorns ... ... | 70 | 79 | 52 | 85 | 106 | 119 | 124 | 136 | 100 | 116 | 93 | 72 | 1,152 |
| A. Astill, Moorooka ... ... ... ... | Do. ... ... | 37 | 22 | 50 | 70 | 101 | 117 | 119 | 112 | 100 | 109 | 109 | 93 | 1,039 |
| R. W. Goldsbury, Kelvin Grove ... ... | Do. ... ... | 50 | 7 | 1 | 49 | 118 | 130 | 139 | 121 | 104 | 101 | 116 | 82 | 1,018 |
| Mrs. A. A. Carmichael, Coorparoo ... ... | Brown Leghorns ... ... | 42 | 14 | 26 | 71 | 113 | 130 | 110 | 108 | 111 | 77 | 95 | 87 | 984 |
| J. K. Stewart, Brisbane ... ... ... ... | White Plymouth Rocks (1) | 0 | 19 | 4 | 37 | 71 | 118 | 117 | 104 | 95 | 90 | 79 | 35 | 769 |
| J. K. Stewart, Brisbane ... ... ... ... | Do. do. (3) | 13 | 0 | 0 | 6 | 86 | 121 | 116 | 102 | 89 | 94 | 75 | 31 | 733 |
| J. K. Stewart, Brisbane ... ... ... ... | Do. no. (2) | 0 | 0 | 0 | 9 | 57 | 109 | 109 | 100 | 74 | 81 | 63 | 29 | 631 |
| | | 1,320 | 1,251 | 1,465 | 2,205 | 2,712 | 3,138 | 3,228 | 3,005 | 2,660 | 2,640 | 2,465 | 1,956 | 28,055 |

# State Farms.

## BUSH HAY.—No. 2.

By R. JARROTT, Manager State Farm, Gindie.

Last month I advised that the hay be not dried too much; but that does not mean that it can be stacked while damp. If the hay is in sheaves, and it feels cold and clammy in the centre, where the band goes round it, give it another day or more, if necessary. If it is in cocks, try a handful out of the middle. If it is right there, it may be damp where it comes in contact with the earth. If so, put the fork under the cock, and turn it bodily towards the west—that is, if it is done in the forenoon. After midday, turn the cocks towards the east; by so doing, the sun will shine principally on the damp part. Very often, after the hay has been in this position for half an hour, it will be safe to cart to the stack.

Most of us, I think, when at this work, hope the seasons will be so good that the hay will not be required for at least ten years. Having this in view, it will be necessary to take a little trouble in putting it together, so that it will be good when required.

When it is determined what size the stack is to be, lay saplings or any old timber inside the pegs. Then dig a trench—say, 6 in. deep and 15 or 18 ft. wide—all around and throw the dirt on top of the timber. After the stack is finished, and the loose hay has been carefully raked up, cut a small drain from the lowest point of the one around the stack to draw the water off.

If the stack stands for any length of time, keep a sharp lookout for the roof, and if any hollows are noticed fill them up by working reeds or long grass into the hollows. Start at the bottom, and work the material well into the stack with the hand. Work upwards so that the material will be put on like shingles.

Of course it would be better if the roof were thatched, but anyone unaccustomed to this work would not make much of a job at it without being first shown how it is done. It is in the hopes of helping such that these few hints have been given.

To anyone who contemplates saving a few tons of hay every year, when available, it would be much cheaper to build a shed with a roof that could be raised and lowered as required. With a shed of this description it does not matter how little hay there may be in it, the roof can be let down to protect it from the weather, and pulled up when the next lot is put in. Another advantage of a shed is that anyone could stack the hay in it, as the posts would keep it from slipping.

A shed from 30 to 35 ft. long and about 16 ft. wide would store a nice little lot, if the material were put in evenly and the roof lowered on to the hay in the evening, and pulled out of the way the next morning.

The roof would require to be as light as possible, consistent with the necessary strength; 4 by 4 hardwood for plates, and 4 by 2 and 3 by 2 pine for rafters and battens, would be about right. A 9-ft. light-gauge sheet iron on each side would give the necessary pitch to the roof.

Not less than ten sound and reasonably straight posts would be required for a shed 35 ft. long—three on either side, and two at each end to carry the rollers for winding the roof up. The said rollers could be made and worked on the same principle as a Cocky hay press, or, if desired, something more elaborate with a pawl and ratchet could be used.

---

## NOTES FROM WARREN STATE FARM.

On 16th February we received 174 points of rain, which was most acceptable after such a long and trying drought. On 2nd March we got 132 points; and on the 3rd, 47 points. Although this has not proved sufficient for our requirements, it has supplied us with a good shoot in the grass and sufficient moisture for the planting of seed; the latter, of course, will soon need moisture, as the subsoil is still dry.

Having kept our cultivation areas in readiness all through the dry weather, and having the seed cleaned and prepared, I was able to take full advantage of the rain when it did come.

The following crops have been planted:—

Two varieties of sweet potatoes—viz., White Maltese, Kumera, Rosella, Spanish Giants, Bundabergs. Varieties of pumpkins, marrows, and squashes.

Maize.—Six acres of maize (including the following varieties:—Early Leaming, Kansas Sunflower, Boone County White, Sydney Red, and Pride of the North) have been planted for ensilage. When the maize was about 4 in. in height, cowpeas were planted alongside so as to form a bulky crop and balanced ration for the stock.

A variety of maize, treated by the Melville process and forwarded for experiment by the Agent-General, was planted, but did not germinate.

Cowpeas.—Twenty-eight varieties of cowpeas are being experimented with, and will be mentioned as the most suitable varieties are proved.

Sorghums.—A small quantity (¼ acre) of sorghums was planted for seed.

Millets.—Sowings of Japanese (7 acres), Siberian, Manchurian, German, Italian, and French millets have been made. The four first have been proved successful, and the latter three are being tried again.

Wheat.—Four varieties have been planted—viz., Cretan, Kubanka, Emmer, and Medeah, of which the Cretan has proved most successful, and the Emmer (a Swiss wheat) is being acclimatised.

Canary Seed and Oats.—Small sowings of each have been made, and further sowings will be made as seed arrives. The former is the best winter crop grown on this farm.

Lucerne, including Grimm's Special (American) and Peruvian seed (in all, 7 acres), has been planted.

A further sowing of rice (five varieties) has been made, a small crop of which was planted on 13th November last, and is just ready for cutting. As the weather was dry all through and watering had to be resorted to, its suitability can hardly be commented on.

All these crops are doing well, and with additional rain should be a success.

---

## RICE EXPERIMENT AT WARREN.

By T. JONES, Manager State Farm, Warren.

Rice (*Oryza sativa*) is a native of the East Indies, which alone proves that it requires the heat of a tropical sun and a large amount of moisture.

We have had the intense heat this year, but, unfortunately, we have not had the desired moisture—in fact, droughty conditions have prevailed since March, 1911. It was under such conditions that I grew five varieties at Warren this year, its suitability as a hay producer being the chief object. The following was the result. The crops were planted on 13th November, 1911, and harvested 26th March, 1912:—

*No.* 1. *Kinzo.*—Germination good; healthy growth, but suffered a severe setback when heading. The grain is not well filled, and there are a large number of white-heads. Height, 2 ft. 2 in.; yield per acre, 19 cwt. 3 qr. 5 lb.

*No.* 2. *Yakan.*—This variety did not prove as strong at any stage of growth as the former, but kept growing well considering the climatic conditions of this year; not so many white-heads as Kinzo, and not so bulky, but cleaner in flag, and weighty yield—16 cwt. 1 qr. 12 lb. per acre. The seed is better filled in this than the former, but the height is only 1 ft. 11 in.

*No.* 3. *Oiran.*—This crop has clean, fine straw, and should prove a valuable hay crop in a good season. It grew steadily all through, and did not suffer as much as the others when heading. The grain is fairly well filled. The heads are small, and the crop short but healthy. Height, 1 ft. 10 in.; yield per acre, 18 cwt. 1 qr. 6 lb. of first-class hay.

*No.* 4. *Kaniko.*—This crop is a good robust grower, and has fairly good heads. It grew steadily all the time, and gave what I consider a good yield for such a season. The grain is not well filled. Height, 2 ft. 4 in.; yield per acre, 19 cwt. 3 qr. 3 lb. of first-class hay.

*No.* 5. *Seed received from V. A. R. Pollock, Esq., Tolga.*—This variety is a giant compared to the others, but has not the ability to withstand dry weather. It grew in a wonderful manner for the first few weeks, and then suffered a severe setback, with the result that about 50 per cent. of the crop is dead flag, which spoils the sample for hay. Only about 20 per cent. of this crop came to head, and only a few grains set. Height, 3 ft. 2 in.; yield per acre, 1 ton 4 cwt. 0 qr. 15 lb; sample poor. This variety, no doubt, would grow well in rich soil, with a good rainfall.

The crops were sown in drills 3 ft. 6 in. apart, and cultivated every week until the last four weeks of their growth. There was no rain for the first two months of their growth, and the total rainfall during growth was 3.89. I have sown the five varieties again, hoping to receive a more liberal rainfall.

---

## MUNGO BEAN AS A COVER CROP.

By C. E. WOOD, Manager Kamerunga State Nursery, Cairns.

To anyone interested in the growing of tropical crops in a climate such as that in the Cairns and similar districts, where weeds grow quickly and where owing to long spells of wet it is often impossible to work the land for weeks at a time, the finding of a cover crop of the legume family and yet not a climber, which provides good cover for the ground, is likely to prove of interest.

The plant known as Mungo Bean (*Phaseolus Mungo*) now being experimented with at Kamerunga State Nursery appears to be just such a plant as is required—at all events, for some crops.

When I was engaged in coffee-growing up the range, I soon found out that if weeds were to be kept in hand some plant must be found that, while affording a good cover for the ground and so help to check weeds, would not interfere with the coffee trees. Naturally I turned to the legume family, and tried various cowpeas, but these were not altogether satisfactory even as a cover, and the labour of continually going round

PLATE 70.—MUNGO BEAN.—Side View, showing Height of Plant.

to keep the runners from going all over the coffee trees did not pay. On the other hand, clean cultivation for coffee or similar crops during a heavy wet season is not in my opinion an advantage, as I found the loss of good surface soil was enormous even when plenty of surface drains were made; but, although I tried many different plants, including various indigenous legumes, it is only since growing the "Mungo Bean" or Green Gram, as it is also called, that I began to see a chance of having found a plant and a legume that might, so to speak, "fill the bill."

The Mungo Bean germinates in from two to three days, and the accompanying photographs show the growth at exactly two months old—the seed was planted 20th December, 1911. "A." gives a side view of a row, and the height may be gauged by the figure walking alongside. "B." is the same, looking down between two rows planted 4 ft. apart,

PLATE 71.—MUNGO BEAN.—Looking Down between two Rows of Plants, 4 feet apart.

and gives a good idea of the shade afforded to the ground. As already inferred, I should have considered this plant a boon had I known of it during my coffee days. I also trust that it may prove of especial value to the cane farmer, but, before making any decided statements, further experiments must be made by growing between cane, as the time when the Mungo has best growth for a cover crop may not be the time when most required for the cane. At present there is no seed available for distribution; but, as a small quantity is being sent to the Sugar Experimental Farm, Mackay, I have no doubt that its suitability as a cover crop for cane will be thoroughly tested, when, if proved to be of real value to the cane farmer, seed in quantity could be imported from other tropical countries, where hundreds of thousands of acres are under this bean for its value as a food.

# Viticulture.

## OBSERVATIONS AND CULTURAL NOTES ON GRAPES—No. 5.

By CHARLES ROSS, Instructor in Fruit Culture.

[CONTINUED FROM APRIL NUMBER.]

23. *Muscat Hamburgh, syn. Black Muscat of Alexandria, Snow's Muscat.*—A large oval black grape with a thin skin and melting, juicy, rich, sweet flesh with a fine Muscat flavour. Fine, large-shouldered, and tapering bunches. Sometimes the berries do not set too well, and a

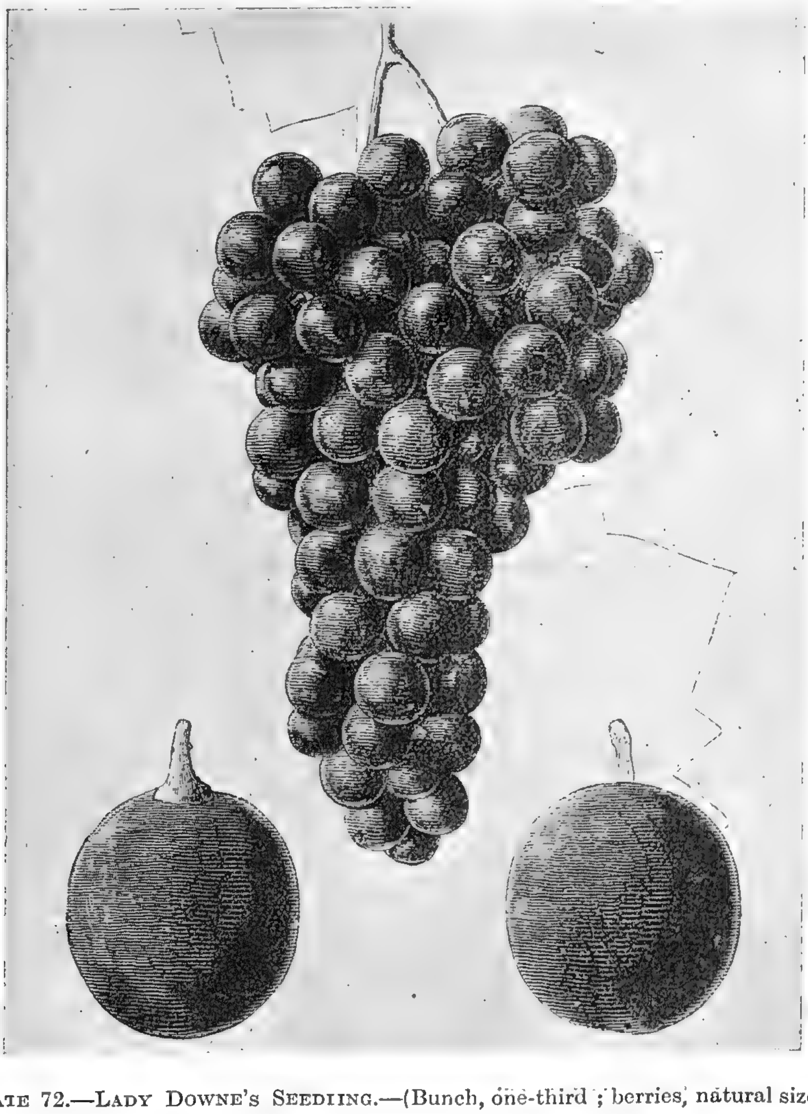


PLATE 72.—LADY DOWNE'S SEEDLING.—(Bunch, one-third; berries, natural size.)

number only half develop; the bunch is, therefore, rather loose. The vine is a moderately vigorous grower, and bears very freely. Too much summer topping should be avoided, as I have noticed that the bunches

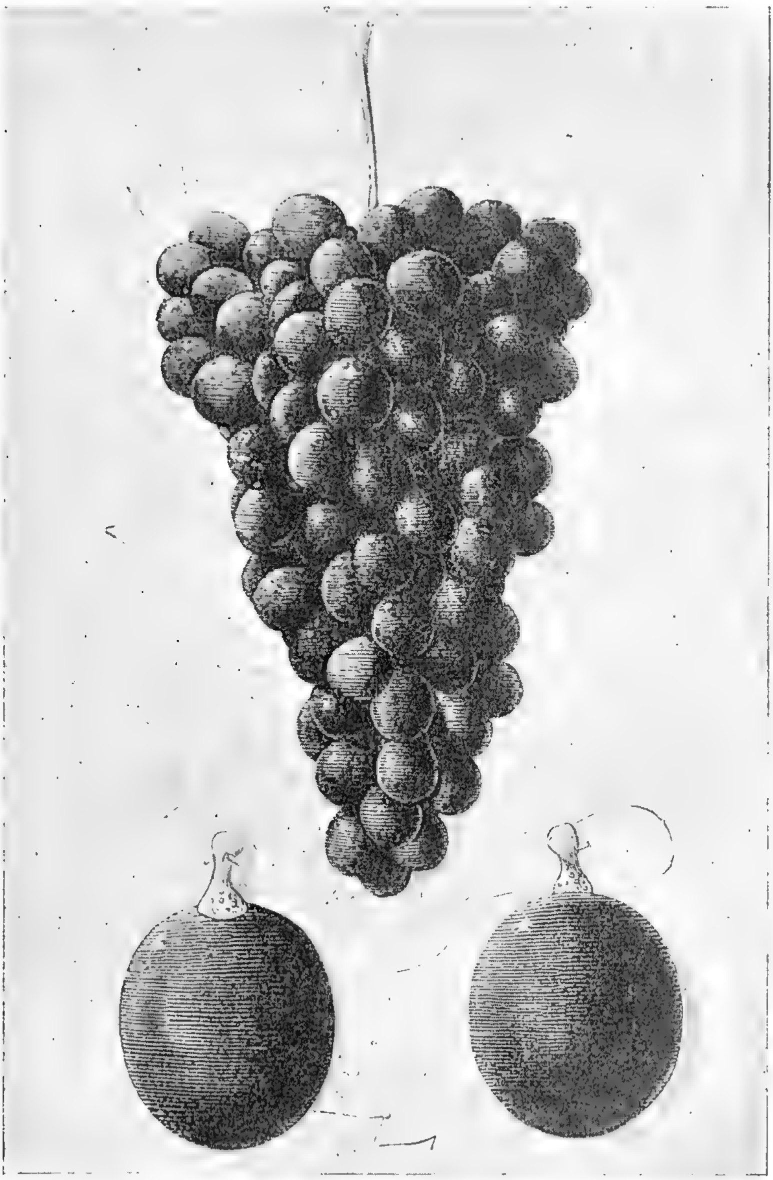


PLATE 73.—MRS. PINCE'S BLACK MUSCAT.—(Bunch, one-third; berries, natural size.)

are liable to "shank" where the foliage is thin. Another method of obviating the evil of "shanking" is to graft on to a more vigorous vine.

The variety is a very old one, and used to be grown as Black Muscat of Alexandria, but was almost lost until it was reintroduced forty years ago as "Snow's Muscat," after a grower of that name. It is now in general cultivation. Both quality and appearance are first class, and it is considered the best of all the Black Muscats. Although somewhat delicate, it does remarkably well over a wide range of this State.

24. *White Morillon.*—A large white grape with heavily-shouldered bunches; late, and will hang on the vine and keep well until April. The flavour is not pronounced, and the flesh is rather squashy. The skin being tough, it carries well and is a useful variety for late markets. The vine is strong and vigorous, and is equally suitable for a low or an overhead trellis.

25. *Oeillade Noir, syn. Blue Imperial.*—A black sweetwater grape, thickly dusted with a fine blue bloom and very handsome. The bunches are a good medium size and set well. The flesh is melting, juicy, with a sweet pleasant flavour. The vine is a moderate grower and fruits well, and is well suited for growing as a bush. This variety has been largely distributed by the Royal Horticultural Society, but it originated in France.

26. *Purple Cornichon.*—A very large, elliptical-shaped berry of intense bluish purple colour. The bunches are also very large and very handsome. It is one of the most magnificent grapes known. The skin is very thick and tough, and the flesh brisk, pleasant, and crackling. It is late in ripening, and will hang well into the winter if protected. The vine is a strong, vigorous grower, and a moderate bearer. My experience is that it is not subject to "spot," but it would be more suitable for the inland districts than for the coast—in fact, I cannot recommend it for the latter at all.

27. *Raisin de Calabre.*—A round, white, vinous grape with large, long, bunches which set well, but are never overcrowded. The skin is whitish, semi-transparent, showing the seeds through, very firm sweet flesh, but not a rich flavour. The vine is a free grower with a vigorous constitution. The shoots are long-jointed, with clean pale bark, and the vine bears well in dry seasons. The variety is largely grown in Southern Italy, where it originated. Suitable for inland districts.

28. *Raisin des Dames.*—A beautiful, yellow grape of the largest size with a tough skin, but tender, juicy, sweet flesh. The bunches are above medium size and closely set. Although not of the best constitution, the vine as grown at Westbrook was fairly vigorous, but the annual shoots did not lignify too well, and the spurs were apt to perish.

[TO BE CONTINUED.]

Plate 74.—Madresfield Court.

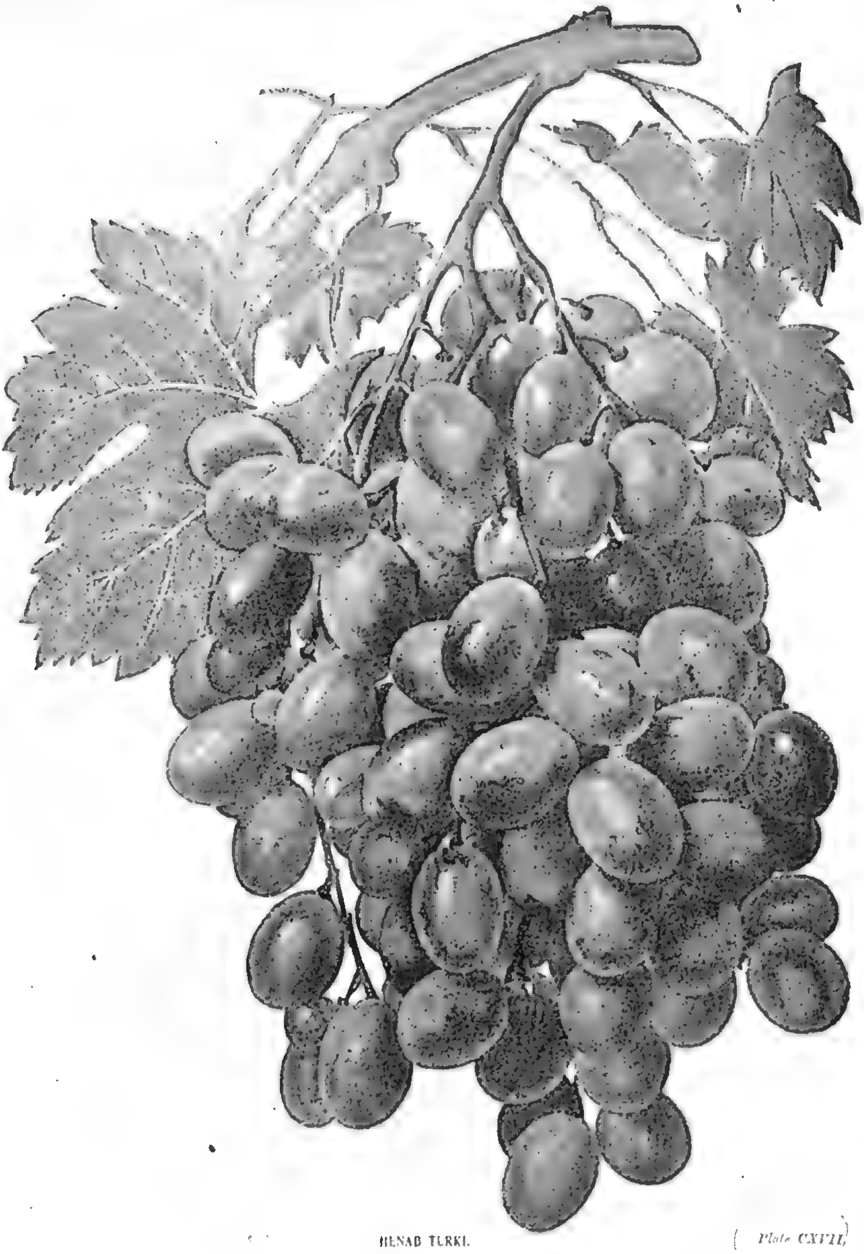



PLATE 75.—HENAB TURKI.
(See Letterpress in April issue.)

# Tropical Industries.

## THE CULT OF THE COCONUT.

In the light of the knowledge that we now have of the suitability of our coast lands—say, from Mackay northwards and along the coasts of the Gulf of Carpentaria—for the profitable culture of the coconut, as has been frequently pointed out by Mr. H. Newport, Instructor in Tropical Agriculture at Cairns, and by various planters in the North, it would seem to be merely piling Ossa upon Pelion to emphasise the value of the coconut as a profitable industry in this State despite the abnormal cost of white labour. Our virgin scrub soils on the coast are eminently suited to this particular palm, and although, in the oldest districts, some of the soils have been cropped until nearly worn out, yet, with the addition of suitable manure, they would be capable of producing payable crops of coconuts. "Tropical Life" (London) publishes the following article on the manuring of coconuts, which has been considered of such value as to be reproduced in the "Tropical Agriculturist" of Ceylon, where the coconut is extensively grown. The article reads as follows:—

### THE QUESTION OF MANURING.

It is commonly asserted that the uses of the coconut palm are as numerous as the days of the year. Apart from local uses, where the leaves serve as roofing, the mid ribs for basket-making, and the hard shell for domestic utensils, the more important commercial commodities are, in the first place, the dried kernel known as coprah, from which a valuable oil is expressed; then comes the fibre from the pericarp, which envelops the shell, used for ropes and cordage; and, lastly, the sap from the young stems and blossoms, which, when fermented, provides us with arrack and a good quality of vinegar. With such an important plant it may be of interest to give some details as to the methods of propagation, planting, cultivation, and manuring.

As has been proved with other cultivated plants, such as wheat, due attention to seed selection is bound to give increased yields. Seed-nuts should be selected from trees that are known to be good, regular bearers under ordinary conditions of soil and climate,* and though this may be generally recognised, the method of picking the nuts, even from the especially selected trees, is often careless, and tends to destroy this initial advantage. The nuts, of course, should be completely matured, and from this point of view many argue that they should be allowed to fall naturally from the trees. This involves considerable damage to the young embryo, and careful hand-picking, if by reliable and experienced

* In our October issue, page 199, we give full particulars of the San Blas nuts and their advantages for planting.

hands, is preferable. To accomplish this the stems of the trees are notched, and this is often done in such a way that little cups are formed, where water lodges, and so sets up decay. Notches are perhaps necessary, but they should always be carefully cut, not too deep and sloping downwards, so as to minimise the danger as much as possible. The ripe nuts are then stored in a dry place for about six weeks, since, if this is not done, the food store in the nuts is liable to decay. A corner of the plantation, preferably under shade, with sandy or well-drained soil, is selected as a nursery, and the nuts are laid lengthwise in shallow trenches and lightly covered with soil. A handful of kainit applied to each nut is of an advantage, as this tends to prevent the ravages of such pests as white ants. From the nursery the young seedlings are removed to the plantation, and this is best done just before the commencement of the rainy season. In removing the seedlings care should be taken to leave the roots as entire as possible, and that no injury be done to the young shoots, especially at their junction with the nut. This transplanting stage is open to many grave dangers. For instance, the young roots may be damaged, and, since the function of transmitting water upwards to the leaves is thus impaired, it is advisable to cut off about one-third of the leaves so as to regulate the evaporation from the leaf surface. But another danger is presented in that the period of transplanting may just coincide with the exhaustion of the natural food store in the nut, and before the seedling has developed sufficient power to extract the necessary food material from the soil by the fine root hairs. This stage occurs about six months after the appearance of the cotyledon or seed leaf, and a period of about three weeks elapses before the seedling has accommodated itself to the new situation. Recognising this danger, there are many who maintain that the nursery stage is unnecessary, and that the better method is to leave the nuts in piles of ten to twelve, and transport the nuts when sufficiently sprouted direct to the plantation. Those who advocate this method claim that not only is the expense of the nursery work avoided, but weakly plants can be readily seen and rejected. When one considers that in Ceylon two transplantings are carried out—the second when the plants are a year or so old—the nursery method, when practised with reasonable care, is perhaps more advisable. In the plantation the palms should never be less than 25 ft. apart each way, and planted in ordinary orchard form—30 by 30 ft., or 48 to the acre, is generally found best.

A few notes may now be made on the conditions of the soil most favourable to the growth of this palm. Without entering too far into the realms of botany, it is necessary to remember that the roots are large and fleshy instead of fibrous, and this points at once to the necessity of having a fine permeable soil. That fact alone explains why coconut palms are naturally found along the seashore, where the soil is of a sandy nature. But the seashore has other advantages. It is now generally recognised that the plant foods are taken up in a dilute solution, and the water so absorbed is then transpired through the large leaf surface. Naturally, then, there is a distinct connection between the transpiration through the leaves and the amount of plant food taken up, and where the palms are situated in a good airy position the vigour of the tree is best assured. Fully exposed to the prevailing wind, with a more or less constant supply of water, the palms yield profitable harvests of nuts, and on these coastal tracts it is only necessary to avoid storm centres, where violent gales would tear the leaves and dislodge the young nuts, to ensure success and obtain regular profits.

From what has been said, one can realise that soils of a clay formation, where drainage has received little attention, are unsuitable; but, though the growth of the trees is practically governed by the water supply, stagnant water is detrimental, as the feeding area of the roots is limited to the surface, and the palms are more readily blown over by the wind. Sheltered valleys should also be avoided, though the poor yields from inland plantations can be largely attributed to the lack of water in the subsoil, too close planting, and the apparent indifference of the native planters towards any improvement, either in the way of thinning out the trees or by undertaking some form of cultivation to produce a more friable condition of the soil.* By adopting scientific methods of cultivation the environment of our economic plants has been greatly extended, and it is possible to create conditions under which these plants thrive just as well as in Nature, and in many cases far better. So one hopes to extend the region of coconut culture from the coastal areas to the inland districts through due attention to seed selection, irrigation and drainage, planting in orchard form, so as to have the maximum amount of light and air, and regular cultivation and manuring to restore the plant foods removed by each harvest of nuts.

In the August, September, and October number of "Tropical Life" several interesting articles dealing with coconut palms have appeared, and so, to avoid repetition of the information given there, we shall confine our attention to the manuring question. Those acquainted with coconut plantations are quite aware that the trees in the neighbourhood of the stations are frequently more vigorous and produce larger crops than those even a few hundred yards distant. The natives attribute the larger return of nuts to a form of gratitude on the part of the trees for their inclusion in the family circle, but the real reason lies in the fact that such trees get more attention in the way of manure from the cattle sheds and other refuse of a fertilising character. Not only is a higher yield noticeable, but the nuts are larger, and young trees on the plantations near the stations come earlier into bearing and yield even at their fifth or sixth year; whereas, in ordinary cases, a period of from eight to ten years usually elapses before the trees produce nuts. This is by no means a small consideration, for a quicker return on the outlay is thus assured. Experiments on the manuring of coconut palms have not yet been conducted on any large scale, and up to the present we have only the guidance of the analyses of the various products removed by a year's harvest. Dr. Backofen has shown by analyses that a crop of 1,000

* See "Notes on cultivation" in "Tropical Life" for October, page 200.

nuts—*i.e.*, the produce of half an acre—removes the following quantities of plant food from the soil:—

| | Lb. |
|---|---|
| Nitrogen .. .. .. .. .. .. | 8.6 |
| Phosphoric acid .. .. .. .. .. | 2.4 |
| Potash .. .. .. .. .. .. | 18.7 |
| Lime .. .. .. .. .. .. | 2.3 |
| Salt .. .. .. .. .. .. | 21.4 |

making a total of 53.4 lb. of plant foods removed from the soil of half an acre by the crop alone, and, besides this, the trees have also to be considered and provided for.

These figures give us a working basis on which we can build up a manure mixture to replenish the soil with the more important plant foods. Assuming that fifty trees go to the acre, and that the average harvest is fifty nuts per tree, then this means that 21½ lb. nitrogen, 6 lb. phosphoric acid, and 47 lb. potash are removed. These figures are taken from the analysis of the nuts, and, allowing for the growth of, and nourishment for, the trees, we arrive at the following figures:—

| | Lb. |
|---|---|
| Nitrogen .. .. .. .. .. .. | 29 |
| Phosphoric acid .. .. .. .. .. | 14 |
| Potash .. .. .. .. .. .. | 74 |

Before deducing a suitable manure mixture from these figures, we must take certain considerations into account. The palms are known to be heavy feeders, but if found under suitable soil conditions, then the roots have a wider ranging power, and can draw to a greater extent on the original or latent supply of plant food in the soil. Then, on a young plantation, it is assumed that suitable methods of cultivation will be adopted, and for the first two or three years catch crops of marketable value, such as corn and mountain rice, may be grown between the lines. The yields from these catch crops will usually balance the cost of cultivation, but after the fourth year the leaves of the palms will have spread over the rows sufficiently to create too dense a shade for catch crops. Cattle manure is rarely found in sufficient quantities for large plantations, and to supply humus, which is useful to conserve the moisture in the soil, a legume crop, such as velvet beans or cowpeas can be grown, and this, when lightly ploughed under, supplies the soil with nitrogen, which the bacteria on the roots have the power of building up from the free nitrogen in the atmosphere. On a fairly heavy soil a legume crop is of considerable value, since roots open up and aerate the soil.

Bearing these facts in mind we can recommend the following mixture:—

| No. 1. | | No. 2. |
|---|---|---|
| 100 lb. ... ... ... ... | Sulphate of ammonia ... ... ... ... | 120 lb. |
| 150 ,, ... ... ... ... | Bone meal ... ... ... ... ... | 200 ,, |
| 50 ,, ... ... ... ... | Superphosphate... ... ... ... ... | 60 ,, |
| 100 ,, ... ... ... ... | Kainit ... ... ... ... ... ... | 100 ,, |
| 50 ,, ... ... ... ... | Muriate of potash ... ... ... ... | 70 ,, |
| 450 lb. per acre. | | 550 lb. per acre. |

The first mixture is suitable for application during the first three or four years, but as soon as signs of the formation of nuts are observed, then the second mixture should be applied, in order to stimulate the trees as much as possible. Where green manures have been ploughed into the soil, then the quantity of sulphate of ammonia can be considerably reduced. These mixtures have been based on the information gained from experiments on orchards where the effects of the various plant foods have been more or less established. For instance, it has been found that the effects of the nitrogen is to increase the size of the fruit, but, in order to obtain quality as well as quantity, phosphate and potash must also be added. These play a prominent part in the formation of carbohydrates and albuminoids, and those who visited the stand of the Potash Syndicate at the recent International Rubber Exhibition, London, will remember the cross sections of the coconuts, where a striking difference in the amount of meat was shown between those nuts from the manured and unmanured plots. Photographs showing relative thickness of the kernels of these nuts have now been taken.

We have been assuming that we are dealing with newly-formed plantations, but the case is quite different when we come to deal with old plantations which may have been neglected for a considerable number of years. The vitality of the trees is naturally low, and we must make up this by the application of plant foods before any appreciable difference can be noted in the yields. We often find in these neglected plantations, however, that the trees are too close together, and not only are the yields unprofitable, but these trees are often in a very unhealthy condition, with bud rot, and are thus a source of infection to healthier palms in the neighbourhood. The first step should be to thin out the plantation till the distance apart each way is not less than 25 ft. It is hard to convince a native as to the wisdom of this, but it will be found to be work that pays. After this thinning, cultivation and manuring can be more uniformly practised. A heavy manuring should be given the first year or so in order to restore the vigour of the trees and to promote the formation of nuts. In such cases the first year's manuring may do very little beyond improving the appearance of the trees, but after the second year an increase in the crop is bound to take place. A manure composed largely of organic material is preferable, and the following mixture should give good results:—

| | Lb. |
|---|---|
| Castor cake .. .. .. .. .. | 250 |
| Tankage .. .. .. .. .. .. | 200 |
| Sulphate of ammonia .. .. .. .. | 50 |
| Kainit .. .. .. .. .. .. | 120 |
| Muriate .. .. .. .. .. .. | 80 |
| Sufficient for an acre .. .. .. .. | 700 |

As soon as the trees show a healthy appearance, then Mixture No. 1 in the first table can be applied with advantage.

"Seeing is believing" is an old adage, and most of us are sceptical in that we require to be shown actual proof of a thing before we will believe it. It is only by actual experimental work that we can hope to convince the planters that the adoption of more up-to-date methods will give increased and profitable yields; and, in view of the growing demand for coprah and vegetable oils, which is creating something of a boom in coconut culture, owners and managers of plantations should test for themselves the value of adopting the more modern methods of cultivation and manuring suggested here.—"Tropical Life."

---

## BRITISH NEW GUINEA DEVELOPMENT.

An instance of rapid development of plantation work in Papua is afforded by the operations of the British New Guinea Development Company, of which Sir Alfred Cowley is managing director. It was at the end of December, 1909, that several large selections of virgin scrub-clad land were acquired by the company, who, in 1910, set vigorously to work to develop their properties. From the "Rubber World" for 29th February, 1912, we take the following report on the company's operations:—

The directors had hoped to be able to submit accounts and hold the annual meeting earlier than last year, but, owing to the long period of transit of mails from British New Guinea to London, and the necessity for stocktaking in Papua, as at 31st December, 1911, this will probably not be possible before May or June. A report has been received from Sir Alfred Cowley, the company's local director in Brisbane, in which he expresses his gratification at the greatly improved appearance of the plantations generally, and advises that the following areas which had then been planted were, almost without exception, looking remarkably well:—Coconuts, 1,597 acres; sisal hemp, 342 acres; rubber, 401 acres; catch crop, 194 acres; total planted, 2,534 acres; cleared ready for planting, 1,990 acres. Sir Alfred explained that, owing to absence of rain, planting was temporarily suspended, but a cablegram has since been received from the general manager reporting that the area now planted amounts to 4,000 acres. Sisal hemp and Ceara rubber should be productive of revenue within two years, and in the meantime profits from the trading business are steadily increasing. Special attention has been paid to the development of this branch of the company's business, and it is confidently believed that it is capable of expansion, and likely to be a source of considerable profit. Of the 4,000 acres already planted it is understood that about 3,000 acres are in coconuts, and, in view of the promising outlook for copra, when these trees begin to bear, a large and increasing revenue should be derived from this crop. Attention is now being given to crops calculated to produce quicker returns, and ploughs are now at work preparing the ground for tobacco and cotton, both of which, from experimental planting, promise to do well. The trial crop of tobacco raised last year has been encouragingly reported upon by the trade, and a considerable local business in this commodity is confidently looked for.

## THE HEMP MARKET.

The following extract from a special report of the High Commissioner for New Zealand in London on the sisal hemp industry will be of much interest to sisal hemp growers in Queensland and elsewhere:—

In the High Commissioner's market cable of the 13th January reference was made to the fact that the rise in value reported in the cable of the 7th January was due to a reported agreement made by the Mexican Government with regard to sisal hemp. The High Commissioner amplifies this statement in a special report dated London, 17th January. He says:—

"The arrangement is generally referred to as a 'valorisation scheme,' but so far no definite particulars have come to hand, and opinions are only based upon cabled information. The root of the matter lies in the very low prices which have been ruling for sisal recently. This hemp is used chiefly in the United States of America for binding-twine manufacture, and the greater part of the output is sold in New York. One of the largest buyers is the Harvester Trust—in fact, that organisation would seem to be the ruling factor on the market. Owing to their large business, the trust, and indeed the other purchasers of sisal in both New York and London, have for some time pursued the policy of holding off the markets as much as possible, thus depressing prices and causing sellers to accumulate large stocks, which at last the merchants were forced to sell at practically any price offered.

"During last year in New York the price of sisal was down below 4 cents per lb.—this being equal to about £17 10s. per ton—and London prices were correspondingly low. When it is remembered that at the beginning of 1910 £29 10s. was the ruling figure in London, and that the average for the whole of 1909 was something near £28 per ton, the extent of the drop will be apparent. Then, of course, the low prices helped to depress the values of Manila hemp and also that of New Zealand, and so the buyers could play one off against the other, as it were.

"Things seem to have gone to such an extent that many growers found themselves at last unable to hold out any longer, and they approached the Mexican Government in the matter. The outcome is the so-called 'valorisation scheme,' and in the absence of definite details I can only give you an outline of the market opinion of this measure, which is known to have been agreed to by the Mexican Government by special Act of Parliament.

"The idea seems to be that the Government, with the aid of the largest banks, will finance sellers with regard to their surplus hemp by making advances to them, and thus enabling them to wait for a favourable market. Apparently only sufficient hemp to meet the current demands will be marketed, and all growers are thought to be included in the scheme. A certain minimum selling price—5 cents per lb., New York (equal to £23 5s.)—£24 15s. to £25 here—is said to have been fixed, and, as a safeguard against overproduction, which these prices might otherwise induce, it is believed that some scheme of restriction of output will be imposed on growers; in fact, the whole scheme would seem to be on the lines of that of the Brazilian Government in regard to coffee.

"The amount set aside by the Government for the purpose of financing the scheme is variously thought to be between half a million and one million pounds sterling, and the expenses of working will be met by a special import duty on sisal hemp.

"Whether buyers found themselves short at the time of the publication of the scheme—about the middle of December—is not known, but at any rate the immediate effect was, as you are aware, for quotations to rise, and present rates show an advance of £3 per ton on those ruling about five weeks ago—to-day's prices in New York being 5¼ cents per lb., equal to £25 15s. to £26 London.

"It remains to be seen whether the arrangement will work successfully, but Mexican planters are said to be hopeful of this result, and contend that sisal prices will remain higher for a considerable time.

"From the point of view of New Zealand, this result is certainly to be hoped for, since values of manila are more or less affected by sisal prices, and of course the manila in turn affects New Zealand quotations. The rise to £22 5s. and £21 10s.—to-day's prices for good-fair and fair respectively—from the £20 and £19 10s. ruling two months ago is a welcome spurt, which doubtless New Zealand millers duly appreciate."—"Journal of the New Zealand Department of Agriculture."

---

## MANURING OF BANANAS.

By J. MONTGOMERIE HATTRICK, F.H.A.S., N.D.A.

Botanically, all cultivated varieties of banana belong to the family Musaceæ. Of the known varieties, only three are cultivated for commercial purposes in Queensland, namely:—

(1) Cavendish;
(2) Lady's Finger;
(3) Sugar.

The first, the Cavendish, is the one most universally grown in Queensland. It is a Chinese variety of relatively small habit, and for this reason is usually closely planted—say 12 to 16 ft. apart each way.

The other two varieties—Lady's Finger and Sugar bananas—are both strong-growing, and must be planted from 20 to 25 ft. apart each way. So luxuriant is the growth in many cases with these strong-growing varieties, that one marvels at the amount of vegetable matter produced on an acre of land, and, viewing it with the eye of a scientist, it very soon ceases to be a matter for wonder that the soil under bananas becomes so rapidly exhausted of available plant food.

The variety chiefly grown in the West Indies and in Fiji is the Gros Michel. In the latter colony it is largely used as a shade-bearing plant in young cocoa plantations, giving at the same time a regular revenue until the cocoa trees come into bearing.

The essentials to successful banana cultivation are:—

(1) An adequate and regular rainfall;
(2) A sufficiently and consistently high temperature;
(3) Shelter from winds;
(4) Good alluvial or scrub land.

Conditions (1) and (2) are, if the bananas are to be grown without irrigation, found only in the tropics. (3) Absence from storms cannot be obtained anywhere, nor is it always possible to select spots sufficiently well sheltered; but, as the plants are so liable to damage by high winds, this point should always, as far as possible, be borne in mind when selecting a site for a banana plantation. (4) A rich alluvial or volcanic soil is essential, and if drainage be not good naturally it should be made so artificially.

Data on the optimum quantity of humus in a soil for bananas are difficult to obtain, but there is not the slightest doubt that the presence of abundant humus is very essential. The writer is firmly convinced from his observations, and from the results of his experiments in Queensland, that in the tropics, and particularly on soils devoted to bananas and also pineapples, the organic matter becomes very rapidly depleted; and mineral artificial fertilisers used alone, while supplying abundant plant food, will fail to give such profitable returns as organic artificial fertilisers such as dried blood, meat works refuse, &c., for the simple reason that they tend, when used alone, to alter for the worse the physical condition of the soil, while the organic manures tend to improve it, in addition to supplying the essential plant foods.

The cultivation of the banana for commercial purposes in Australia is practically limited to Queensland, and even there the area devoted to it is, as the following figures will show, relatively small when compared with the 44,325 acres under this crop in the West Indies in 1905:—

AREA AND AVERAGE YIELD OF BANANAS IN QUEENSLAND.

| Year. | Acres. | Average bunches per acre. |
|---|---|---|
| 1906 | 5,163 | 260 |
| 1907 | 4,975 | 302 |
| 1908 | 4,647 | 355 |
| 1909 | 4,994 | 280 |
| 1910 | 5,198 | 217 |

On these figures the area under the crop has been practically stationary for the last five years. Indeed, if one goes further back, it is seen that the area has actually diminished by almost 20 per cent. since 1903.

The reason for this is to be found partly in the system of working. The districts best suited to bananas in Queensland lie in the North, where the lands are held by whites, but leased to Asiatics (chiefly Chinese), who in cultivating the banana do not display the skill usually associated with their cultivation of other crops, for the simple reason that they do not care whether the land becomes exhausted or not. As they only rent the land, a piece is usually roughly cleared, planted with bananas, and as soon as the plants cease to bear profitable crops the block is abandoned by the Chinese or Asiatic tenant, who moves to a fresh piece of land.

Other factors, which tend to retard the development of banana cultivation in Australia, are:—

(1) The fact that black or coloured labour is now prohibited in Australia;
(2) The recurrence, particularly in the districts best suited for the growth of the banana, of cyclones or hurricanes;
(3) Transport difficulties;
(4) The limited nature of the market.

All bananas produced in Australia must be marketed in that country, of which the total number of inhabitants does not yet exceed 5,000,000.

In spite of these limiting influences, so important is the cultivation of the banana to Queensland (121,075 bunches produced in 1910) that the best means of maintaining the fertility of banana lands has been the subject of careful scientific investigation, and it has been established beyond doubt that banana plantations need not be abandoned, but by suitable cultivation and manuring may be maintained indefinitely in highly profitable production.

What is possible in Australia holds good also elsewhere, and the writer hopes that, by applying the lessons of the present article in the West Indies and other banana-producing lands, results of manuring at least as favourable as those obtained in Queensland may there also be achieved.

Reference has already been made to the very luxuriant growth of the banana. To the practical planter there is no need to emphasise the point, as he is only too familiar with the enormous masses of vegetable matter produced. By the thoughtful, however, valuable conclusions may be deduced when going through a plantation of any age and viewing the bulky masses. Here one sees the plant in all stages of development, from the tender sprouting sucker to the stem which, its function fulfilled—*i.e.*, its fruit produced—lies rotting on the ground, apparently useless, yet a veritable museum of cell forms in the study of which no microscope is necessary, and which, from this view point alone, is worthy the most careful attention.

But apart from its purely scientific interest, what does all this teach? Consider for a moment the extraordinarily rapid growth of the plant, its abundant and enormous leaves, the huge cells so easily visible in the decaying plants, the fact that one may commence cutting fruit nine months after the suckers are planted, and that, once commenced, fruiting is practically continuous.

Surely this indicates that the banana is not a plant which can slowly absorb the mineral matter it requires from a reluctant and unkindly soil. Rather must it have its manurial ingredients in abundance and in an easily available form; and this is completely borne out by the known facts. In the data published by Mr. J. C. Brünnich, Agricultural Chemist to the Government of Queensland, one of the most striking points is that chemical analyses of virgin and worn-out banana lands have shown the so-called exhaustion of their *available* plant food, *e.g.*:—

## ANALYSES OF FRIABLE RED LOAM OF VOLCANIC ORIGIN.

| | (*a*) In Virgin State. | | (*b*) Exhausted by 20 Years Cropping. | |
|---|---|---|---|---|
| | Soluble in HCl of S.G. | Soluble in 1 % Citric Acid Solution. | Soluble in HCl of S.G. | Soluble in 1 % Citric Acid Solution. |
| | % | % | % | % |
| Potash ($K_2O$) ... ... ... ... | ·109 | ·0400 | ·067 | ·0035 |
| Phosphoric acid ($P_2O_5$) ... ... | ·255 | ·0142 | ·338 | ·0034 |
| Lime (CaO) ... ... ... ... | ·450 | ... | ·180 | ... |
| Nitrogen (N) ... ... ... ... | ·560 | ... | ·292 | ... |

From these figures it is seen that in this particular instance the exhausted land contained less than one-tenth the available potash, and not quite one-fourth as much available phosphoric acid as the similar virgin soil. Small wonder indeed that the worn-out land no longer gave profitable banana crops. The full significance of these figures can, however, only be grasped by studying them in conjunction with the actual food requirements of the plant, as indicated by its chemical composition. The writer is indebted to the same authority for the following figures calculated from his

## ANALYSES OF BANANA PLANTS AND FRUITS.

LB. OF PLANT FOOD. (AVERAGE OF 3 VARIETIES—LADY'S FINGER, CAVENDISH, AND SUGAR.)

| | (*a*) In Plants per Acre. | (*b*) In Bunches per Acre. | (*c*) Total per Acre |
|---|---|---|---|
| Pure potash ($K_2O$) ... ... ... ... | 193·6 | 77·88 | 271·48 |
| Phosphoric acid ($P_2O_5$) ... ... ... | 14·0 | 8·52 | 22·52 |
| Lime (CaO) ... ... ... ... ... | 99·0 | 3·15 | 102·15 |
| Nitrogen (N) ... ... ... .. | 55·8 | 28·74 | 84·54 |

Nothing could well be more striking than the enormous quantity of potash in both the plants and fruit, as shown by these figures. Considering the fruit alone, which is, after all, the only part of the plant really lost to the soil, it is seen to contain more than twice as much pure potash as all the other manurial ingredients put together.

Surely it is, then, small matter for wonder, when this relatively enormous quantity of potash must be absorbed by the plant *in a few months,* that banana cultivation must be abandoned as soon as the soil has been depleted of its readily available plant food, because not only must the plant absorb all the manurial constituents contained in the fruit, but also the large quantities of these substances required to build up the plant body itself. Taken together, the quantities of manurial ingredients in plant and fruit are enormous, and they must be present in the soil in readily available form if the quickly growing plant is to produce a fruit at all, and here in a nut-shell we have the secret of the rapid exhaustion and consequent abandonment of even the richest and most fertile banana lands.

But need these lands be abandoned? Is it not possible in the case of bananas, just as with all other crops, to return to the soil the plant food constituents removed and to maintain indefinitely the productiveness of the plantation?

These questions have been most emphatically answered in the affirmative, wherever exact scientific experiments on manuring of bananas have been carried out.

In Queensland the experiments carried out under the direction of Mr. J. C. Brünnich, Chief Agricultural Chemist, have all been planned with the object of finding out the most suitable combination of artificial fertilisers. Mr. Brünnich had evidently been so firmly convinced, from his preliminary investigations, that only a complete manure would meet the case, that he has not thought it worth while including incompletely manured plots in any of his experiments.

The trials arranged by the writer in Queensland were, however, simpler and designed, in the first place, merely to demonstrate to the planters the need for a complete manure, and, more than anything else, the necessity of including potash in their mixtures.

For this reason the essential feature of the plan of each experiment was that one plot received a certain mixture of artificials furnishing phosphoric acid and nitrogen only, while another plot received, in addition to the same quantities of phosphoric acid and nitrogen, a certain quantity of potash.

Other things being equal, the difference in yield between two such plots gives the increase due to the potash.

As the local conditions under which the Queensland experiments were carried out varied very much, it was thought advisable to modify the dressings accordingly, and for this reason it seems better to state the results of each individual experiment separately, in the first place, before grouping all experiments together with a view to arriving at an average result.

The following table gives a summary of the results, not only of the Queensland experiments, but also of two experiments carried out in Fiji, one of which was an official experiment of the Department of Agriculture.

A study of this table will show that in every case the planters have received very handsome returns for the money spent on potash. The net profits are in each case calculated from the value of the crop as stated by the experimenter from the ruling market price on his plantation in the year in which the experiment was carried out. The figures, therefore, afford a very fair criterion of the returns to be expected from the judicious use of potash manures. Averaging all the figures, one arrives at the very interesting result that, for every 1s. spent on potash, the planter receives 6s. in return.

The results of the official experiments of the Queensland Department of Agriculture have not yet been published. The basis of the complete manure used in these experiments is, however, equivalent to the following dressing per acre:—

1½ Cwt. sulphate of potash.
4 Cwt. superphosphate.
2 Cwt. sulphate of ammonia.

Mr. J. C. Brünnich, in his Annual Report for 1910, says:—"We find that Cavendish bananas, which are the best croppers, remove yearly 123 lb. potash in the fruit alone. Our figures agree very closely with some given by Professor Hilgard, who found 63.1 per cent. of potash in the ash of the fruit, and 27.6 per cent. in the ash of the leaves. The amount of potash we supplied in our manuring experiments is, therefore, not sufficient, and should be nearly doubled."

Many of the Queensland experimenters also reported that they considered the dressings given in the writer's experiments were insufficient, and from the results of all the experiments, as well as from Mr. Brünnich's data, everything points to the following as a very suitable

STANDARD DRESSING FOR BANANAS, PER ACRE.

2½-3 Cwt. sulphate of potash (96 per cent. pure).
3-4 Cwt. superphosphate (17 per cent. water soluble phosphoric acid).
1½-2 Cwt. sulphate of ammonia (20 per cent. nitrogen).

Equivalent quantities of phosphoric acid and nitrogen may also be given in other forms—*e.g.*, in the form of organic manures, such as meatworks refuse, dried blood, &c. In any case it is essential, in the cultivation of bananas, to maintain an ample store of humus in the soil, and also to apply at regular intervals dressings of lime.

An important point is the influence of the manure on the size of the bunches.

In Jamaica, "a bunch" is nine hands. In Fiji a bunch of eight hands or over is a "large bunch," under eight hands is a "small bunch." The relative proportion of large to small bunches is of great commercial importance, because the price obtained depends so largely on the size of the bunch.

In the experiment conducted by the Department of Agriculture in Fiji, which was planned by Mr. Chas. H. Knowles, an attempt was made to determine the influence of the manure on the size of the bunch. He found that, while on the unmanured plot only 25 per cent. of the bunches were "large," on the plot receiving phosphoric acid and nitrogen 74 per cent. were large bunches. On the plot receiving potash, phosphoric acid, and nitrogen, 66 per cent. were large bunches, and, although this proportion is lower than from the plot without potash, the absolute yield was so very much more from the complete manure that the extra outlay for potash was amply justified.

It is difficult, if not impossible, to lay down hard-and-fast rules for the manurial treatment of any crop, and the writer would urge all planters who intend using artificials to test his recommendations by practical trial before adopting them throughout a whole plantation; but there can be no possible doubt that on the lines indicated, and with the ever essential concomitants of lime, humus and good cultivation will profitably increase the crop while maintaining the fertility of the plantation and the size of the bunch.

## RESULTS OF FERTILISER EXPERIMENTS ON BANANAS.

| Experimenter and Address. | No. of Plot. | Fertilisers applied in cwts. per acre. Sulphate of Potash. | Superphosphate. | Sulphate of Ammonia. | Yields per Acre. Bananas. | Crop Increases per acre (a) Over Unmanured. | (b) Due to Potash. | Value of Increase due to Potash. | Cost of Potash. | Profit per acre due to Potash. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cwt. | Cwt. | Cwt. | Dozen. | Dozen. | Dozen. | £ s. d. | £ s. d. | £ s. d. | |
| 1. J. T. Wilson, Woombye, Q. | 1 | ... | ... | ... | 1500 | ... | ... | | | | On sandy loam near sea level; two years planted. Variety: Cavendish. Price, 1½d. per dozen. |
| | 2 | ... | (1½ concentrated) | 1 | 1690 | 190 | ... | | | | |
| | 3 | 1½ | 1½ do | 1 | 3000 | 1500 | 1310 | 8 3 9 | 1 2 6 | 7 1 3 | |
| 2. J. T. Wilson, Woombye, Q. | 1 | ... | ... | ... | 1000 | ... | ... | | | | Light sandy loam, well sheltered. Rainfall for year, 60 in. Variety: Cavendish. Price, 2d. per doz. |
| | 2 | ... | 4 ordinary | 1½ | 1400 | 400 | ... | | | | |
| | 3 | 2 | 4 do | 1½ | 2090 | 1090 | 690 | 5 15 0 | 1 10 0 | 4 5 0 | |
| 3. J. K. Menary, Woombye, Q. | 1 | ... | ... | ... | 800 | ... | ... | | | | Sandy loam, good, deep, well drained soil. First crop. Variety: Cavendish. Price, 2d. per dozen. |
| | 2 | ... | 4 | 1½ | 1200 | 400 | ... | | | | |
| | 3 | 2 | 4 | 1½ | 2200 | 1400 | 1000 | 8 6 8 | 1 10 0 | 6 16 8 | |
| 4. Geo. Burnett, Sec. Fruitgrowers' Association. Buderim Mt., Q. | 1 | ... | ... | ... | 1290 | ... | ... | | | | Worn-out red volcanic soil, 800 ft. above sea level, well drained. Crop at 3d. per dozen. |
| | 2 | ... | 3 | 1½ | 1480 | 190 | ... | | | | |
| | 3 | 2 | 3 | 1½ | 2630 | 1340 | 1150 | 13 7 6 | 1 10 0 | 11 17 6 | |
| 5. H. Collard, Buderim Mt., Q. | 1 | ... | ... | ... | 2650 | ... | ... | | | | Volcanic soil of good quality, but rather porous; 500 ft. above sea level. Crop at 3½d. per dozen. |
| | 2 | ... | 3 | 1½ | 7200 | 4550 | ... | | | | |
| | 3 | 3 | 3 | 1½ | 9400 | 6750 | 2200 | 32 1 8 | 2 5 0 | 29 16 8 | |
| 6. J. L. Hunt, Nukuavoka, Fiji. | | | | | Bunches. | Bunches. | Bunches. | | | | Rich alluvial loam. Experimenter regarded test as very satisfactory, and thought, given favourable weather conditions, it would have been more so. Crop at 1s. per bunch. |
| | 1 | ... | ... | ... | 400 | ... | ... | | | | |
| | 2 | ... | 3 | 1½ | 400 | ... | ... | | | | |
| | 3 | 1½ | 3 | 1½ | 560 | 160 | 160 | 8 0 0 | 1 4 0 | 6 16 0 | |
| 7. Department of Agriculture, Nasinu Experiment Station, Fiji. | | | | | % Bunches large small | | | | | | Large bunches are those over 8 "hands." Value based on crop at 9d. for large, 6d. for small bunches. |
| | 1 | ... | ... | ... | 25.7 74.3 | ... | ... | | | | |
| | 2 | ... | 4 | 1 | 74.1 25.9 | ... | ... | | | | |
| | 3 | 3 | 4 | 1 | 66.2 33.8 | ... | ... | *6 2 6* | *2 5 0* | *3 17 6* | |

# BANANA MANURING EXPERIMENTS ON BUDERIM MOUNTAIN. FIFTH PROGRESS REPORT.

BY J. C. BRUNNICH.

Last year, on account of long dry spells, was exceptionally trying to our banana crops, making the crop particularly late; still the results of the experimental plots on Buderim Mountain are highly satisfactory, and prove clearly the great advantages of thorough and deep cultivation, combined with a liberal application of artificial fertilisers.

The harvest from the first series of experiments, representing the second year's crop, as the plots were planted in October, 1909, is quite up to expectation, as seen from the results tabulated below. The table gives both the number of dozen of bananas and the number of bunches (in brackets) for each plot, and also calculated yield per acre.

On Mr. Foote's plot the yield agrees, with almost mathematical accuracy, with the quantities of artificial fertilisers applied; and the high yields of experimental plots B, F, and I, on which double quantities were applied, with 54, 50, and 43 hundred dozens of bananas per acre, are easily picked out, and form a striking contrast with the result of the unmanured plot D, on which the stools are practically dying out. On Mr. Guy's plots, first series, the results are not so striking, and in most cases the bunches were very much later, so that, in order to get a fair comparison of the second year's harvest, which, as a rule, was taken in our experiments up to December in each year, we estimated the crop up to March (figures on the table in italics). The poorer results of Mr. Guy's plots of the first series are partly due to heavy washaways in the earlier stages of growth.

So far no definite conclusions can be drawn from the first series of experiments with regard to the advantages of either superphosphate (P) or Thomas Phosphate (Pt), but the superiority of dried blood (Nb) and of nitrate of lime (Nn) as a source of nitrogen over ammonium sulphate (Na) is quite apparent.

With regard to the second series of experiments, which were planted in September, 1910, the lateness of the crop, due to a rather dry season, is particularly noticeable on Mr. Foote's block, and only the bunches of plots L, M, and N, on which prior to the planting of bananas a very heavy crop of pigeon peas was grown and ploughed under, the majority of the bunches was harvested by the end of December. The crop itself is not quite up to the results of the first year's crop of the first series. The stools, however, look particularly well, and the growth of the second suckers is quite phenomenal, resembling the healthy vigorous growth of bananas on virgin scrub land, so that the second year's harvest should be a very heavy one. On Mr. Guy's block, second series, the bunches

PLATE 75.—BANANA MANURING EXPERIMENTS—1ST SERIES, W. H. GUY, ESQ.

(2.) 2 ($KPN_B$).

(4.) No Manure.

(6.) 2 ($KP_T N_N$).

(9.) 2 ($KPN_A$).

PLATE 76.—BANANA MANURING EXPERIMENTS—2ND SERIES, W. H. GUY, ESQ.

(12.) 2 ($KPN_N$).

(14.) 2 ($KPN_B$) and Salt

(15.) No Manure.

(18.) 2 )$KPN_B$) and Lime.

PLATE 77.—BANANA MANURING EXPERIMENTS—1ST SERIES, JOS. FOOTE, ESQ.

(B.) 2 ($KPN_B$).

(C.) ½ ($KPN_B$).

(D.) No Manure.

(G.) ($KP_T N_N$).

PLATE 78.—BANANA MANURING EXPERIMENTS—2ND SERIES, JOS. FOOTE, ESQ.

(L.) ($KPN_B$).

(O.) No Manure.

(Q.) 2 ($KPN_N$) and Lime.

(R.) ($KPN_N$) and Lime.

matured earlier all round. and the yield was quite as good as that of the first crop of the first series, experimental plots 12 and 14, with the double amount of fertilisers, giving again the best results.

On all the experimental plots green manures were grown between the bananas, and the crop of small Mauritius bean and cowpea on Mr. Foote's block were very heavy, covering the ground well. These crops are being cut down, as the season of heavy thunderstorms is pretty well over, the stools mulched with the green manure, and the ground between the rows to be well scuffled and cultivated afterwards.

The early maturing of bunches in the rows, on which a heavy crop of pigeon-pea was grown and ploughed in, has already been noticed, and this must be due to the large amount of humus enabling the ground to hold the moisture better.

The leguminous crops on Mr. Guy's blocks are not doing so well, and this is undoubtedly due to a greater want of lime in this soil. This fact was borne out by the analysis of soils taken from the limed and unlimed portion of the second series, when we found that the limed soil contained only .22 per cent. total and .054 per cent. available (citric acid soluble) lime, whereas the unlimed soil gave a little higher results; but both soils had a strong acid reaction.

When planting green manure crops between the rows of bananas, it is very important to keep the stools themselves clear, as in dry seasons the green crop would rob the ground of too much moisture. It is advisable to have the ground covered during the season of heavy rainfalls; the crop should afterwards be cut down, and the soil well cultivated during the dry months.

It is quite evident that only soils with a fairly large amount of humus will grow bananas successfully, and the humus can easily be supplied by suitable green-manure crops.

Our experiments should show how long bananas can be grown profitably on old exhausted banana lands by the aid of heavy applications of artificial fertilisers, costing, with two dressings with the double standard amounts, about 1s. 3d. per stool annually. The advantages of utilising old lands are many, and should amply pay for the heavy cost of fertilisers.

A few photographs were taken in each series of the experimental plots, but only the most characteristic are picked out and reproduced in the four plates attached. The unmanured experiments—4, 15, D, and O—are easily picked out when compared with the manured experiments, all of which show a particularly vigorous growth, with a healthy appearance of suckers and fine large bunches of fruit.

A further dressing with artificial fertilisers will be given towards the end of April, so as to give the plants good vigour to stand the winter months:—

## CROP RESULTS OF BANANA MANURING EXPERIMENTS ON BUDERIM MOUNTAIN.

*Yield in Dozen of Bananas* (Number of Bunches in Brackets).

| Experiment. | Per Experiment. | | | Per Acre. | |
|---|---|---|---|---|---|
| | 1910. | 1911. | *1911 (Est.)* | 1910. | *1911 (Est.)* |
| EXPERIMENTAL PLOTS OF W. H. GUY, ESQ.—FIRST SERIES (PLANTED OCTOBER, 1909. | | | | | |
| 1. K P NB ... ... | 43 (7) | 119½ (15) | *202½ (37)* | 464 (75) | *2184 (399)* |
| 2. 2 (K P NB) ... .. | 45 (7) | 179½ (18) | *274½ (36)* | 485 (75) | *2961 (388)* |
| 3. ½ (K P NB) ... ... | 24½ (6) | 54½ (7) | *117½ (24)* | 264 (65) | *1268 (259)* |
| 4. O ... ... | 35 (6) | Nil | *10 (4)* | 378 (65) | *108 (43)* |
| 5. ½ (K PT NN) ... ... | 127 (17) | 154 (15) | *199 (25)* | 1370 (183) | *2147 (270)* |
| 6. 2 (K PT NN) ... ... | 197½ (26) | 332½ (29) | *423½ (43)* | 2152 (280) | *4568 (464)* |
| 7. K PT NN ... ... | 127½ (20) | 227 (21) | *327 (37)* | 1375 (216) | *3527 (399)* |
| 8. K P NA ... ... | 68 (12) | 177½ (17) | *315½ (35)* | 733 (129) | *3403 (378)* |
| 9. 2 (K P NA) ... ... | 157½ (21) | 177½ (25) | *258½ (37)* | 1699 (226) | *2788 (399)* |
| 10. K PT NA ... ... | 110 (17) | 274½ (25) | *305½ (32)* | 1187 (183) | *3295 (345)* |
| SECOND SERIES (PLANTED SEPTEMBER, 1910.) | | | | | |
| 11. 2 (K P NB) ... ... | Poor Crop of Narico Beans. | 155 (22) | *179 (26)* | ... | *1931 (280)* |
| 12. 2 (K P NN) ... .. | | 174 (23) | *189 (25)* | ... | *2039 (270)* |
| 13. 2 (K P NN) Salt .. ... | | 151 (23) | *172 (27)* | ... | *1855 (291)* |
| 14. 2 (K P NB) Salt... ... | | 176½ (25) | *201½ (29)* | ... | *2174 (313)* |
| 15. O ... ... | | 112½ (19) | *135½ (25)* | ... | *1462 (270)* |
| 15A. Shirl. 5 (¾ K 3½ P 1 ½ N) | | 170 (23) | *170 (23)* | ... | *1834 (248)* |
| 16. O Lime .. | | 64 (12) | *104 (24)* | ... | *1122 (259)* |
| 17. 2 (K P NN) Lime ... | | 123 (18) | *151 (24)* | ... | *1629 (259)* |
| 18. 2 (K P NB) Lime ... | | 132½ (20) | *171½ (26)* | ... | *1850 (280)* |
| 19. 2 (K P NN) Salt lime ... | | 86 (14) | *130 (22)* | ... | *1402 (237)* |
| 20. 2 (K P NB) Salt lime ... | | 97½ (15) | *132½ (21)* | ... | *1429 (226)* |
| EXPERIMENTAL PLOTS OF J. FOOTE, ESQ.—FIRST SERIES (PLANTED OCTOBER, 1909.) | | | | | |
| A. K P NB ... ... | 287 (33) | 489 (44) | ... | 2281 (262) | 3886 (350) |
| B. 2 (K P NB) ... ... | 359½ (36) | 682½ (57) | ... | 2857 (286) | 5424 (453) |
| C. ½ (K P NB) ... ... | 229½ (32) | 261½ (26) | .. | 1824 (254) | 2078 (207) |
| D. O ... ... | 146 (25) | 89 (11) | ... | 1160 (199) | 707 (87) |
| E. ½ (K PT NN) ... ... | 267½ (31) | 345 (35) | .. | 2126 (270) | 2742 (278) |
| F. 2 (K PT NN) ... .. | 302 (35) | 631½ (56) | ... | 2400 (278) | 5018 (445) |
| G. K PT NN ... ... | 283 (35) | 422 (42) | ... | 2249 (278) | 3354 (334) |
| H. K P NA ... ... | 312½ (35) | 427 (41) | ... | 2848 (278) | 3398 (326) |
| I. 2 (K P NA) ... ... | 319½ (35) | 544½ (49) | ... | 2539 (278) | 4328 (390) |
| K. K PT NA ... ... | 281 (34) | 466½ (50) | .. | 2233 (270) | 3708 (397) |
| SECOND SERIES (PLANTED SEPTEMBER, 1910). | | | | | |
| L. K P NB Salt lime ... | Heavy crop | 135 (20) | *155 (25)* | ... | *1232 (199)* |
| M. 2 (K P NB) Lime ... | of | 155 (23) | *183 (28)* | ... | *1454 (223)* |
| N. K P NB ... ... | pigeon pea. | 161½ (21) | *183½ (25)* | ... | *1458 (199)* |
| O. O ... ... | Good crop | 5 (1) | *80 (13)* | ... | *636 (103)* |
| P. O Lime ... | of | — — | *96 (19)* | .. | *763 (151)* |
| Q. K P NN Lime ... | beans. | 5½ (1) | *140 (27)* | ... | *1113 (215)* |
| R. 2 (K P NN) Lime .. | Poor | 5 (1) | *152 (29)* | ... | *1208 (230)* |
| S. 2 (K P NN) Salt Lime .. | crop | 11½ (2) | *133½ (25)* | .. | *1061 (199)* |
| T. 2 (K P NN) ... ... | of | — — | *132 (25)* | ... | *1049 (199)* |
| U. 2 (K P NN) Salt ... | beans. | — — | *177½ (27)* | ... | *1411 (215)* |

K = 160lb., $K_2O$ as 320lb. Potassium Sulphate per acre.
NB = 40lb., N as 290lb. Dried Blood per acre.
NN = 40lb., N as 290lb. Nitrate of Lime per acre.
NA = 40lb., N as 200lb. Ammonium Sulphate per acre.
P = 80lb., $P_2O_5$ as 470lb. Superphosphate per acre.
PT = 80lb., $P_2O_5$ as 470lb. Thomas Phosphate per acre.

2 (K P N) means double quantities. ½ (K P N) means half quantities.

All manures applied twice a year.

*Figures in Italics include the crop up to March.*

## SISAL HEMP IN MOZAMBIQUE.

At the sisal hemp plantation of the Boror Company at Malinguine, on the River Inhamacurra, Mozambique, over 2,000,000 plants of various ages are under cultivation. In 1910 the proportion of fibre obtained was 3½ per cent., though in 1911, owing to the unusually high rainfall of the 1910-11 season, the proportion fell to 3 per cent. Another plantation of 700,000 plants has been laid out at Inhamacurra, a little further up the stream. The soil is a light sandy loam. Reporting upon a sample of this hemp sent to them by Mr. R. N. Lyne, the Director of Agriculture, Messrs. Grey, Dawes, and Co. write:—"This is the finest specimen of sisal hemp for length and strength of colour we have ever seen, and we value it, at the present low price of fibre, at £28 per ton. We have seen such fibre before now obtain a price of £45 per ton in a good market. We are in a position to sell any quantity of this, and shall be glad to take in hand any consignments you may have."—"Rubber News," February, 1912.

## MAURITIUS HEMP.

Mauritius hemp, a fibre obtained from the leaves of the *Furcraea gigantea,* is also being successfully cultivated in Mozambique. A sample of this fibre, which resembles sisal, was also forwarded by Mr. Lyne to Messrs. Grey, Dawes, and Co., who valued it at £27 per ton, remarking that it was saleable in a fair quantity, owing to its present scarcity. This hemp was from the plantation of Mr. Banhofer, at Matenga, Inhambane district, on the red sandy soil common to the district.—"Rubber News," February, 1912.

## FROM SEED TIME TO HARVEST.

Approximately, the following table gives the times elapsing between the sowing of vegetable seeds and maturity:—

| | | | |
|---|---|---|---|
| Artichokes, Globe .. | 180 days | Leeks .. .. .. | 100 to 120 days |
| Artichokes, Jerusalem .. | 150 to 180 ,, | Lettuce .. .. .. | 45 to 75 ,, |
| Asparagus (from crowns) | 15 months | Melons .. .. .. | 100 to 180 ,, |
| Asparagus (from seed) .. | 4 seasons | Mushrooms .. .. | 21 ,, |
| Beans (Broad) .. .. | 120 days | Mustard and Cress .. | 30 to 40 ,, |
| Beans (French) .. .. | 50 ,, | Okra .. .. .. .. | 80 ,, |
| Beetroot .. .. | 40 ,, | Parsnips .. .. | 100 ,, |
| Brussels Sprouts .. | 90 to 120 ,, | Peanuts .. .. | 180 ,, |
| Cabbage and Cauliflower | 90 to 120 ,, | Pumpkins .. .. | 130 to 150 ,, |
| Carrots .. .. .. | 80 to 100 ,, | Radish .. .. .. | 40 ,, |
| Celery .. .. .. | 150 ,, | Rhubarb (from crowns) | 60 ,, |
| Chokos .. .. .. | 60 ,, | Rhubarb (from seed) .. | 2 years |
| Cucumbers .. .. | 75 to 105 ,, | Salsify .. .. .. | 150 days |
| Egg Fruit .. .. | 100 to 120 ,, | Spinach .. .. .. | 80 to 100 ,, |
| Endive .. .. .. | 65 to 75 ,, | Spring Onions .. .. | 60 to 90 ,, |
| Globe Onion .. .. | 120 to 180 ,, | Tomatoes .. .. | 90 to 120 ,, |
| Horse-radish .. .. | 180 ,, | Turnips .. .. .. | 65 to 90 ,, |
| Kale (seakale), from two-year-old roots .. | 230 ,, | Vegetable Marrows .. | 75 to 105 ,, |
| Kale (1,000-headed) .. | 180 ,, | Watercress .. .. | 60 ,, |
| Kohl-rabi .. .. | 100 ,, | Yams .. .. .. | 150 to 250 ,, |

# Botany.

## CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

BY F. MANSON BAILEY, C.M.G., F.L.S., COLONIAL BOTANIST.

### Order COMPOSITÆ.

TRIBE HELIANTHOIDEÆ.

VERBESINA, Linn. (Crown Beard).

(Altered from Verbena, which some species are supposed to resemble.)

Heads many flowered, heterogamous with fertile rays, or rarely by their abortion homogamous; the disk flowers perfect. Involucre of numerous or rather few scales. Receptacle convex or conical; the chaff embracing the achenes. Achenes flat (laterally much compressed) and winged on the margin, or those of the rays wingless. Pappus of two awns, either free from or united with the wings. Chiefly herbs, with opposite or alternate leaves, and mostly yellow flowers; natives of the warmer parts of America.—*Benth. and Hook.* Gen. ii., 379.

**V. encelioides,** *Benth. and Hook.* Dog Weed of America. (Plate 79.) Annual, more or less hoary-pubescent, or sometimes smoothish and green; stem loosely branching and several feet high. Leaves triangular-ovate or somewhat cordate, or the upper nearly lanceolate, coarsely and incisely serrate, and with interrupted margined or winged petiole dilated at base into a toothed or laciniate foliaceous clasping auricle. Heads large, corymbose, scales of the hemispherical involucre loose; the outer set linear-lanceolate and acuminate foliaceous, fully equalling the flattish disk; rays numerous, cuneate-oblong, bright golden yellow, 3-lobed at summit; disk achenes surrounded by a broad whitish and thickish wing, which at the summit is little, if at all, exceeded by the short and very slender awns of the pappus.—*Ximenesia encelioides,* Cav.

Hab.: Warmer parts of America, but now a very widespread weed in warm countries; during the past few years has established itself in this State in the Aubigny District, and seems likely to prove a most prolific weed. The species of this genus possess none of the recommendations of their near allies the *Helianthi* or sunflowers.

### Order FUNGI.

The following additions to our Fungi have been determined by Mr. G. Massee, of Kew, England:—

LYCOPERDACEÆ.

BOVISTA, Pers.

**B. olivacea,** *Cooke and Massee.*—Globose, 1½ to 2 in. diam., with a short, stout, rooting base, cortex very thin and evanescent, heridium thick, at first soft and pliant like leather, becoming brittle and breaking away in patches, pale ochraceous, at length whitish, mass of spores, and


PLATE 79.—VERBESINA ENCELICIDES, *Benth. et Hook.*—"Dog Weed" of America. A, ray floret; $A^1$, 3 lobed ray; $A^2$, tube; $A^3$, style; $A^4$, achene; B, dish floret; $b^1$, corolla tube; $b^2$, achene; $b^3$, involucral scale; C, involucral scale—(*a*)—(*c*) enl. D. achene, nat. size. E, achene, enl.

very dense capillitium, bright citrine, thin olive, threads thin, flaccid, simple, spores globose smooth, pale yellow, sometimes pedicellate, 5 $\mu$ diam.

Hab. : On flower beds, Brisbane Botanic Gardens, *F. M. B.*

UREDINEÆ.

UROMYCES, Link.

**U. junci,** (Desm.), Tul.—(1) Aecidia disposed in circular spots, interrupted or gregarious and densely congested; pseudoperidia cupulate, margins white, finely laciniate; æcidiospores, polygonus, sphæroidal or oblong, 14-23 $\mu$ diam., pale orange, smooth. (2) Uredosori in yellow or brown spots, rotund, elliptical or oblong, often confluent; uredospores rotund, elliptical, or rarely pyriform; 17—18 x 14—17 $\mu$, aculeolate, pale-brown. (3) Teleutospores ovoid, elliptical or clavate, thickened at the apex, often somewhat angular, 20—42 x 14--20 $\mu$, smooth, pedicel usually rather long, 35 x 4—5 $\mu$, brownish, rigid.

Hab. (Uredo stage): On stems of a rush, *Juncus pallidus*, Sandgate, *C. T. White* (Europe and North America).

SPHÆRIACEÆ.

LEPTOSPHAERIA, Ces. et. De Not.

Perithecia epidermal, at first hidden, sphæroidal or depressed—sphæroidal, somewhat conoidal, pierced at the apex; ostiole sometimes papillate; asci cylindrical, clavate or saccate, 8-spored, paraphysate; sporidia ovoid or fusoid, twice or many septate, olivaceous; honey-coloured or fuliginous.—Sacc. Syll. Fung. II., 13.

**L. juncina.** (Auersw.), *Sacc.*—Perithecia thickly scattered, obscure, globose, pierced at the apex, 50 $\mu$ diam.; asci ovate, oblong, shortly stipitate, 48 x 10--12 $\mu$ 8-spored, sporidia fusoid, obtuse at both ends, somewhat curved 3-septate, scarcely constricted at the septa, fuscous 24—30 $\times$ 3—4, 5 $\mu$.

Hab. : On stems of a rush, *Juncus pallidus*, Sandgate, *C. T. White* (Europe).

---

## PRODUCTS FROM THE PRICKLY PEAR.

According to home papers, Mr. Luther Burbank, the eminent horticulturist, has been turning his attention to the cactus with the idea of obtaining a spineless edible species which, by offering excellent food for cattle, would redeem the deserts of the world. But it appears Mr. Burbank has found even more than he was looking for. He has discovered a process by which water proof, white wash, paint, motor-car tyres, and printing paper can all be extracted from this hitherto useless plant. It is something to learn that the cactus will supply us with a rubber substitute more durable, when made into tyres, than rubber itself. Yet with the memory of Mr. Burbank's previous achievements we hesitate to say that he is too sanguine.—" Grenier's Rubber News."

# Plant Pathology and Entomology.

## NATURAL ENEMIES OF THE BANANA OCCURRING IN QUEENSLAND.*

By HENRY TRYON, Government Entomologist and Vegetable Pathologist.

### THE FRUIT FLY.—*DACUS (TEPHRITIS) TRYONI*, Frogt.†

This injurious insect, sometimes named the "Queensland Fruit Fly," attacks the fruit more commonly in the plantations situated northwards from Townsville than in more Southern latitudes—in fact, in the latter it is often temporarily absent, having apparently, for the time being, restricted its attention to other fruits to which it is locally more partial.

Its connection with the Banana is commenced with the deposition of the eggs. These are laid in groups of a few individuals beneath the skin, this being punctured by the females for oviposition; a small black spot, conspicuous upon the surrounding green surface, and that afterwards widens to form a blotch of discolouration, marking the site of the injury. These eggs in hatching give rise to maggots that tunnel into the fruit pulp that in consequence softens, acquires a brown discolouration, and then decays. From the fruit the maggot—when but a few days old—passes to the soil, and having entered this becomes a smooth oval pupa. This in due course gives rise again to the perfect insect—or fly. This fly is generally brown-coloured with conspicuous pale-yellow glossy blotches on the mid-body, the clear wings having two smoke-coloured bands—one all along their fore-borders, the other extending slantingly across them.

In its adult condition the insect is not destructive, but feeds upon various sweet fluids that exude from fruit, flowers, or foliage of one plant or another, being especially partial to the so-called "honey dew" excreted by aphides and plant lice.

This insect occasions considerable damage to Queensland Bananas; and, as fruit that exhibits its injuries, or is even marked by it on receiving its eggs, may serve to convey it over wide areas in the course of commerce, it is instrumental in occasioning also severe restrictions on the Banana trade that at times have extended to wholesale condemnation in the Southern States of sound and injured fruit alike.

Moreover, the female fruit fly commonly oviposits in the green Bananas before even these have attained their full size, and this fact has been regarded as one necessitating their being harvested long before they are ripe or are even in a condition to mature properly subsequent to being gathered. Such fruit as is free to be disposed of in the market is commonly of a quality much below that which would otherwise characterise it.

---

* Tyron (H): Orange-piercing moths. Fam. Ophiderinæ. "Queensland Agricultural Journal," Vol II. Pt. 4, April, 1898. Separate pp. 1-8. Pl. XVIII-XVIIA.

† The Fruit Fly that is found associated with the Banana in tropical Queensland differs from typical examples of *D Tryoni* in having the dorsum of the prothorax suffused with black; this portion of the body, therefore, presenting an unusual darkening of colour. The abdomen, again, is differently coloured.

In this connection, the fact that the Fruit Fly does not attack the Banana to any extent generally in Queensland is a fortunate circumstance.

The procedures hitherto found practical for preventing Fruit Fly attack, and accordingly recommended, is as follows:—

1. Securing the absence, in the vicinity of the plantations, of other fruit trees that might serve as a breeding-ground and source of supply for it. [All maggot-infested peaches, oranges, loquats, mangoes, &c., when once their condition has been discovered, should be promptly gathered and destroyed, a special effort being made to effect this before the insects have had time to escape to the soil, where, whilst pupating, they both elude observation and are in great measure beyond the reach of attack. If, again, the trees alluded to be not a source of income, but are growing abandoned or neglected, as too often is the case, they should not be allowed to bear at all, but be extirpated as sources of danger. In our Northern coastal districts (*e.g.*, at Cairns) the Guava (*Psidium*) has become naturalised and its fruit yields hordes of flies to infect the Banana fruit, that also is produced there so abundantly.]
2. Again, from the time the fruit is two-thirds grown onwards, covering the bunches with Hessian or Stocking Net. [Formerly, the Southern States—or Victoria, at least—required planters to protect the fruit destined for their markets in this way from fly attack. Moreover, a special tubular stocking net for the purpose was manufactured. This has been largely used in the Cairns and Johnstone River Banana-yielding areas. When Europeans first visited Papua, they must also have observed—as is now general there—the practice, on the part of its native populations, of wrapping the bunches closely with tapa or other suitable material to exclude the attacks of Fruit Flies, and of injurious animals generally, whilst meanwhile the ripening process proceeded.]
3. Avoiding leaving on the field, when gathering the fruit for the market, any material that might serve to attract the fly or act as a breeding-ground for it. [The Fruit Fly is often found in the "fingers" that, having split or been otherwise damaged, are discarded in casing bananas and subsequently ripen on the ground. Again, also, this is so with respect to those bunches of defective fruit that are similarly cast aside, if indeed cut at all.]
4. Learning to recognise the "fingers" that have been "stung," or have received the egg-batches, and, having detected these, detaching and destroying them. [This is commonly done with special thoroughness by Chinese Banana-growers, when collecting the bunches prior to transmitting them to the several ports for despatch to distant markets. The discovery of such fruit, and consequent action, is again an object of careful provision on the part of inspectors under the Diseases in Plants Act of Queensland.]

5. Spraying the plants—not the fruit—with a mixture that, whilst providing sustenance for the Flies, is at the same time fatal to them. The best formula for a bait that would be applicable for Banana Fruit Fly destruction is still a matter for experiment; but one whose composition may be easily remembered (as involving successive numbers in the proportion of its ingredients) is—Sugar (Ration), 3 lb.; Arsenate of Lead, 4 lb.; and Water, 5 gallons. As it is necessary that this, when applied to the foliage, should be in the form of innumerable small droplets, the use of an ordinary spray pump is needed for its administration.

## LEAF-EATING WEEVIL.—*COPTORHYNCHUS SP.*

This insect is a small wingless short and stout-bodied weevil measuring about 7 mm. (3½ lines) in length, with the main divisions of the body very well defined—the prothorax, or forebody, oval-shaped, with straight fore and hind borders and thimble-punctured; the elytra, or hind-body, ovate, contracted hindwards, very convex above, punctate, striate, with short stout bristles arising directly from the interstices. It is black with conspicuous patches of white scales, that are disposed in a regular pattern, three forming broad longitudinal bands on the prothorax above. It has been found consuming the foliage of the Banana plant at Moa Island, Torres Strait; and, probably, occurs as a pest of it in other localities of North Queensland also.

It is related to weevils associated in the genus *Otiorhynchus*, that are elsewhere so destructive to various plants, and of which one kind at least has already become naturalised in Queensland.

Possibly Bordeaux mixture sprayed upon the foliage would deter attack, whilst Arsenate of Lead or Paris Green would similarly effect the destruction of insects that are already engaged in their depredations.

## VERTEBRATES.

### 1. WATER HEN OR RED BILL (*Porphyrio melanotus*).

This large water rail occasionally visits Banana cultivations in flocks, and very exceptionally manifests a peculiarly destructive habit. This consists in pecking the succulent " stem" around its base, on having acquired an appetite for banana-tissue, until the plant topples over. Thus far the Red Bill has only been observed injuring in this manner the Sugar variety of Banana. An instance of this singular form of depredation was brought under notice by a correspondent residing in the Rockhampton district. This occurred during the month of September. After mentioning that a large flock of the birds in question had visited the plantation two weeks earlier, he stated that they had fallen [knocked over] over a hundred plants since whose stems were up to 6 in. in diameter. The writer has remarked that the same bird will visit canefields adjoining their haunts and nip off the buds of the recently planted " sets" as they issue from the ground—especially should the swamps in which they reside or their margins have been burnt over. However, he has, too, witnessed this bird visiting vegetable gardens in large numbers without their committing any such depredations as might be remarked by their Chinese proprietors.

2. FLYING FOX (*Pteropus sp.*)

These nocturnal animals frequently visit Banana plantations of tropical Queensland and gnaw both flowers and ripening fruit. Much of the latter is again scored by their sharp claws in so doing.

PROTECTION FROM THE FRUIT FLY.

In order to guard against the attacks of the Fruit Fly, it was decided, I believe, by the Federal Government that all Bananas intended for export should be covered before maturity with Cottonette, and many thousands of yards of this material were manufactured by the Ipswich Cotton Spinning Company for use on the plantations. This expense to the growers was, however, no longer made obligatory after 1909; and all that is required is that Bananas, before being shipped South, shall be inspected by specially qualified men acting under the Diseases in Plants Act. The inspector's certificate that the fruit shipped is free from disease is now considered a sufficient safeguard against the introduction of the Fruit Fly into the Southern States. It may here be remarked that entomologists in all the States appear to be agreed that there is not the least danger of the acclimatisation of the fly in the South, and the principal cause alleged for the condemnation of Queensland is either the immaturity or over-ripeness of the fruit on arrival in the Southern States.

---

## PROTECTING STOCK FROM FLIES.

It has been discovered (writes the " Bulletin Agricole," Port Louis, Mauritius) that a blue colour is disliked by flies, and that they desert localities where this colour is predominant. This was discovered by a French farmer, who noticed that all his cows were worried by flies, except those which were tethered opposite a wall painted blue. This induced him to add blue to the limewash with which he covered the walls of his stables. (See "Queensland Agricultural Journal," December, 1908.)

Since then an officer of the Agricultural Department in Kansas, U.S.A., has, it is said, discovered a special composition, innocuous to cattle or horses, which protects the cattle from the flies which torment them, causing them to lose weight, and diminishing the milk production of dairy cows.

The remedy is:—1½ lb. resin, 16 oz. soft soap, 10 oz. fish oil, and 2 to 3 gallons of water. This mixture is applied to the animal's skin with a brush. At first the cattle are washed with it three times a week, and at more frequent intervals later on. This has given excellent results in Kansas and at all stations where it has been used. We may add that the liquid has no harmful effect whatever on the cattle.

# Animal Pathology.

## DENTITION OF THE OX.

(From Leeny's "Nerve Doctoring of Animals.")

| AGE. | | | | INCISORS, TEMPORARY. | | MOLARS, TEMPORARY. | | NUMBER. | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Period. | | | | No. | Position. | No. | Position. | Temp. | Perm. | Total. |
| At birth or soon after | | | | 2 | Central ... ... | ... | ... | 20 | ... | 20 |
| | | | | 2 | Central lateral ... | ... | ... | | | |
| | | | | 2 | Lateral ... ... | ... | ... | | | |
| | | | | 2 | Corner ... ... | 12 | 1st, 2nd, and 3rd | | | |
| Early Period. | | Late Period. | | | Permanent. | | Permanent. | | | |
| Years. | Months. | Years. | Months. | | | | | | | |
| 1 | 6 | ... | | ... | ... | 4 | 4th ... ... ... | 20 | 4 | 24 |
| 1 | 3 | ... | | ... | ... | 4 | 5th ... ... ... | 20 | 8 | 28 |
| 1 | 9 | 2 | 3 | 2 | Central ... ... | ... | .. | ... | ... | ... |
| 2 | 0 | ... | | ... | ... | 4 | 6th ... ... ... | 18 | 14 | 32 |
| 2 | 3 | 2 | 9 | 2 | Lateral central ... | 8 | 1st and 2nd ... ... | 8 | 24 | 32 |
| 2 | 9 | 3 | 3 | 2 | Lateral ... ... | 4 | 3rd ... ... ... | 2 | 30 | 32 |
| 3 | 3 | 3 | 9 | 2 | Corner ... ... | ... | ... | ... | 32 | 32 |

## TIMES OF SUNRISE AND SUNSET AT BRISBANE, 1912.

| DATE. | MAY. | | JUNE. | | JULY. | | AUGUST. | |
|---|---|---|---|---|---|---|---|---|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. |
| 1 | 6·14 | 5·16 | 6·31 | 5·0 | 6·40 | 5·3 | 6·30 | 5·18 |
| 2 | 6·14 | 5·15 | 6·31 | 5·0 | 6·40 | 5·4 | 6·30 | 5·18 |
| 3 | 6·15 | 5·14 | 6·32 | 5·0 | 6·40 | 5·4 | 6·29 | 5·19 |
| 4 | 6·15 | 5·13 | 6·32 | 5·0 | 6·40 | 5·4 | 6·29 | 5·20 |
| 5 | 6·16 | 5·13 | 6·33 | 5·0 | 6·40 | 5·4 | 6·28 | 5·20 |
| 6 | 6·17 | 5·12 | 6·33 | 5·0 | 6·40 | 5·5 | 6·28 | 5·20 |
| 7 | 6·17 | 5·12 | 6·34 | 5·0 | 6·40 | 5·5 | 6·27 | 5·21 |
| 8 | 6·18 | 5·11 | 6·34 | 4·59 | 6·40 | 5·6 | 6·26 | 5·21 |
| 9 | 6·18 | 5·10 | 6·35 | 4·59 | 6·39 | 5·6 | 6·25 | 5·22 |
| 10 | 6·19 | 5·10 | 6·35 | 4·59 | 6·39 | 5·7 | 6·24 | 5·23 |
| 11 | 6·19 | 5·9 | 6·35 | 4·59 | 6·39 | 5·7 | 6·23 | 5·23 |
| 12 | 6·20 | 5·9 | 6·35 | 4·59 | 6·39 | 5·7 | 6·22 | 5·24 |
| 13 | 6·20 | 5·8 | 6·36 | 4·59 | 6·39 | 5·8 | 6·21 | 5·25 |
| 14 | 6·21 | 5·8 | 6·36 | 4·59 | 6·39 | 5·8 | 6·20 | 5·25 |
| 15 | 6·21 | 5·7 | 6·36 | 4·59 | 6·39 | 5·9 | 6·19 | 5·26 |
| 16 | 6·22 | 5·7 | 6·37 | 4·59 | 6·38 | 5·9 | 6·18 | 5·26 |
| 17 | 6·22 | 5·6 | 6·37 | 4·59 | 6·38 | 5·10 | 6·17 | 5·26 |
| 18 | 6·23 | 5·6 | 6·38 | 5·0 | 6·37 | 5·11 | 6·16 | 5·27 |
| 19 | 6·24 | 5·5 | 6·38 | 5·0 | 6·37 | 5·11 | 6·16 | 5·27 |
| 20 | 6·24 | 5·5 | 6·38 | 5·0 | 6·36 | 5·12 | 6·15 | 5·28 |
| 21 | 6·25 | 5·4 | 6·38 | 5·0 | 6·36 | 5·12 | 6·14 | 5·28 |
| 22 | 6·26 | 5·4 | 6·39 | 5·1 | 6·36 | 5·12 | 6·13 | 5·28 |
| 23 | 6·26 | 5·3 | 6·39 | 5·1 | 6·35 | 5·13 | 6·12 | 5·29 |
| 24 | 6·27 | 5·3 | 6·39 | 5·1 | 6·35 | 5·13 | 6·11 | 5·29 |
| 25 | 6·27 | 5·2 | 6·39 | 5·1 | 6·34 | 5·14 | 6·10 | 5·30 |
| 26 | 6·28 | 5·2 | 6·39 | 5·1 | 6·33 | 5·15 | 6·9 | 5·30 |
| 27 | 6·28 | 5·1 | 6·40 | 5·2 | 6·33 | 5·15 | 6·8 | 5·30 |
| 28 | 6·29 | 5·1 | 6·40 | 5·2 | 6·32 | 5·16 | 6·7 | 5·31 |
| 29 | 6·29 | 5·1 | 6·40 | 5·2 | 6·32 | 5·16 | 6·6 | 5·31 |
| 30 | 6·30 | 5·0 | 6·40 | 5·3 | 6·31 | 5·17 | 6·5 | 5·32 |
| 31 | 6·30 | 5·0 | ... | ... | 6·31 | 5·17 | 6·4 | 5·32 |

### PHASES OF THE MOON.

| | | H. M. |
|---|---|---|
| 1 May | ○ Full Moon | 8 19 p.m. |
| 9 „ | ☽ Last Quarter | 7 56 „ |
| 17 „ | ● New Moon | 8 14 a.m. |
| 24 „ | ☾ First Quarter | 12 11 „ |
| 31 „ | ○ Full Moon | 9 30 „ |
| 8 June | ☽ Last Quarter | 12 36 p.m. |
| 15 „ | ● New Moon | 4 24 „ |
| 22 „ | ☾ First Quarter | 6 39 a.m. |
| 29 „ | ○ Full Moon | 11 34 p.m. |
| 8 July | ☽ Last Quarter | 2 47 a.m. |
| 14 „ | ● New Moon | 11 13 p.m. |
| 21 „ | ☾ First Quarter | 3 18 „ |
| 29 „ | ○ Full Moon | 2 28 „ |
| 6 Aug. | ☽ Last Quarter | 2 18 p.m. |
| 13 „ | ● New Moon | 5 58 a.m. |
| 20 „ | ☾ First Quarter | 2 57 „ |
| 28 „ | ○ Full Moon | 5 59 „ |

# General Notes.

## THE SMALLEST HORSES IN THE WORLD.

Mr. David Buffurn, in the American " Country Gentleman" of 27th January (says " The Live Stock Journal"), gives an interesting account of the breeding of the Lliani ponies, the smallest horses in the world. In 1901, after spending some time in the West Indies, he returned to the United States, bringing seven of the tiny animals from Lliani, a little island lying off the west coast of Hayti, intending to breed them on his farm at Narragansett Bay. The ponies attracted much attention in the United States, and an official report of the Rhode Island State Board of Agriculture gives the following account of heights and weights, the former being from the ground to the top of the withers:—Toussaint, black stallion, 19 in., 48 lb.; Dessalines, cream-coloured stallion, 19 in., 49½ lb.; Grisette, cream-coloured mare, 18 in., 46 lb.; Josephine, black mare, 19½ in., 50 lb.; Marie, bay mare, 18½ in., 47 lb.; Faustin, bay stallion, 19 in., 49 lb.; Fifi, chestnut mare, 18½ in., 48 lb. In the same year Mr. Buffurn and his partner (Captain W. Jones) purchased the island from the Government of Hayti. They gave up the idea of breeding the ponies in the United States, and confined their operations to Lliani. They found it possible to diminish the very small size of the ponies. Hippolyte, a six-year-old stallion, was a fraction under 17 in. in height last spring, and weighed only 36 lb. He was stolen, and the way in which a hunt was made for him with success makes an amusing story. He was found in New York being conveyed through a street by a negro, who was carrying the little animal with one hand in a perforated wooden box, to which a handle had been affixed. Several other attempts, some successful, were made by gangs of thieves, landing in the island, to steal the ponies. In one case a man was detected making off for the shore with a mare under one arm and her foal in a portmanteau. Speculations as to the origin of the ponies, Mr. Buffurn states, were discussed in American papers when he brought his first lot of them into the United States.

## NOVEL TREATMENT OF PEACH TREES.

Experiments made at the experimental station at Bologna (Italy) have shown that by removing the bark in rings from the branches of peach trees the fruiting is greatly encouraged, and the fruit is finer and ripens more quickly than those of trees not so treated. The tree is not injured by this operation, and the fruit is even more firmly attached to the branches.

The " ringing" of currant vines and of apricot trees has been commonly practised, with a view to causing the fruit to set.

## WHEAT GROWING IN SAND.

The accompanying illustration shows a very fair specimen of wheat grown in pure sand at Currigee—Moreton Bay Oyster Co. It grew not far from a manured plot, and the roots, as shown, made their way to the richer ground.

## "JOURNAL OF THE COLLEGE OF AGRICULTURE," JAPAN.

We have received Vol. II., No. 7, of the above journal, published on 26th December, 1911. This publication, which is well-printed in English, contains a large number of excellent illustrations representing "Prehistoric Fishing in Japan." There are eleven full-page reproductions of the weapons, arrow heads, dart heads, harpoon heads, fish spears and hooks of curious make, stone axes, clay sinkers—all apparently belonging to paleolithic times. There are also reproductions of fish, and well-preserved parts of prehistoric fish similar to, if not identical with, the placoid and ganoid fishes of the Carboniferous period or of the Pleistocene of the Quaternary Epoch. Many of the remains were found in shell mounds, like the Danish Kjockken-moeddings of the Polish Stone Epoch, in which strange bone hooks and fishing nets were found. The publication, as a scientific work, is well worthy of a place in our public libraries and museums. We are indebted to Mr. Kanematsu, Sydney, for the journal.

## CARAVONICA COTTON GOODS.

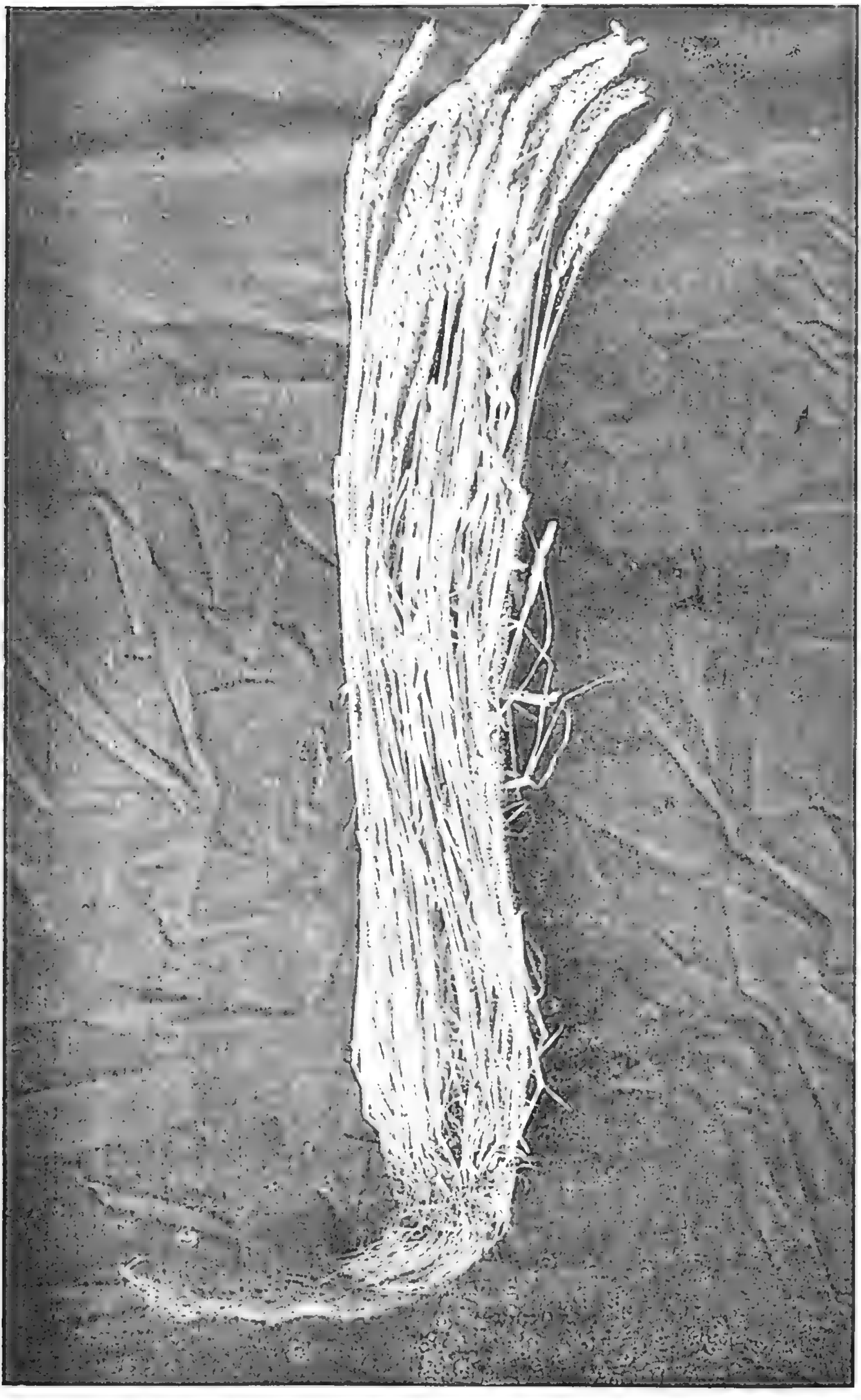
The high-class goods manufactured from Queensland Caravonica cotton in Chemnitz, Saxony, are said to be the best cotton goods in the world, and although not low priced are the cheapest because of their durable nature.—"Rubber World."

## WEIGHTS OF FARM SEEDS PER BUSHEL.

Maize, 56 lb.; oats, 40 lb.; wheat, about 60 lb.; Cape barley, 52 lb.; malting barley, 50 lb.; rye, 60 lb.; imphee, 40 lb.; sorghum, 40 lb.; panicum, 60 lb.; lucerne, 60 lb.; clover, 60 lb.; buckwheat, 50 lb.; flax (linseed), 60 lb.; grasses (mixed), 20 lb.; prairie grass, 20 lb.; perennial rye grass, 20 lb.; rib grass, 60 lb.; paspalum dilatatum, about 10 lb.; couch grass, 40 lb.; cocksfoot, 20 lb.; rice, 60 lb.; peanuts, 25 lb.

## PRICKLY-PEAR MUCILAGE FOR WHITEWASH.

In reply to a question on the use of one of the products of the prickly pear in the manufacture of whitewash, Mr. J. C. Brünnich, Agricultural Chemist, said:—"Prickly pear leaves contain a peculiar mucilage which may improve the consistency of whitewash, and there can be little doubt that prickly pear leaves could be utilised for this purpose. The mucilage, however, could not be profitably extracted." In another part of this issue of the journal will be found a reference to the by-products of the prickly pear, by Luther Burbank.



Wheat Growing in Pure Sand.—Note the Roots working towards a richer soil.

# Answers to Correspondents.

## BUTTER FACTORY CHART.

E. W. HILL, Hillview—

O'Callaghan's milk and cream chart is used throughout Queensland. This chart affords greater accuracy in determining the amount of commercial butter contained in cream of a known test than did the charts that were formerly used.

O'Callaghan's booklet, entitled "Testing Milk and Cream," may be obtained from Thomson Bros., George street, Brisbane, and contains both milk and cream charts.

Reference to this chart shows that it requires 207 lb. of cream testing 40 per cent. butter-fat to produce 99.98 lb. of commercial butter.

## PINEAPPLES AND PAPAWS.

FRUITGROWER," N.C. Line—

(1) The Ripley pineapple is rough leaf—*i.e.,* has prickles on the edges of the leaves. The so-called (in the markets) rough leaf is of different "build" to the Ripley. The latter is almost oblong in shape, with a small green top. The "rough leaf" is more pointed towards the head, and has a large green top. The advantage of the Ripley over the ordinary rough leaf is that almost the whole of the former is fit for canning, there is little waste, whilst the common rough leaf, being narrow towards the head, loses bulk when headed and peeled. The Ripleys vary very little in size on a plantation; the common roughs vary considerably. Smooth-leaf pines differ from Ripleys in size, and in that there are no prickles on the leaves. They often run to 10 or 12 lb. weight. Queens are merely smooth-leaved pines.

(2) Not necessarily. Papaws have borne fruit where no male tree was in evidence. But where papaws are grown on any large scale, a male tree may be kept, but all other males should be destroyed, as they exercise an injurious influence on the female trees.

Please note that we do not, as a rule, answer questions from anonymous correspondents.

## CHLORIS BARBATA.

A.D.W., Ingleby—

No seed of *Chloris barbata* is obtainable in Brisbane. Probably Mr. J. R. Chisholm, "Prairie," *viâ* Townsville, could supply some.

## SIZE OF BUNCH OF BANANAS.

"Banana," Mooloolah—

A bunch of bananas may carry eight, nine, or even more "hands." Mr. J. Montgomerie Hattrick, F.H.A.S., &c., writing on "Manuring of Bananas," in the "Tropical Agriculturist," Ceylon (February, 1912), says:—

An important point is the influence of the manure on the size of the bunches. In Jamaica, a bunch is nine hands. In Fiji, a bunch of eight hands or over is a large bunch; under eight hands a small bunch.

In North Queensland—also at Buderim Mountain and Maryborough, South Queensland—a very large bunch of Cavendish bananas will carry as much as fourteen hands, and a small bunch seven to eight hands; but much depends on the size of the fruit. The relative proportion of large to small bunches is of great commercial importance, because the price obtained depends so largely on the size of the bunch. (See Mr. Brünnich's and Mr. Hattrick's articles on "Manuring of Bananas," in another part of this issue of the "Journal.")

## SPRAYS—HOW TO MAKE AND USE.

E. W. Hornke, Wichello, Peechy—

*Aphis and Cabbage Moths.*—Spray with 2 fluid ounces of black-leaf tobacco to 1 gallon of water. Spraying with the resin and soda wash is also very satisfactory. The wash is prepared as follows:—Resin (pounded), 5 lb.; caustic soda (70 per cent.), 1 lb. (or washing soda, 3 lb.); fish oil, 1 pint. Water to make 25 gallons. Boil the above ingredients with water enough to cover for one or two hours, adding water slowly if there is a tendency to boil over. The compound will assume the colour of black coffee. Occasionally pour a small quantity of the mixture into water. If it is not boiled sufficiently, it will form a ropy mass at the bottom of the vessel. Dilute with warm water, stirring all the time, to one-third. This first bulk of 8 gallons makes a stock mixture to be diluted to the full amount when used. A very fine spray must be used.

Turnips are especially liable to the attacks of aphides, which, if not checked, spread with alarming rapidity, and will soon exterminate a whole field. Spraying with the resin and soda wash, with kerosene emulsion, or with tobacco water, on first noticing the pest, will usually effectually get rid of it.

Kerosene Emulsion: Kerosene, 2 gallons; soap, ½ lb.

Spraying with Paris green will effectually destroy the larvæ which riddle the leaves of cabbages, cauliflowers, &c.; but it must be borne in mind that Paris green, being an arsenical poison, must not be used on crops of this kind within five or six weeks of their being ready for market. The danger from insect pests will be considerably lessened if the location of these crops be altered every season.

If Paris green is dusted from a bag in the proportion of 1 oz. to 100 oz. of flour, and just enough applied to make a slight show on the leaves—say, 1 oz. of the mixture to twenty-eight heads of cabbage—the aphis or worms will all be killed in the course of two or three days, while the average amount of poison on each cabbage will be about one-seventh of a grain. Fully one-half of the powder will fall on the outside leaves and on the ground, and thus an individual would have to eat about twenty-eight cabbages in order to consume a poisonous dose of arsenic, even if the balance of the poison remained after cooking.

## A COVER CROP.

W. T., Papua—

Mr. F. M. Bailey, Colonial Botanist, describes the plant and seed you sent for identification as *Phaseolus truxillensis,* a species similar to our French Bean (*P. vulgaris*). It is commonly cultivated in tropical countries for food. It is a perennial plant, and should be suitable for a cover crop.

## SEPALS, PETALS, &C., OF PLANTS.

M. E. DART, Bodalla—

"Flowers are called," says Mr. F. M. Bailey, Colonial Botanist, "dimerous, or 2-merous, trimerous or 3-merous, pentamerous or 5-merous, &c., when the sepals, stamens and styles are in whorls of an equal number. I cannot call to mind, however, any plant in which this follows on to the seed, but there may be some in which such is the case."

## TO GET RID OF ANTS.

F. J. DOMAN, Burrill's Creek—

See "Q.A. Journal," January, 1908, p. 23, and March, 1910, p. 149.

# The Markets.

## PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR APRIL, 1912.

| Article. | | APRIL. Prices. |
|---|---|---|
| Bacon, Pineapple | lb. | 7½d. to 9d. |
| Bran | ton | £6 |
| Butter | lb. | 9½d to 10½d. |
| Chaff, Mixed | ton | £7 to £7 10s. |
| Chaff, Oaten (Victorian) | " | £7 |
| Chaff, Lucerne | " | £6 10s. |
| Chaff, Wheaten | " | £6 to £6 10s. |
| Cheese | lb. | 8¾d. to 9d. |
| Flour | ton | £9 5s. |
| Hay, Oaten (Victorian) | " | £8 to £8 10s. |
| Hay, Lucerne | " | £7 |
| Honey | lb. | 2½d. to 2¾d. |
| Maize | bush. | 4s. 8d. to 4s. 10d. |
| Oats | " | 4s. 2d. |
| Pollard | ton | £7 |
| Potatoes | " | £10 to £11 |
| Potatoes, Sweet | sugar bag | 1s to 2s. |
| Pumpkins | ton | £4 |
| Wheat, Milling | bush. | 4s. 9d. |
| Onions | ton | £11 |
| Hams | lb. | 1s. 1½d. |
| Eggs | doz. | 1s. 3d. |
| Fowls | pair | 2s. 9d. to 3s. 6d. |
| Geese | " | 6s. |
| Ducks, English | " | 3s. |
| Ducks, Muscovy | " | 3s. 3d. to 4s. |
| Turkeys (Hens) | " | 5s. 6d. to 6s. 6d. |
| Turkeys (Gobblers) | " | 8s. to 13s. |

## SOUTHERN FRUIT MARKETS.

| | |
|---|---|
| Apples (Choice Eating), per case | 8s. to 12s. |
| Apples (Cooking), per case | 4s. to 6s. |
| Bananas (Fiji), G.M., per bunch | 4s. to 12s. |
| Bananas (Fiji), G.M., per case | 18s. to 20s. |
| Bananas (Queensland), per bunch | 1s. to 6s. |
| Bananas (Queensland) per case | 11s. to 13s. |
| Cocoanuts, per dozen | 2s. 6d. to 4s. |
| Lemons (local), Choice, per gin case | 12s. to 14s. |
| Mandarins (local Emperors), per case | 10s. to 12s. |
| Oranges (local), per gin case | 9s. to 10s. |
| Papaw Apples, per half-case | 3s. 6d. to 7s. |
| Passion Fruit (local), per half-case | 10s. to 11s. |
| Peaches, per bushel case | 5s. to 8s. |
| Peanuts, per lb. | 5½d. |
| Pears (local), per bushel case | 7s. to 12s. |
| Pineapples (Queensland), common, per case | 6s. to 7s. |
| Pineapples (Queensland), Ripley's, per case | 8s. to 9s. |
| Pineapples (Queensland), Queen's, per case | 6s. to 7s. |
| Plums, per half-case | 3s. 6d to 5s. |
| Quinces, per gin case | 3s. 6d. to 5s. |
| Tomatoes, per quarter case | 2s. 6d. to 4s. |

## PRICES OF FRUIT—TURBOT-STREET MARKETS.

| Article. | APRIL. Prices. |
|---|---|
| Apples (Eating), per case ... | 10s. to 13s. |
| Apples (Cooking), per case | 9s. to 11s. |
| Apricots, per case | |
| Bananas (Cavendish), per dozen ... | 3d. to $3\frac{1}{2}$d. |
| Bananas (Sugar), per dozen | $2\frac{1}{2}$d. to 3d. |
| Cape Gooseberries, per case | 4s. 6d. to 7s. |
| Cherries, per quarter-case | |
| Citrons, per cwt. | 11s. 6d. |
| Custard Apples, per quarter-case | 4s. to 6s. |
| Grapes, per quarter-case ... | 1s. 6d. to 1s. 9d. |
| Lemons (Italian), per case | 25s. |
| Lemons (local), per half-case | 15s. |
| Mandarins, per case | 6s. to 9s. |
| Mangoes, per case ... | ... |
| Nectarines, per quarter-case | ... |
| Oranges (Navel), per case ... | ... |
| Oranges (Other), per case .. | 4s. to 5s. 9d. |
| Papaw Apples, per quarter-case | 2s. 6d. to 3s. 6d. |
| Passion Fruit, per quarter-case | 4s. to 6s. |
| Peaches, per quarter-case ... | |
| Peanuts, per lb. | $3\frac{1}{2}$d. |
| Pears, per case | ... |
| Persimmons, per half-case... | ... |
| Plums, per quarter-case ... | 5s. |
| Pineapples (Ripley), per dozen | 3s. 6d. to 5s. |
| Pineapples (Rough), per dozen | 2s. 6d. to 5s. |
| Pineapples (Smooth), per dozen | 2s. 6d. to 5s. |
| Rockmelons, per dozen | ... |
| Rosellas, per quarter-case ... | 1s. to 2s. |
| Strawberries, per tray | ... |
| Tomatoes, per quarter-case | 1s. 6d. to 4s. |
| Watermelons, per dozen ... | ... |

## TOP PRICES, ENOGGERA YARDS, MARCH, 1912.

| Animal. | MARCH. Prices. |
|---|---|
| Bullocks | £8 2s. 6d. to £9 7s. 6d. |
| Cows ... | £5 17s. 6d. to £7 12s. 6d. |
| Merino Wethers | 19s. 3d. |
| Crossbred Wethers... | 20s. 3d. |
| Merino Ewes | 13s. 6d. |
| Crossbred Ewes | 18s. |
| Lambs | 15s. |
| Pigs (Baconers) | ... |
| Pigs (Porkers) | 33s. |

# Farm and Garden Notes for June.

FIELD.—Winter begins on the 24th of this month, and frosts will already have been experienced in some of the more exposed districts of the Southern coast and on the Darling Downs. Hence, insect pests will, to a great extent, cease from troubling, and weeds will also be no serious drawback to cultivation. The month of June is considered by the most successful lucerne-growers to be the best time to lay down this crop, as any weeds which may spring up in the event of a dropping season will be so slow-growing that the young lucerne plants will not be choked by them.

The land should now be got ready for millets, sorghums, panicum, &c. Oats, barley, vetches, clover, tobacco, buckwheat, field carrots, and Swedes may now be sown. Some advocate the sowing of early maize and potatoes during this month, but, obviously, this can only apply to the more tropical parts of Queensland. The land may be got ready, but in the Southern districts and on the tableland neither maize nor potatoes should be planted before August, or at the earliest, in warm, early districts, at the end of July. There is always almost a certainty of frosts, more or less severe, during these months. Arrowroot will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes, yams, and ginger. Should there be a heavy crop, and consequently a glut in the market, sweet potatoes may be kept by storing them in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe, and will rot or dry up and shrivel in the sand pit. Before pitting, spread the tubers out in a dry barn or in the open, if the weather be fine. In pitting them or storing them in hills lay them on a thick layer of sand, then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them. Then put down another layer of tubers, and repeat the process until the hill is of the requisite size. The sand excludes the air, and the potatoes will keep right through the winter. Late wheat may still be sown, but it is too late for a field crop of onions. In tropical Queensland the bulk of the coffee crop should be off by the end of July. Yams may be unearthed. Cuttings of cinnamon and kola nut trees may be made, the cuttings being planted under bell glasses. Collect divi-divi pods and tobacco leaves. English potatoes may be planted. The opium poppy will now be blooming and forming capsules. Gather tilseed (sesame), and plant out young tobacco plants if the weather be suitable. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples. Gather all ripe bananas. Fibre may be produced from the old stems. A hand machine for this purpose has just been introduced into Queensland from France, which will turn out 65 lb. of clean fibre in a day of ten hours. The agent for the machine is Mr. A. Robinson, Civil Service Stores, Brisbane, and the price, we are informed, is £7 10s.

KITCHEN GARDEN.—Cabbage, cauliflower, and lettuce may be planted out as they become large enough. Plant asparagus and rhubarb in well-prepared beds in rows. In planting rhubarb it will probably be found more profitable to buy the crowns than to grow them from seed, and the same remark applies to asparagus.

Sow cabbage, red cabbage, peas, lettuce, broad beans, carrots, radish, turnip, beet, leeks, and herbs of various kinds, such as sage, thyme, mint, &c. Eschalots, if ready, may be transplanted; also horse-radish can be set out now.

The earlier sowings of all root crops should now be ready to thin out, if this has not been already attended to.

Keep down the weeds among the growing crops by a free use of the hoe and cultivator.

The weather is generally dry at this time of the year, so the more thorough the cultivation the better for the crops.

Land for early potatoes should now be got ready by well digging or ploughing.

Tomatoes intended to be planted out when the weather gets warmer may be sown towards the end of the month in a frame where the young plants will be protected from frost.

FLOWER GARDEN.—No time is now to be lost, for many kinds of plants need to be planted out early to have the opportunity of rooting and gathering strength in the cool moist spring time to prepare them for the trial of heat they must endure later on. Do not put your labour on poor soil. Raise only the best varieties of plants in the garden; it costs no more to raise good varieties than poor ones. Prune closely all the hybrid perpetual roses, and tie up, without pruning, to trellis or stakes, the climbing and tea-scented varieties, if not already done. These and other shrubs may still be planted. See where a new tree or shrub can be planted; get these in position; then they will give you abundance of spring bloom. Renovate and make lawns, and plant all kinds of edging. Finish all pruning. Divide the roots of chrysanthemums, perennial phlox, and all other hardy clumps; and cuttings of all the summer bedding plants may be propagated.

Sow first lot, in small quantities, of hardy and half-hardy annuals, biennials, and perennials, some of which are better raised in boxes and transplanted into the open ground, but many of this class can, however, be successfully raised in the open if the weather is favourable. Antirrhinum, carnation, picotees, dianthus, hollyhock, larkspur, pansy, petunia, *Phlox Drummondii,* stocks, wallflower, and zinnias, &c., may be sown either in boxes or open beds; mignonette is best sown where it is intended to remain.

To grow these plants successfully, it is only necessary to thoroughly dig the ground over to a depth of not less than 12 in., and incorporate with it a good dressing of well-decayed manure, which is most effectively done by a second digging; the surface should then be raked over smoothly, so as to remove all stones and clods, thus reducing it to a fine tilth. The seed can then be sown in lines or patches as desired, the greatest care being taken not to cover deeply; a covering of not more than three times the diameter of larger seeds, and a light sprinkling of fine soil over small seeds, being all that is necessary. A slight mulching of well-decayed manure and a watering with a fine-rosed can will complete the operation. If the weather prove favourable, the young seedlings will usually make their appearance in a week or ten days; thin out so as to leave each plant (if in the border) at least 4 to 6 in. apart.

# Orchard Notes for June.

## THE SOUTHERN COAST DISTRICTS.

The Notes of last month, referring to the care to be taken in the handling and marketing of all kinds of citrus fruits, apply with equal force during this and subsequent months till the end of the season.

Keep the orchard clean, and work the land to retain moisture. The handling of the citrus crop is the main work in many orchards, but where slowly acting manures are to be given their application should not be later than this month. They should be well mixed with the soil, so that when the Spring comes and the trees start a fresh growth a certain percentage of plant food will be available for the trees' use. Heavy pruning should be done now, whilst the trees are dormant. All large limbs should be cut off close to the main stem; the edges of the cuts should be carefully trimmed, and the whole wound, if of large size, covered with paint or grafting wax, so that it will not start to decay, but soon grow over. When the soil of the orchard is becoming deficient in organic matter, the growing of a winter green crop, such as mustard or rape, is well worth a trial. Clear the crop of fruit from the part of the orchard to be so treated. Plough the land well; work the soil down fine so as to get a good seed bed, and broadcast the mustard or rape. A manuring of 4 cwt. of meatworks manure and 1 cwt. of sulphate of potash per acre will produce a very heavy crop of green manure, and the plant food not required for the production of such crop will be still available for the trees' use in Spring.

Pineapples and bananas should all be cleaned up, and the land got into first-class order. Pineapples, where at all liable to frost, should be covered with grass or other suitable material. The growth of weeds between the rows of pines on land liable to frost is one of the best ways of encouraging frost, as frost will strike dirty, weedy ground, and injure the pines growing thereon severely, when it will do little, if any, damage where the land is kept perfectly clean—another advantage of cleanliness in cultivation.

## THE TROPICAL COAST DISTRICTS.

Keep the land well cultivated—plough when necessary to bury weed growth, and get the surface of the ground into a state of thorough tilth, as moisture must be retained in the soil by cultivation to mature the spring crop of fruit. This applies not only to oranges and other tree fruits, but to bananas and pines as well. A good start in spring means good bunches of bananas and early ripening pineapples. Heavy pruning can be done now in the case of all trees not carrying a heavy crop of fruit; but, where citrus trees are heavily loaded, the pruning should be put off till after the spring crop of fruit has been gathered. The spraying of the trunks and inside of the trees with the lime and sulphur wash can be carried out, and where Maori is making its appearance the sulphide of soda wash should be used as well.

## THE SOUTHERN AND CENTRAL TABLELANDS.

The pruning of all kinds of deciduous fruit trees is the chief work of the month in the Stanthorpe district. Do not be frightened to prune severely, first, in the case of young trees, so as to get strong well-grown trees instead of straggling top-heavy trees; and, second, in the case of trees that are going off in the size and quality of their fruit. Where peaches, apricots, plums, or nectarines are only making very little new growth, and that weak, so that the fruit produced thereon is small, it is advisable to head the tree hard back so that it will throw out some vigorous branches in Spring that will form a new head for the tree. Apples, as well as plums and apricots, are sometimes inclined to over-produce fruit spurs, which become long and straggling, and bear a large quantity of small-size fruit. A vigorous shortening back and cutting out of such spurs will have a very beneficial effect in the quality and size of the fruit produced.

Gather and burn all prunings; and, where codlin moth is present in the orchard, examine the tree carefully when pruning it, so as to see if there are any cracks, crevices, or masses of loose bark in or under which the larvæ of the moth may be hibernating. All larvæ so found should be destroyed, and if the work is carried out systematically it will tend to materially decrease the crop of moths that will hatch out the following spring.

As soon as any part of the orchard is pruned, gather up the prunings, and work the land, as a thorough winter weathering of the soil is very beneficial in its effects; and, further, it will tend to destroy many insects that may be wintering in it. The planting of new orchards or of trees to replace any that may have died, or that have been proved to be unsuitable to the district, may be continued during the month, and right on till the end of winter.

Do not prune vines in the Stanthorpe district, as it is advisable to leave the pruning as late as possible, but vine pruning can be done at any time now in the Roma or Central districts. Tree pruning can be continued during the month, and the orchard should be kept well worked. Citrus fruits can be marketed. Lemons should be gathered and cured.

QUEENSLAND AGRICULTURAL JOURNAL

Vol. XXVIII. JUNE, 1912. Part 6.

# Agriculture.

## RICE-GROWING.

The successful experiment lately carried out at the Roma State Farm in the cultivation of rice, should convince any practical farmer in the first place that rice can be grown as a valuable fodder as easily and as cheaply as oats, barley, or rye, and furthermore that, given good seasons, it is a crop which will produce more succulent fodder to the acre than many which are now grown. The experiment did not extend to the production of "paddy," or grain in the husk, but we need only refer to rice-growers in the Logan and Pimpama districts, as well as in Cairns, to receive assurance that the production of rice grain exceeds that of wheat or other such cereal, both in grain and straw, and the price of rice per bushel is higher than that of other cereals. The belief that rice can only be grown in tropical, swampy land, or under heavy irrigation is a too common error. The cultivation of the swamp rice of Java, China, and Japan has never been attempted, and, it is certain, never will be attempted in Queensland. Even if white men could be found willing to work all day up to their knees in mud planting out this class of rice, the cost of the work would be absolutely prohibitive, and would prove a disastrous speculation to any one who tried it. It is the "Upland, or Mountain" Rice which has been grown both in Southern and Northern Queensland for several years with signal success, particularly in the districts above named—*i.e.*, the Logan and Pimpama districts in the South, and the Cairns district in the North.

That portion of the Logan district where rice has been extensively grown is known as Pimpama Island, situated in the South-eastern portion of the State, between the latitudes of 27 and 28 S.

We have lately had so many inquiries about the feasibility and prospects of rice-growing in Queensland, that we cannot do better than answer them by republishing an excellent paper on the subject, written a few years ago for this "Journal" by Mr. F. W. Peek, then farming at Loganholme, under the title of

## "RICE-GROWING IN THE LOGAN DISTRICT, AND ITS PREPARATION FOR MARKET.

### "EARLY CULTIVATION.

"What is known as 'Pimpama Island' is the land lying between the Logan, Albert, and Pimpama Rivers, which are connected by a series of creeks and swamps with a long frontage to the Pacific Ocean or Moreton Bay, containing several thousand acres of rich coastal land, interspersed with large areas of ti-tree swamps, the water of which is brackish and undrinkable. The soil cultivated, and which has proved itself best adapted to the growth of rice, is of a sandy, loamy nature in appearance, but containing in a remarkable degree the constituents most suited to the nature and requirements of the plant, being easy of working, although slightly tenacious in wet or showery weather, but of very shallow depth in some places. Layers of decomposed marine shells are found in rather large quantities, pointing out that the lands were once ocean-washed, and the receding waters have left valuable deposits of lime and other constituents in the soil, which, together with the rich humus formed by the decaying foliage of scrub vines, palms, ferns, &c., of rank tropical growth, have left these patches of soil of varying area between the swamps most suitable for rice culture.

"The value of the land averages from £2 10s. to £6 per acre without improvement, and very little, if any, remains unalienated, it being so close to Brisbane, and the Logan district being one of the first settled districts of the colony. All the best lands were early availed of for cultivation. Who first introduced the rice seed of commercial value to Queensland appears to be undecided; but our State Botanist, Mr. F. M. Bailey, has described a species of wild rice (*Oryza sativa*), a native plant of North Queensland, growing in the swampy lands there, as being indigenous to this State; also, the Chinese have grown rice rather extensively on the North Queensland river banks, particularly near Cairns, in patches for many years past, and which has met with a ready sale when placed on the market.

"But it is to Mr. A. J. Boyd, the present editor of the 'Queensland Agricultural Journal,' that the credit is due of the introduction, in 1869, of rice-growing in the Logan district—he having procured the seed and planted it as an experimental crop at his sugar plantation, Ormeau, which he then had at Pimpama. The seed was one of the Japan varieties, with which he met fair success as regards the growth

PLATE 80.—RICE COUNTRY.

and result. Since that time, from the seed Mr. Boyd raised and distributed, other settlers have taken up the matter of rice-growing at various times and in a fitful manner, the largest local planter some fifteen years ago being Claus Lahrs, an enterprising German settler, who planted at Pimpama Island two or three varieties of the China and Japan rices, but, owing to the seed not being tested or acclimatised, he met with but indifferent success. He even went so far as to incur the expense of erecting a mill for dressing the paddy (as rice in husk is termed), but after a few years he gave it up, partly because of the machinery, not being of the best description for dressing the rice, doing its work imperfectly, but also also because the rice grown was not the best variety for table use or suitable for the home market. So the industry, so far as the manufacture was concerned, was allowed to lapse. The farmers since then have still kept on planting the rice, which they have cut and used for fodder for their horses and stock, using the seed saved from the crop reaped for re-sowing the land. The consequence has naturally been that the crop had deteriorated with successive plantings, through the same seed being used without change. But three things of great importance had been learned. These were: 1st. The suitability of the soil and climate of the Logan district for rice culture. 2nd. The proper time at which to sow the seed to ensure success. 3rd. The best system of planting and after-treatment of the crop. The value of rice has also been thoroughly tested as green feed for horses and stock, who eat it greedily, and keep in splendid condition when fed upon it. The greatest difficulty in rice culture has been found in procuring the right seed, there being such a large variety of each kind, both with their distinctive flavour, colour, and quality, as well as in the facility with which the crop can be handled and harvested (as I will explain further on) and in the requirements of the merchant, who has his prejudices in favour of certain kinds, which more or less best suit the tastes of the consumer. This has now to a certain extent been overcome, and our farmers are now prepared to carry out this important branch of agricultural industry on sound business lines and with up-to-date methods.

"PREPARING THE LAND.

"Rice, like every other cereal and vegetable, to ensure good results, must have a certain amount of attention and care in preparing the land, although the question of drainage does not enter so largely into consideration as regards rice as with other cereals, and it, of course, greatly depends as to which variety of rice you intend to cultivate, but stagnant water should be avoided as detrimental. The variety I intend this article to illustrate is the Aus, or upland rice. I have tried the Aman variety as an experiment, but with small success, the chief fault of the latter being the necessity of it being submerged continuously with not less than 2 to 3 in. of water, and, when the crop ripens, the difficulty of harvesting, owing to the grain being so brittle that at the least touch it leaves the ear with a consequent loss of seed. The variety of rice grown most extensively in the Logan district was known as the 'White Java,' which gives a length of straw from 4 to 6 ft., with a good flag, besides a grain of good length, fairly plump, and good cropper, and, so far, seems fairly free from disease or rust. Other varieties tried were the China, Kobe Japan, Batavia River, and Italian Upland, of which the White Java and the Italian Uland were obtained through the medium of the Agricultural Department.

"In preparing the land for planting, ordinary methods need only be adopted—that is, to first plough, leaving the soil to lay for a week or so, to aerate and sweeten; then crossplough and harrow, bringing the soil to as fine a tilth as possible. The best time in this district for planting (and I should think it a suitable time for all districts south of Rockhampton) is at the end of September or at the beginning of October, when we get the first rains. In cultivating for rice on hillsides or sloping land with a natural rapid drainage, it would be advantageous to slightly terrace the land crosswise to the fall of the hill, leaving an open catchment drain on the higher side, blocked at each end to conserve the rain water, because even so-called upland rice must have a certain amount of moisture, and by the construction of the above drain, or dam so to speak, the gradual percolation of the conserved water will have the desired effect of helping to supply the necessary moisture, which would be about 20 to 30 in. of rainfall spread over the period of growth. This rainfall has produced very good crops of fair yielding grain.

"SOWING THE SEED.

"In sowing the seed we have to be determined as to our requirements—if for cropping for grain or for fodder purposes only. There are three systems: Broadcast chiefly for fodder purposes, planting in drills, and transplanting from nursery beds. In the first instance—*i.e.*, sowing broadcast—it will take a bushel (60 lb. of paddy) to the acre, the seed being harrowed and treated in the same manner as oats or wheat in the after cultivation. But the plan most generally adopted, and by far the best, is planting the rice in drills 2 ft. 6 in. or 3 ft. apart, and about 10 to 12 in. between the plants, which may be done successfully with an automatic seeder. By this method, about 35 to 40 lb. seed to the acre are required. It ensures the crop being more even and not so patchy as when sown broadcast, and allows a better chance of going through the crop with hoe or cultivator to remove any weeds that may have made their appearance before the rice has got fairly started. The system of planting in nursery beds and transplanting out is adopted chiefly in planting swamp rice or the Aman variety; but, as this system of planting entails a lot of labour, I do not think it will ever come into active operation in this State. The mode of operations with this variety is briefly as follows:—Beds are prepared according to the area to be planted; a bed about 20 ft. long and 6 ft. wide will be amply large enough to grow plants for a quarter of an acre, the beds being well made and enriched, so as to produce vigorous plants. Sow the seed and rake in carefully, watering at certain intervals. Care must be taken to keep the plants growing. When the plants are about 6 in. high they are ready for transplanting to their permanent beds, which is done by making holes about 10 in. to 1 ft. apart in the rows and 2 ft. 6 in. between the rows. But, as before pointed out, this is a most tedious and costly mode of planting, and the labour involved is a serious item for consideration. You might as well try to transplant a field of oats or wheat, and expect to get a profit. So that it will be easily seen the planting in drills is at once the most economical and systematic, besides being the one most generally adopted.

"HARVESTING THE CROP.

"This was a difficult matter to undertake with the rice formerly planted in the Logan district, the China and some of the Japan varieties being so brittle that when ripe the least touch caused the grains to drop off with a consequent loss of seed. This has been happily overcome to a certain extent by the better variety planted. Not only does the White Java give better facility for harvesting, but the straw is of a better colour and quality, of a good length, averaging from 4 ft. to 5 ft., and in good land even 6 ft. is no unusual length; and no more fairer or gratifying sight to the farmer's eye can be imagined than the rich appearance of a rice field ready for harvesting: this is whilst the stalks have still a bronze-green appearance, the heads have turned a golden brown, about half-way down, and appear what a wheat farmer or an inexperienced person would deem three parts ripe. The heads of rice, heavy with grain, have a graceful, drooping appearance; as many as thirty to forty heads have been produced from a single grain planted—the product weighing from 10 oz. to 14 oz.

"By cutting some varieties of rice in this state, the loss is not so great as with over-ripe grain. The cutting is begun in the morning as soon as the dew is off, the rice being bound up into very small bundles, ready to be threshed as soon as possible (which will be explained later on). Rice is never left stooked in the field, but is treated as quickly as possible.

"The usual method pursued in harvesting is to cut with the ordinary sickle or reaping-hook, although where large areas are planted, it is thought that the latest inventions of wheat-harvesting machinery could be used most effectively. A slight alteration in the reaper and binder might be required in the way of lighter and broader wheels on the rich soft rice lands, but otherwise I see no difficulty in the harvesting. At all events, it is the intention of the writer to induce some firm to make a trial at next harvesting as an experiment, and if successful a machine will doubtless be obtained on co-operative lines for the use of the district. After cutting with the sickle, the rice is gathered into bundles and carted into the barn or shed, or, if not sufficiently dry, is left for a day or so to ripen; but this is not often the case, experience having taught our farmers the right time to cut, and it is generally taken to the barn at once for stripping or threshing.

"THRESHING THE RICE.

"Where there are large quantities, this can be done with the ordinary flail on a threshing-floor, but other systems are in vogue where only small quantities are grown. One plan of threshing is by driving

PLATE 81.—HARVESTING RICE.

four forks into the ground, about 4 or 5 ft. apart in width and 10 or 12 ft. long, placing two long saplings lengthways and two crossways. Over these a sheet or tarpaulin is placed to hang and form a sort of long trough. In the centre, resting on the cross pieces, a rough kind of ladder is placed, and the bundles of rice are then beaten over the bars of the ladder, which causes the grain to drop into the bag. Some farmers merely nail a few strips across a box or wooden trough, and beat the rice out on this by handfuls. After the grain is beaten from the straw (it is then known as paddy), the next operation is the winnowing. This is done in an ordinary sieve by letting the grain fall on to a sheet in a light breeze, the sieve being held up at a little distance; its weight causes the sound grain to fall on the sheet, whilst the light grain, bits of straw, &c., are wafted away to one side. The paddy is then carefully collected and placed in the sun, spread out for a few days to get thoroughly dry, when it is bagged and stowed away in a dry barn, or else taken away to the miller for turning into the article of trade and commerce with which we are more familiar, and known as rice and not paddy. The straw, after the grain is threshed out, is spread out to dry or cure, or else it is fed to the stock. A great deal of nutriment remains in the stalk at the time of threshing, and I believe it would make up into a splendid ensilage if desired to be used when other feed is scarce. I should be pleased to hear the results if any of our enterprising farmers will give it a trial.

"MILLING THE RICE AND PREPARING THE CROP FOR MARKET.

"This is a most interesting operation, and for the want of the necessary machinery the rice industry has lain dormant for several years in the Logan district. Every credit must be given to Mr. F. W. Peek (the writer of this article) for the energy and enthusiasm he has displayed in reorganising the industry, and the farmers through the medium of the Logan Farming and Industrial Association, who took the matter up, believing that a great benefit would result to the district if only carried out in a systematic manner. The matter was ably discussed at their meetings. The Agricultural Department was written to for advice, and their assistance was given as far as possible to facilitate the objects sought to be obtained. It was from information supplied by the Department that the farmers were induced to co-operate in the purchase of a new and better variety of seed, a quantity of White Java —900 lb.—being purchased and distributed at first cost among the farmers; next, a small experimental patch was started, the Department supplying rice seed of other varieties, which are now being tested for their producing and milling qualities, the seeds from this source being again redistributed free of charge to those willing to grow them and still further test the various kinds submitted.

"With the large increase of area planted, the want of a mill began to make itself felt. The prices offered for Queensland-grown rice were very low, principally owing to no local mills in Southern Queensland being established at that time. Again, the Department of Agriculture was appealed to, and the address was obtained of the latest up-to-date firm

PLATE 82.—RICE MILL, PIMPAMA ISLAND.

of manufacturers of rice-milling machinery. This was the Engleburg Huller Company, of Syracuse, U.S.A., who were promptly written to for information, and price-lists and catalogues were received from them. A meeting of the farmers was called, and an endeavour was made to get a co-operative mill, but without success, the general opinion being that growing and manufacture were two different branches of the business, and that milling would be better undertaken by a local sugar-miller. who would have the necessary engine power to work the rice-mill at times when the sugar season was over. This was eventually the plan adopted. Mr. Wm. Heck, who owns a sugar-mill on Pimpama Island, sent for and erected the necessary buildings and machinery as an adjunct to the sugar-milling industry. A neat weatherboard structure, the dimensions being 28 ft. long, 18 ft. wide, and 22 ft. high (two story), was erected on stumps to keep the floors dry—an essential in ricemilling operations—a floor being placed about 10 ft. high from the basement floor and extending the full length of the building. Upon this floor is erected the Engleburg Huller and Polisher, a neat little machine known as the 'No. 4 size,' and capable of treating half a ton of dressed rice per day. The paddy, being run into the hopper of the machine, falls on to a cylinder which revolves at high speed and most effectually 'hulls'—that is, rubs off the cuticle or outer skin—and polishes the grain in one operation. The pollard or residuum from the rice (hulling and polishing) falls on the floor, whilst the grain itself descends to the lower or basement story of the building by means of a shoot which conducts it into a machine placed to receive it, and known as a grader, which is worked and fed automatically from the machine above. There are four sieves or sifters in this grading machine which separate the broken grains, and also the polished rice into first, second, and third quality, the rice being caught in bags or boxes placed to receive it. It is then ordinarily ready for market, but Mr. Heck has added another machine to his mill, known as an improved winnowing machine; this machine, by a series of cogs and cranks, makes the rice pass through another set of sieves, and, at the same time, the wind from a rotary fan contained in the machine and driven at a high velocity clears off any impurities of husk, dust, &c., that may be with the rice after leaving the grading machine, and completes the milling operations by finishing the product in a perfectly clean and highly polished state. Samples of this rice were exhibited at the National Agricultural Society's Show in Brisbane, and submitted to experts, who expressed themselves as pleased at the improved samples displayed, which were equal to any imported rice of the same variety and very little different from the best Japan.

"THE RICE CROP—WILL IT PAY?

"This is the question invariably put to the writer whenever advocating the growing of rice as one of the crops to be successfully undertaken in the coastal districts of this State.

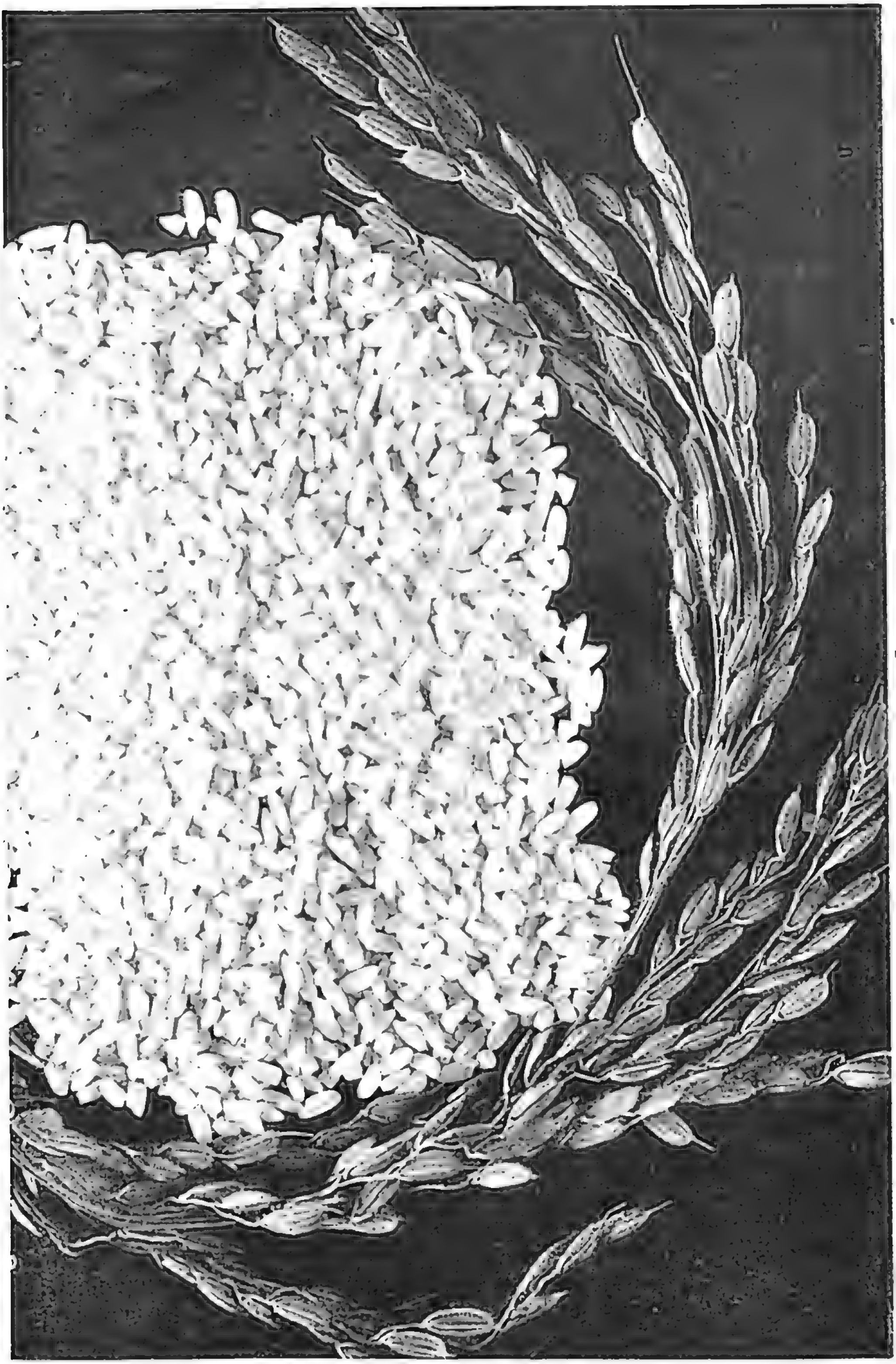


PLATE 83. HEAD OF RICE AND SHELLED RICE. (Natural Size.)

"In the first place, take the cropping. In ordinary situations, with only fair cultivation, from 30 to 40 bushels of 60 lb. of paddy can be obtained per acre, which is double the wheat yield, the average crop of wheat being from 15 to 20 bushels per acre. I know in some instances these quantities have been exceeded in both crops, but I give a fair average for comparison. The value of wheat per bushel ranges from 3s. to 3s. 6d., whilst the value of rice sold to the local mill averages from 4s. to 5s. per bushel delivered at the mills. Then dry rice chaff is of great value as a feed for stock and horses, and I feel sure, if placed on the market and once fairly tested, it would command a ready sale. The straw is less hard, and, when well dried, compares favourably with oaten straw, and a fairly low estimate would give (according to variety grown) from 3 to 4 tons per acre, of an estimated value of £2 to £3 per ton, or an average to the grower per acre of straw and grain of £15 10s. per six months' crop. Of course, in favoured districts two crops can be obtained in the year—that is, where frosts do not appear. Then the above figures would have to be doubled as a yearly income, but, in the Logan district, only one crop of rice is taken, to be followed by a late crop of some other kind, such as oats, &c. Of course, the greatest benefit is derived by the grower on a large scale if he does his own milling. A glance at the prices paid for paddy and the prices now obtainable for the finished product will be worth consideration. Taking the current prices of rice, at the time of writing, in the Brisbane market, duty paid, best Japan is £24 per ton. The commonest quality of imported rice, 'Rangoon,' fetches, duty paid, £19. This price gives a fair margin of profit to the local miller if he sells at £18 per ton. The samples being milled this season at the Pimpama Island Mill are of very high grade, and closely resemble 'Patna' in shape of grain, but slightly darker in colour. Taking then, the local rice at £18 per ton market value, to produce which 1 ton 10 cwt. of paddy would be required (according to records taken at recent trials) to be milled, of a value of £12 9s. 9d.; this would leave a margin of £5 10s. 3d. I will add here that paddy rice is bought locally like wheat at 2,240 lb. per ton, deducting the cost of milling, the average of about £2 per ton leaves the miller a net profit of £3 10s. 3d. per ton. To this must be added the value of the pollard, which also is of great value as feed for calves, pigs, or poultry, when steamed and then mixed with separator milk. Its commercial value is certainly not less than £2 to £3 per ton."

Commenting on a sample of rice sent by Mr. Peek to the "Brisbane Courier," that journal wrote:—

"'We were to-day shown a sample of rice grown at Pimpama Island, Moreton Bay. It resembles Patna rice in shape of grain, but is darker in colour. Qualified experts who have seen the sample say that it is the first really high-grade rice that they have seen grown in this State, and as it can be marketed at from £18 to £18 10s., should command a ready sale. The commonest quality of imported rice, Rangoon, fetches £19, duty paid, here just now, while for Japan rice £24, duty paid, is asked by the distributing houses.'

" The price quoted for the mill such as I have described, and which is so constructed that it can be duplicated or extended at a very small cost is, for the No. 4 machine, with a capacity of not less than half-a-ton per day, together with grader, &c., about £130, delivered at Brisbane. Of course, the buildings are extra, and the power required to drive the machinery; but worked in conjunction with any existing sugar-mill, or sawmill, &c., it would prove of great value to the district, and a source of profit on the outlay to any enterprising millowner.

" FUTURE PROSPECTS OF THE RICE INDUSTRY.

" Like all other crops, rice has its enemies and diseases; it has a kind of rust, smut, &c., and in some parts of Queensland grubs will take the roots, but up to the present the grub has not caused any trouble in the Logan district. The rust has yet to be dealt with, and I think this will be accomplished by experimenting with various kinds of rice seed till we meet with a rust-resisting variety. It is probable now, that under Federation the importance of rice culture will receive the attention it is worth. A large sum of money is annually expended in importing the product into the Commonwealth States, I would therefore advise all farmers to give rice a fair trial, especially as we are growing varieties that can now be classed as fairly successful on our coast lands, and where a fair average rainfall can be partly depended upon. The value of rice grown simply as fodder to cut green is great for stock feed, the stalks being sweet, juicy, and succulent, and giving a good return per acre, and all stock will eat it with avidity. The question of labour does not enter largely into rice cultivation; as I have pointed out, although a tropical product there is every facility for cultivation by present mechanical methods—that is as far as the Aus or upland rice is concerned; the Aman or Boro varieties being swamp rices needing irrigation I have not yet heard of as being grown to any great extent, and they probably will not be for some time, if at all, owing chiefly to the heavy outlay required for a suitable water supply and an irrigation plant, which can be dispensed with in growing the beforementioned varieties of upland rice, which have proved most suitable for existing conditions and our present agricultural methods of cultivation and harvesting. Of this I am certain, that the rice is one of our coming crops which, together with coffee, will prove of great benefit to this State particularly, and a further source of wealth to our producers. The market for rice in Australia is a growing one, and it will take years before the supply overtakes the demand. Our farmers need not fear to grow the crop and invest in this industry, which will return a fair amount of profit for the labour and outlay required to produce an article which only requires care in selecting and planting the varieties to suit the market requirements. I am sure the efforts of our producers will be crowned with success, and I shall be pleased with the part I have taken in assisting the modern development of rice cultivation in Queensland."

This prediction, we regret to say, has not been fulfilled, as may be shown by reference to the Registrar-General's Annual Reports since the year 1900. In that year the statistics showed:—

| | |
|---|---|
| Total area planted in Queensland .. | 319 acres |
| „ quantity produced (paddy) .. | 9,275 bushels |
| „ average would equal of clean rice | 320,617 lb. |
| The net imports of rice for 1899 were .. | 9,283,933 lb. |
| Of the value of .. .. .. .. | £50,099 |

The above figures represent the position as to production and consumption, and would therefore be about 3.34 per cent. of the total requirements of this State only.

The statistics for the following years, as published in the Annual Report of the Under Secretary for Agriculture for 1910-1911, are as follows:—

| Year. | Acres. | Bushels. | Average per Acre. |
|---|---|---|---|
| 1901 ... ... ... ... ... ... ... ... | 205 | 5,222 | 25·47 |
| 1902 ... ... ... ... ... ... ... ... | 38 | 1,093 | 28·76 |
| 1903 ... ... ... ... ... ... ... ... | 49 | 1,322 | 26·98 |
| 1904 ... ... ... ... ... ... ... ... | 60 | 1,638 | 27·30 |
| 1905 ... ... ... ... ... ... ... ... | 33 | 885 | 26·82 |
| 1906 ... ... ... ... ... ... ... ... | 24 | 772 | 32·17 |
| 1907 ... ... ... ... ... ... ... ... | 14 | 343 | 24·50 |
| 1908 ... ... ... ... ... ... ... ... | 7 | 270 | 38·57 |
| 1909 ... ... ... ... ... ... ... ... | ... | ... | ... |
| 1910 ... ... ... ... ... ... ... ... | 2 | 22 | 11·00 |

The average yields per acre, it will be noticed, are far higher than those for other cereals, and are arrived at by including all areas under rice, whether grown for fodder or grain.

The reason for the gradual reduction in area sown, and practical eventual extinction of the industry, is probably due to the increase in the cultivation of sugar-cane and arrowroot, and the phenomenal progress of the dairying industry in the Logan and Pimpama districts.

The total annual production of rice in the United States of America, which, in 1866, was 2,000,000 lb., has now reached 710,289,000 lb. of rough rice, allowing 45 lb. rough to 1 bushel, and 162 lb. rough to 100 lb. cleaned. In 1910, there were 723,000 acres sown, producing 24,510,000 bushels, an average of 33.9 bushels per acre. The farm value of this was 16,624,000 dollars or £3,324,800. Rice lands have risen from £2 per acre to £8 per acre; hundreds of miles of irrigation canals have been constructed. Rice has been the redemption of the prairie lands of Texas and Louisiana. In ten years the worthless lands of these two States will produce the world's demand in rice. An acre there produces 20 sacks, worth from 10s. to 16s. per sack. Where are the Queensland farmers in the race?—[Ed. " Q.A.J."]

## THE PRICKLY COMFREY.

The Prickly Comfrey as a farm crop for pigs and other farm stock is never met with, as far as we know, on Queensland farms. A few years ago it was boomed in America as a wonderful forage plant, but is to-day scarcely grown anywhere in the United States. In Europe, however, it is widely grown for "soiling," but where good crops of corn, lucerne, clover, and other soiling plants can be grown, there is little room for the Comfrey, although, in composition, it compares favourably with other succulent forage crops, but has nothing special to recommend it, and it is of no use for hay.

It is known botanically as *Symphytum asperrimum*, a rank-growing, succulent forage plant, not to be confounded with the Prickly Lettuce (*Lactuca scariola*), which is a dangerous weed which many years ago overran the Rosewood district, where it was supposed to have caused the death of many cows. The Comfrey plant grows to a height of 3 or 4 feet, and has large, long leaves, which are mucilaginous in character. It is very hardy growing and affords 5 to 6 cuttings per season. A yield of over 30 tons per acre was reported by the U.S. Department of Agriculture as having been obtained in Wisconsin, and New York State reported a total yield of 50 tons per acre. But these were exceptional yields, the average crop amounting to from 10 to 15 tons per acre.

It will grow on light lands of inferior fertility, but gives the best yields on rich soils heavily fertilised. It is grown from roots set in the spring. These are fleshy, like dock roots, and go down deep into the soil. They should be planted in rows 3½ feet apart and 18 inches distant in the row, and kept well cultivated. A large yield of forage can be obtained the first year, but the heaviest yields are not obtained until the second or third year. In gathering the crop for forage it may be safely cut as close to the ground as a grass knife will run.

One of the chief objections to this plant is the difficulty experienced in getting stock to eat it. Cattle learn to like it in time, but can scarcely be induced to touch it at first. A little bran or salt sprinkled on the leaves at the first few feedings will make it more palatable.

The question is: "Is the Comfrey a valuable fodder for swine?" This appears to be satisfactorily answered by an article on the subject which appeared in the March, 1912, issue of a German publication entitled "Illustrirte Halbmonatsschrift über die Fortschritte im Ackerbau und Landwirtschaftlichen Düngerwesen des In-und Auslandes," on "The Comfrey and its value in Swine-breeding." Several correspondents of that publication have written testifying to the great value of the Comfrey during drought conditions. One proprietor said, "Where all other vegetation was dried up, the Comfrey plants were beautifully green, and were a splendid sight under the shade of the fruit trees."

Another stated that Comfrey roots were planted out in April, and yielded a good cutting in July, and, notwithstanding the abnormal drought, furnished a second cutting in September. "Comfrey," says the editor of the above publication, "is the best green food for pigs.

It can be cut five times a year, as it sends forth its succulent leaves from early spring to late autumn. On an average the yield is 20 tons per acre. The plant will grow on any soil, but prefers a moist, marshy soil. Every waste corner on the farm or in the garden, where nothing else will grow, can be utilised for Comfrey. With care the plant will continue to give crops for from 21 to 30 years. It never dies down in winter, even in the extremest cold. Even occasional heavy rains do it no harm. Pigs may devour as much as they like of it, but it never produces flatulency or hoven. Comfrey always remains succulent, never becoming dry or woody, as is the case with clover. This feed is remarkably adapted to the health of pigs. It is not only an excellent food in itself, but it assists the digestion of other foodstuffs."

"Cattle," continues the article mentioned, "as soon as they are accustomed to it, are also partial to it. It is also valuable as a foodstuff for sheep, goats, and poultry. A Comfrey patch is a rich field for honey-seeking bees. But, above all, it is the best stand-by for pigs, for the reason that, more than any other animals, the pig delights in soft, succulent green feed."

In planting Comfrey an important matter is the selection of roots. They should be chosen from young, strong, healthy plants, and should not be cut too small.

The cultivation is very simple. The land must be deeply ploughed, levelled, and the plant distances laid off 14 by 16 inches. The best manure is farm yard manure, in addition to which, seeing that the field is to last for several years, a plentiful supply of potash and phosphoric acid must be supplied. A good manure (artificial) is 3 to 5 cwt. kainit, 2 cwt. Thomas's slag, stable manure, and 1 cwt. superphosphate per acre. A few years later the field should be manured with from 1 to 2 cwt. 40 per cent. potassium sulphate and ½ cwt. Chile saltpetre.

Whether the Comfrey would take precedence of our many succulent forage plants is extremely doubtful, but as a drought-resister it might prove of value in some of our dry seasons, which from time to time occur.

The analysis of Prickly Comfrey shows its composition to be—

| Water. | Ash. | Protein. | Fibre. | Nitrogen—Free Extract. | Fat. |
|---|---|---|---|---|---|
| 88.4 | 2.2 | 2.4 | 1.6 | 5.1 | 0.3 |

Compared with the composition of lucerne—

| | | | | | |
|---|---|---|---|---|---|
| 76.2 | 3.1 | 6.7 | 4.3 | 9.4 | 0.3 |

## NUMBER OF MAIZE STALKS PER HILL.

It often happens that, with the best sorts of improved corn, a few stalks in the hill will give better results than a large number. Experiments are recorded by the Illinois Station (U.S.A.) which show that on rich plain land a larger number of stalks will give the best results. But this does not hold good in our State on the poorer lands, and, as a rule, not on the Downs lands.

If the corn is planted the ordinary distance apart—about 4 feet—and one stalk is grown in every hill, and every stalk produce one ear weighing a pound, the yield may safely be put down at 46 bushels per acre. If two stalks are grown in every hill, the yield will be 92 bushels per acre, while if three stalks are grown to the hill, the yield will be 139 bushels per acre.

But this is taking for granted that every stalk produces its ear of 1 lb. weight. As a matter of fact, a large percentage of stalks in a field are barren, while others produce ears which do not weigh a pound. For this reason, the usual practice is to plant from three to four stalks to the hill.

If we take the case of Cuzco corn we should, if each stalk bore its possible number of six ears per stalk, find that the yield would amount to 278 bushels per acre. I saw Cuzco corn grown at Barcaldine, by Mr. Hannay, of Geera, which in many instances carried from four to six ears per stalk, but taking the crop as a whole, the number of barren stalks reduced the return very considerably. It is possible that 95 per cent. of the seed sown will germinate, but it does not necessarily follow that each stalk will bear a 1 lb. cob, or even any cob at all. How often do we see a sort of " hand" of cobs on a stalk, consisting mainly of husk, with perhaps a 2 or 4 oz. cob in one of the " fingers."

On the supposition that there are 4,840 stalks to the acre, each stalk bearing a 1 lb. cob, the resulting crop would be 80 bushels to the acre, but such a crop is seldom realised except on rich virgin land.

In 1889 a farmer in South Carolina, U.S.A., produced the grand prize crop in the " American Agriculturist" contest. On a single acre he grew 255 bushels of crib-cured corn. I have already shown how this was done and at what cost. A 60-bushel crop in Queensland, grown without manure, with its accompanying crop of pumpkins, is of infinitely greater value.—[Ed. " Q.A.J."]

---

## COW-PEA (VIGNA CATJANG).

This crop in Queensland has not yet claimed the attention of the farmer to the extent that its merits warrant. As a soil renovator or as a fodder, it ranks amongst the foremost in all districts; whilst in the drier ones it is undoubtedly the best for either of the purposes mentioned, as it will thrive and mature under such extremes of heat and dryness as would spell failure with other crops. This season, at the Roma State Farm, notwithstanding the prevailing uncongenial conditions, the poorest and most unsuitable varieties produced good quantities of vine and pulse.

It is purely a summer crop and cannot be sown until all danger of a frost in localities where such occur is past (as it is most susceptible and the slightest freeze will kill the young plants outright), and can be continued until the end of January, if suitable varieties are selected for the purpose. This season some of the crossbreds raised here, sown on 5th January, ripened pods by 20th March, whilst others at time of writing—13th April—have only just blossomed.

The standard weight of a bushel of cow-pea seed is 60 lb.; but the quantity of seed to sow per acre is governed by the method of sowing and the variety sown. With such a variety as the Large White or Large Black and White, to broadcast a crop from ¾ to 1 bushel of seed per acre would be required; whereas, if drilled in in rows 3 ft. apart, from 8 to 12 lb. would suffice; with the small-seeded varieties like Poonah, 20 to 30 lb. for broadcasting and 4 to 6 lb. for drilling-in would be ample.

*Green Manuring.*—The wheat lands in the Western districts are naturally deficient in organic matter, with the result that after a few years of cultivation—which does not tend in any way to increase this content, but rather to decrease it—this deficiency makes its presence felt in the increasing difficulty of working the soil and the inability to retain a nice loose surface, or, to use an every-day expression, it makes the ground set like cement after heavy rains. To overcome this evil. which it undoubtedly is, as it reduces the moisture content of the soil by preventing percolation and assisting evaporation, the addition of organic matter must be brought about in the cheapest and most beneficial form. To gain this end, green manuring must be resorted to; and of the many crops adapted for this purpose cow-peas will be found to be the most suitable for the following reasons, viz.:—

1. As before stated, their ability to fulfil the purpose for which they were sown under adverse conditions.
2. They will produce good crops on almost any kind of soil.
3. The period for which they occupy the ground is so short.
4. The amount of material furnished is heavy, and of such a nature that it quickly decomposes under favourable conditions.
5. Its roots penetrate to such a depth and in such numbers as to exercise a most beneficial effect upon the physical condition of the subsoil. This is the chief feature which enables it to withstand dry spells; but, as it results in the moisture in the subsoil being utilised, it will be seen that, unless the crop has been grown and ploughed in before the summer rains, a wheat crop sown that season (which is not advocated) will be wholly dependent on rain, during its growing period, to bring it to maturity.
6. Like other legumes, it obtains nitrogen from the air, with the result that when it is turned in the soil is richer in this most essential plant food.

*Preparation of Seed Bed.*—Whether the crop is intended for manuring purposes or is being grown for fodder or pulse, the preparation of the seed bed should be thorough in all cases, as, like any other cultivated plant, it amply repays for the extra working.

*Sowing.*—Where possible, the seed should be drilled in in rows 3 ft. apart, and the seed dropped about 8 in. apart in the rows. This results in a great saving of seed, a more even and thorough germination, and, under some conditions, an immediate germination, which if the crop had been broadcasted, would not have taken place until rain was experienced, meaning possibly a delay of weeks or months at a season when it would mean that the seed and labour had been wasted owing to frosts being experienced before the crop was sufficiently grown to be of any value. Again, drilling permits cultivation—a great factor where the soil is inclined to run together after rain, as with the horse-hoe the escape of moisture can be reduced to a minimum and the soil kept in a condition to admit of as rapid percolation of any rain which may fall as its character will admit; whereas with a broadcasted crop sown on such soils the harrows, which are the only implements practically which can be used, exercise very little, if any, beneficial effect. Besides the better destruction of weeds, the horse-hoe gives a much greater body of well-worked aerated soil for the turning over with the crop, thereby facilitating the capillarity connection between the moved and unmoved soil being made, resulting in a more quick decomposition taking place. The foregoing remarks are only made in order to demonstrate relative values of drilling *versus* broadcast, and not in any way to decry the use of harrows even in the cultivation of this crop, as they are used here (across the drills) after scuffling when the plants are small if the ground untouched by the cultivator is crusted or becoming weedy. The use of them then, owing to the loose soil between the drills permitting the harrow-tines to sink well into the ground, results in the destruction of both without injury to the plant. As will be gathered from the foregoing, broadcasting is not advocated for dry districts at least, but, as all have not the necessary implements for drilling-in the seed, some of whom may be desirous of putting in the crop, the reason is given why the quantity required for this purpose has been mentioned.

*When to Plough in.*—The crop is valuable at any stage of its growth as a manurial crop, but where it has to be ploughed in, the operation should not be long deferred after it has begun to blossom; otherwise it will become a tangled mass which will probably require running over with a disc harrow in order to enable it to be turned in. Again, if dealt with at the time stated, it can be turned completely under and not leave any portions between furrow slices to assist in the escape of moisture and thereby retard decomposition, and at that period it is also in the best structural condition to undergo rapid transition in the soil. If sheep or cattle are kept, it would be wanton waste to plough in an early-sown crop unless circumstances necessitated such, as the crop can be grazed off when the pods are fully formed, but not ripe, without the ultimate benefits being reduced.

To ensure decomposition being rapid, the land ploughed should be immediately rolled, and it is recommended, during midsummer at least, that this operation should conclude each day's work.

The period which should elapse before a commercial crop can follow cow-peas ploughed in as green manure in a dry district, with every hope of success, is, for the summer crops eight months, and winter crops twelve months at least. Should the crop have been fed off early in the season and the ground ploughed before the heavy rains are experienced, a winter cereal crop may be sown, as the moisture contents of the soil will have risen sufficiently to warrant it, but under no other conditions should it be attempted.

*As a Fodder Crop.*—In this capacity, either green in the form of silage or cured, it is much relished by stock, and affords a most nutritious fodder—in fact, according to analysis, it is stated to equal bran in feeding value, weight for weight, and can be used to replace lucerne.

*Sowing.*—When sowing for fodder purposes, it is generally sown in a similar manner to that already mentioned—viz., in drills 3 ft. apart. Now, as the crop is not harvested for hay until the first pods are turning yellow, it means that the field is one tangled mass with most varieties. This feature is the one which precludes cow-peas being extensively grown for hay, as it renders harvesting laborious and costly. To overcome to a certain extent this evil, the drills are sometimes sown 6 ft. apart; but this means waste ground, besides the expenditure of more labour in preventing growth of weeds. To avoid this and at the same time to have the crop in a condition which will facilitate harvesting, it is advocated that two drills of cow-pea be sown, then two of maize, and so on throughout the field. Providing the moisture in the soil is sufficient to meet the requirements of the crops, a good yield of maize can be expected, as the proximity of the nitrogenous crop exercises a most beneficial effect.

*Hay-making.*—In the journal for January, 1912, will be found a valuable article on this subject by R. Jarrott, manager State Farm, Gindie.

*Silage.*—When sowing this crop for silage purposes, it has been found that it facilitates harvesting to put it in the drills along with maize, owing to the fact that instead of covering the ground it twists round the stalks of the cereal, which admits of mowing. Seeing that these two crops together form a complete ration for stock, the method is to be recommended. Providing the seed of the maize is not too large, this can be done with an ordinary wheat drill, which will sow three rows at a time.

The best time to cut for silage is when the first pods are ripening—that is, with the varieties advocated for this purpose. With some this stage would be too late unless water is added; this applies more particularly to late crops.

*Grazing.*—It has been proved that for sheep, cattle, pigs, &c., it is a splendid green feed, and does not contain any deleterious substance in harmful quantities, like many other crops. The only precaution necessary is to refrain from putting on stock very hungry, and not let the crop become too ripe before fed off, as the peas in this case, which are produced in abundance, will swell on being taken into the stomach of the animal and cause colic and death if consumed in sufficient quantity.

As a cleansing crop for weedy lands, the cow-pea has few equals.

## VARIETY TEST AT ROMA STATE FARM, 1911-12.

Though the season has been one of limited rainfall and at the same time erratic, the results of the testing of various varieties may be found of value in determining a suitable variety by intending growers; hence they will be given:—

*Large Black and White.*—This was the earliest maturing variety grown, and should be found valuable for early green feed, or for manuring orchards or vineyards after crops have been gathered. It does not appear to be so suitable for growing for hay purposes as some of the other varieties. Sown early in the season, it sent out runners after first seed had formed like a second growth; late sowing resulted in the production of pods at the expense of the vine. The seeds are large, white in colour, with black eye.

*Black-eyed Susan.*—This variety came next to Large Black and White in time of ripening. It is better than that variety for curing into hay, both as regards quantity and quality of material. The seed is marked in the same manner as the previous mentioned variety, but is much smaller. It is suitable for hay, green feed, silage, or green-manuring purposes.

*Black.*—Has been grown here for some considerable period and has proved to be one of the best general-purpose cow-peas we have. This season was slightly later than the previous mentioned variety, but produced heavy quantities of vine and pulse. The colour of the seed, which is a medium size, is black.

*Purple* and *Clay.*—With the exception of the colour of the seeds from which they are named, the remarks made on the "black" varieties can be attached to these two.

*New Era.*—This variety matured about the same time as the last three mentioned. It appeared to be finer in growth, the pod containing the peas being white and finer in texture than the others. The seeds are speckled greyish colour, and small—general-purpose variety.

*Skew-bald.*—Named after the colour of the seed, which are also fairly small. It is a medium early variety, with a habit of growth somewhat similar to Black-eyed Susan—appears to be a good general-purpose pea.

*Large White.*—Medium late variety of low creeping habit, rather coarse, does not appear to be so well adapted for the situation as others already mentioned. Peas, which are large and white in colour, are produced in good quantities, and are considered the best for culinary purposes.

*White's Perennial.*—This, as the name implies, is a perennial though it has not yet been ascertained here whether it can withstand the winter if cut and covered. It is a late maturing variety, and on this account hardly to be recommended for sowing here; has a very straggling habit of growth, which would, it is feared, render harvesting rather difficult. From the fineness of the vine, it should make the best quality hay or chaff of any of the varieties. Is a shy seed bearer, the colour of which is somewhat similar to the Clay colour.

*Poonah.*—A medium-season variety with an erect habit of growth peculiar to itself, which should result in it being extensively cultivated both for hay and silage purposes, as on this account it can be cut with a mower and handled when sown in rows 3 ft. apart. Though the yield per acre might not be as great as would be obtained from other varieties recommended, it would be more than compensated for in the ease of harvesting. Seeds very small—colour clay.

*Mammoth.*—This is a very late variety, and is more suited for coastal cultivation. It should prove excellent for silage purposes, but would, it is considered, have to be sown in drills 6 ft. apart to make harvesting possible. Too coarse for hay. It derives its name from its growth and size of seeds, which are of a clay colour.

*Crossbreeding.*—Crosses were made last season in an endeavour to improve the structural portion of the early maturing varieties by increasing the quantity and improving the quality (by making it finer) for curing purposes. Though this crop admits of progress twice as quickly as wheat, the F1 and F2 generations being sown and seeded this season, we are not yet in a position to state whether any improvement has been arrived at, as the stability of the plants produced to perpetuate their present characteristics have not yet been proved, and can be only called variable results until such has been ascertained.

Further crosses have been made again this season, and it is thought that there is more likelihood of something beneficial being obtained from this season's work than from last, as some very desirable characteristics were introduced with some of the new varieties, chief of which was the erect habit of growth of the Poonah variety.

## FARMING WITH DYNAMITE.

One of the most expensive works to the selector of timbered lands is the extraction of stumps. The mere felling and burning off of the timber is comparatively a simple and not too expensive business, but before the plough can be brought into play, the stumps on heavily-timbered land must be removed. To do this by hand labour is, as every farmer knows, a slow, laborious, and expensive matter, even after the use of the Forest Devil or any other form of tree and stump puller. How to get those stumps out, and how to get them out at a cost that will make the stumping of the land a business proposition, is a question of vital importance.

In the United States the question appears to have been decided, and the quickest, easiest, and best way has been shown to be by the use of dynamite. The American farmer has come to the conclusion that he cannot any longer afford to use the stump puller.

The loss of time and labour from endless breakdowns, the cost of repairs, the time lost in setting, moving, and operating, the large holes left in the ground, the immense amount of soil to grub off the stump roots, and the unwieldy and large size of the stumps, making it so difficult to move and burn them, all condemn the stump puller, except, of course, under certain conditions.

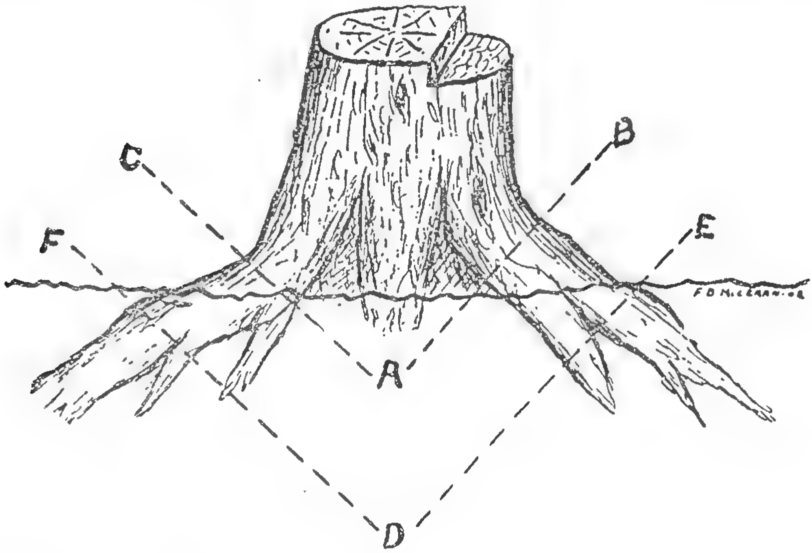
Now, by the use of dynamite, all these objections are overcome. When properly used, dynamite takes the stumps out completely, and breaks them up into small pieces, that can be easily and rapidly piled up, or loaded, hauled and burnt.

As an example, we will take an instance recorded by a Minnesota (U.S.A.) farmer. He had to clear 20 acres of heavy pine. The stumps averaged 50 to the acre, or 1,000 stumps in all, measuring from 18 in. to 4 ft. across, the average being 30 in. Every stump was blasted regardless of size. From one-half cartridge to eight cartridges were used, or an average of three cartridges per stump. Now, as to the cost. Dynamite cost him 13 dollars (£2 12s. 6d.) per 100lb. (200 cartridges), or 6½ cents (3¼d.) per cartridge, or an average of 19½ cents (1s. 6¾d.) per stump for dynamite. Add ¾d. for blasting cap and fuse, and this makes 10½d. per stump. One man at 8s. 4d. per day bores the holes, loads, and blasts, on an average 50 stumps per day, at a cost of 2d. per stump for labour, making a total cost of 1s. 0½d. per stump. With 50 stumps per acre, at 1s. 0½d. each, the average cost per acre for blasting is 12.50 dollars (£2 10s. 5d.). It costs £1 10s. 6d. per acre to haul and burn the stumps, making the total cost £4 per acre. Compare this with the cost of stumping heavy forest land in this State. What would it cost to stump by hand such enormous trees as are found on, say, the Blackall Range, particularly about Beerburrum.

## HOW TO BLOW OUT STUMPS.

When dynamite is properly used, practically every stump can be blown completely out of the ground, roots and all, at a reasonable cost. The two great causes of failure are—first, the improper location of the charge; and, second, failure to use enough dynamite.

The charge must not be placed too near the surface. It must be got down deep, say, for all stumps up to 1 ft. in diameter, and deeper as they increase in size; or, at least, the diameter of the stump below its base. If a 2-ft. stump is to be blown, the charge must be put at least 2 ft. below; if 4 ft. in diameter, 4 ft. below, &c. When a charge of dynamite explodes, the force is exerted equally in all directions, but, as the resistance of the earth is so great that it cannot go down or sideways, it must come up. In coming up, however, some force takes effect sideways, and the actual force is exerted in the shape of a cone, the circle at the top of the cone representing the opening in the ground. The deeper the charge is in the ground, the greater will be the "spread" at the top of the cone. In other words, the deeper the charge, the larger the hole, and obviously, if the hole is large enough, the stump is out. (See Fig.) Assuming that



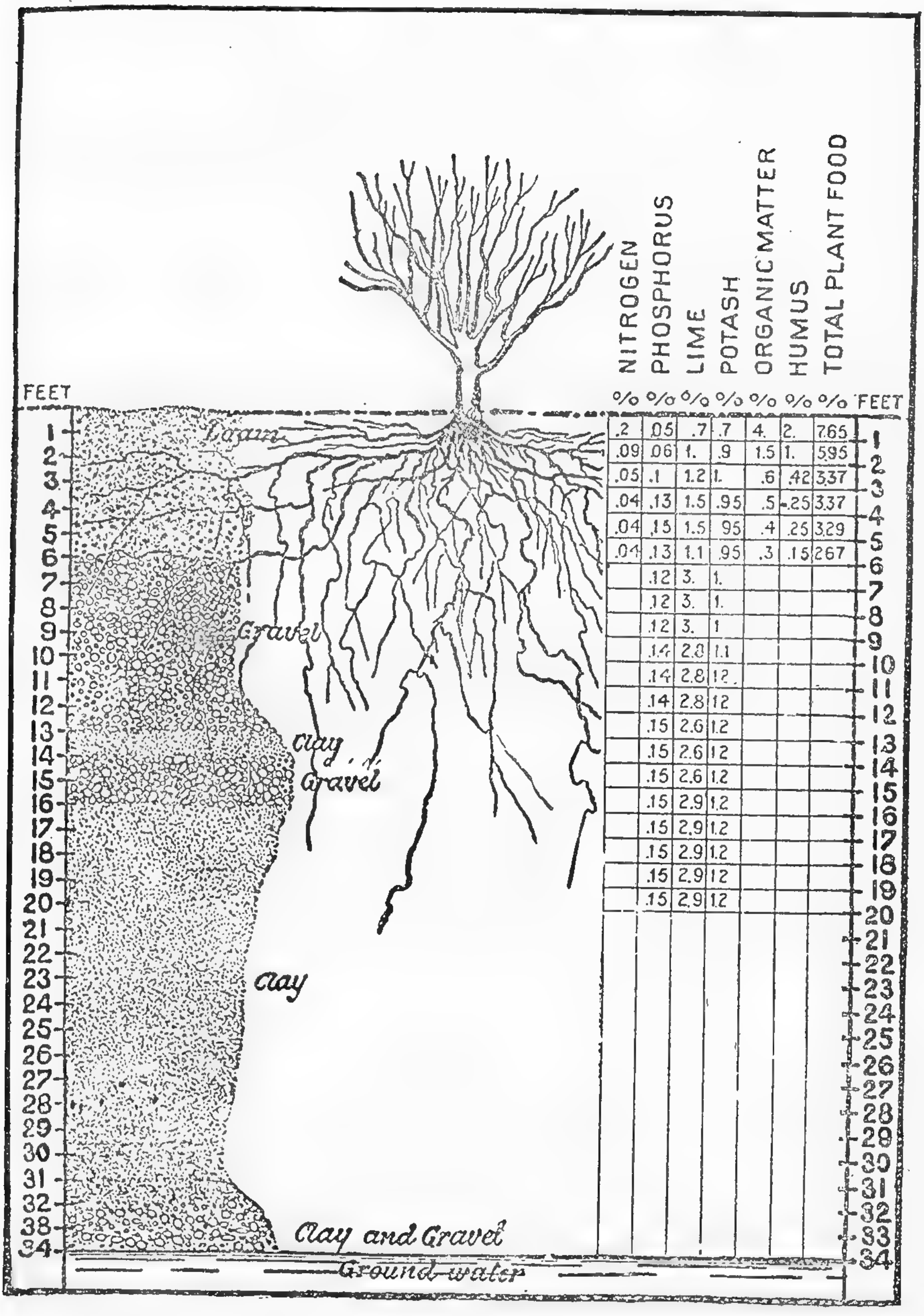

the charge is placed at the point A (which is too near the surface), then the force is exerted along the lines AB and AC. The result is, the stump is simply split open, leaving all pieces firmly rooted in the ground. If the charge is heavy, the crown of the stump is broken off at the points C and B, leaving all the roots in the ground. However, had we placed the charge deeper—at D (which is about the proper location)—the force would be extended along the lines DE and DF, thus spreading out so as to get under the big roots where the force is needed, and this results in splitting the stump in several pieces, and throwing it, roots and all, completely out of the ground. It is obvious that the hole is thus left larger, but it is much cheaper to fill the hole than to dig out roots.

### BREAKING UP LAND.

The stumps being removed, the next business is to break up the land, and here again dynamite offers a cheap and effective factor. It is almost impossible to break up hard-pan or tough clay subsoils with the plough; so this is where dynamite plays an important part. By blasting with dynamite, the hard-pan is completely broken up, water-storing capacity is increased, and the dry, dead top-soil converted into a rich loam for less than the amount of shire council taxes.

### HOW IT IS DONE.

To loosen the hard subsoil, holes are bored 3 ft. deep and about 40 ft. apart, and in each hole a stick of dynamite is placed. When makes a reservoir for the rains, which otherwise run off the land almost fired, the explosion loosens the entire subsoil between the charges, and as fast as they fall.




| NITROGEN % | PHOSPHORUS % | LIME % | POTASH % | ORGANIC MATTER % | HUMUS % | TOTAL PLANT FOOD % | FEET |
|---|---|---|---|---|---|---|---|
| .2 | .05 | .7 | .7 | 4. | 2. | 7.65 | 1 |
| .09 | .06 | 1. | .9 | 1.5 | 1. | 5.95 | 2 |
| .05 | .1 | 1.2 | 1. | .6 | .42 | 3.37 | 3 |
| .04 | .13 | 1.5 | .95 | .5 | .25 | 3.37 | 4 |
| .04 | .15 | 1.5 | 95 | .4 | .25 | 3.29 | 5 |
| .04 | .13 | 1.1 | 95 | .3 | .15 | 2.67 | 6 |
| | .12 | 3. | 1. | | | | 7 |
| | .12 | 3. | 1. | | | | 8 |
| | .12 | 3. | 1 | | | | 9 |
| | .14 | 2.8 | 1.1 | | | | 10 |
| | .14 | 2.8 | 1.2 | | | | 11 |
| | .14 | 2.8 | 1.2 | | | | 12 |
| | .15 | 2.6 | 1.2 | | | | 13 |
| | .15 | 2.6 | 1.2 | | | | 14 |
| | .15 | 2.6 | 1.2 | | | | 15 |
| | .15 | 2.9 | 1.2 | | | | 16 |
| | .15 | 2.9 | 1.2 | | | | 17 |
| | .15 | 2.9 | 1.2 | | | | 18 |
| | .15 | 2.9 | 1.2 | | | | 19 |
| | .15 | 2.9 | 1.2 | | | | 20 |

PLATE 84.—FARMING WITH DYNAMITE. SHOWING DOWNWARD GROWTH OF ROOTS.

This does not, however, do away with the plough. The disintegration simply extends to the lower strata which a plough can never reach. Ordinary ploughing merely turns over the same old soil year after year, and constant decrease in crops is only prevented by rotation or expensive fertilising.

Natural elements of fertility in soil are phosphoric acid, potash, humus, and nitrogen compounds. Ploughing stirs the soil to a depth of 6 or 8 in. from the top, but these plant foods in the underlying soil are never touched by the plough. If the subsoil were disturbed occasionally by dynamite blasts, much less costly fertilising year after year would be required, because the blasting would make the land so porous as to enable it to absorb plenty of water in rainy weather, and this water, which is a principal item of plant food, in being drawn to the top by the roots of the plant as is needed for its growth, would carry with it the soluble fertilising elements. The blasting breaks up the ground all over the field to a depth of 5 or 6 ft. below the ordinary ploughing depth.

Again, in the orchard, the dynamite not only saves much labour and time in planting the trees, but ensures the best growth and large yields. A man will spend an hour digging a tree hole, which dynamite will excavate in an instant. Then, the spaded hole will be hard all the way down, making it difficult for the transplanted roots to take hold. This is one of the chief reasons why transplanted trees so often die. The dynamite not only excavates the hole, but it also loosens the ground for yards round, killing all grubs and vermin, and forming a spongy reservoir for moisture. That is why trees planted in dynamited holes live and thrive.

### THE ADVANTAGES OF DYNAMITE IN CLEARING LAND.

The stump-covered site of a formerly heavily-timbered piece of forest or scrub land is new, rich soil that needs no fertiliser.

Pulling stumps with a machine is hard work for horses and men. It leaves the field full of holes, that must be filled, and ploughing the hard-packed soil round stumps or old roots is no joke.

If, instead of pulling the stumps out, you burn them out, what happens? The intense heat required destroys the chief fertile elements of the soil all round the fire, and you leave a burnt field instead of new fertile soil.

The stumps can be dynamited for about one-third of the cost of pulling and burning them.

The blast splits up the stump into firewood, removes all the dirt, breaks all the main roots, and loosens the soil for yards round.

One man can do all the work, if necessary.

After the stumps are all blasted out, you will have a new, rich field, easy to cultivate, and requiring no fertiliser to yield bumper crops.

In the event of it being necessary to remove a whole standing tree, the dynamite will lift it bodily out of the ground, and when this is done, there is no stump to remove.

### THE COST OF BLASTING OUT STUMPS.

At a "Farming with Dynamite" demonstration, held under the auspices of the Norfolk and Western Railroad, at Ivor, Virginia (U.S.A.), one and one-half acres, containing forty-six stumps, were cleared in one day at an expense of 18 dollars (£3 12s. 6d.), including labour, or an average of 1s. 7½d. per stump. Records kept by the Long Island Railroad, covering operations on their experimental farm, showed that, including the wages of the men who did the work, the cost of blasting out the stumps, piling and burning them, averaged about 8d. per stump.

### DRAINING SWAMPS.

Many of our swamps, like those of North America, are caused by surface water gathering on low ground because it cannot sink through the impervious clay subsoil. Such swamps can be thoroughly drained by shattering this subsoil with a few charges of dynamite. Amongst many instances of this swamp reclamation is that of a Kansas farmer who had a 40-acre swamp on his land. Across the lowest part, when the water was about 3 ft. deep, he blasted a row of holes. In a day or two the water had disappeared, and in the following season he raised 1,600 bushels of oats on the 40 acres. Since then he has produced four crops of lucerne annually on the reclaimed land.

The above dissertation on "Farming with Dynamite" is taken from a handbook published by the E. I. Du Pont de Nemours Powder Company, Wilmington, Delaware, U.S.A.

With regard to the safe handling of dynamite, the writer points out that although there is a certain amount of nitro-glycerine in dynamite cartridges, this dangerous explosive is scientifically compounded with wood meal, earth, and other ingredients in such a way that it can be absolutely depended on not to explode accidentally if plain instructions for its use are complied with. The powder company claim that one of the safest explosives is their "Red Cross" dynamite, especially recommended for agricultural purposes. This brand cannot be exploded except by powerful shock such as is produced by a strong blasting cap or an electric fuse. Responsible persons can use and handle dynamite just as safely as they can handle gasoline, matches, or coal oil.

Mr. R. B. Howard, Chief Protector of Aboriginals, has for some time been using dynamite for breaking up ground at the Baramba Aboriginal Settlement, as well as on his own farm at Indooroopilly, with signal success.

## WATER SUPPLY TO FARMS.

BY ARTHUR MORRY, Surveyor, Department of Agriculture and Stock.

### THE COLLECTION AND STORAGE OF RAINFALL.

[CONTINUED FROM PAGE 96.]

The object of the dam is to confine the greatest volume of water and to present the smallest evaporating surface.

The selection of a site naturally will be determined by the farm requirements, subject to conditions being favourable. In gully dams high banks on both sides are an advantage, but the fall of the gully should not be too great, and an increase in width for some distance back, provided it does not become too shallow, will add to its value.

Depth is a great advantage in preventing undue evaporation, but in securing this, pressure is also increased, and great care must be taken to render it capable of withstanding the natural forces to which it will be exposed.

Water may be impounded in gullies by weirs, over the crest of which the surplus should flow, or by dams provided with a suitable by-wash to carry away the surplus, thus preventing it flowing over the crest.

In gullies with high banks, weirs are preferable, as it is sometimes difficult to provide a bywash, under these conditions, and, unless such provision is made in an ordinary earthern embankment, it would soon be swept away. It must be remembered that the materials used in the construction of a weir, should be of such a character that they will not disintegrate by the action of flowing water.

The foundation should be upon rock, or an apron of concrete or masonry provided on the outside to prevent the force of the fall washing away the foundations.

Cement concrete is an excellent material for the purpose, but in the majority of cases is beyond the reach of the farmer, though in the long run most economical because of its indestructible qualities. Until recent years, dams for impounding water on a large scale were constructed entirely of earthern embankments, with a slope of 2½ or 3 to 1 on the inner face, and 2 to 1 on the outer face. In large works it is usual to pave the inner face with stone sets to prevent erosion by the rippling action of surface waves, and a wall or core of clay puddle is built up in the centre to prevent leakage. Concrete is a much better material for building up the core, wherever it can be adopted, as it is absolutely proof against rats and other animals.

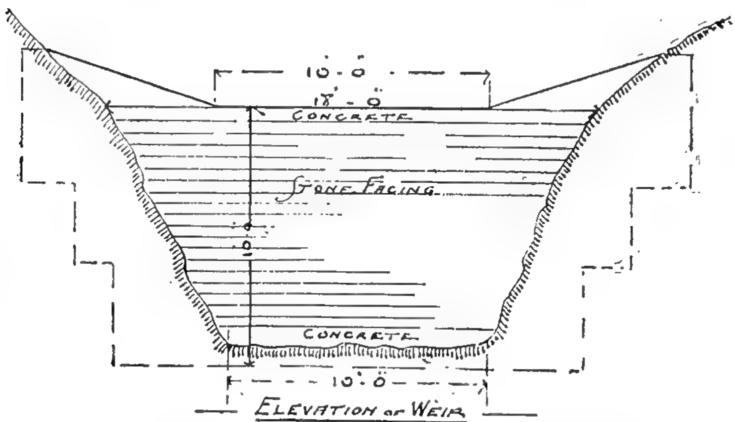
The writer has recently erected a weir, with an inner slope of earth 2½ to 1, a concrete core averaging 12 inches thick on a rock foundation, reinforced with steel wire to prevent shrinkage, and faced with a wall of loose stones, built to a batter of 1 foot in 6 feet, over which the storm water has flowed to a depth of 2 feet without causing any damage. The accompanying diagram illustrates the construction of this weir, which is situated on a creek, often quite dry. It can be easily adapted to any situation, and, on a small scale, is not beyond the means of many farmers who would prefer an improvement of a permanent character.

The quantities of materials required in constructing a weir of this character across a gully 10 feet wide at the bottom, 18 feet at the top, and 9 feet high, are given as a guide to those whose purpose it may serve. It must, however, be noted that prices will vary in different districts, and, in consequence, Brisbane values only can be quoted. Cost of labour generally would be lower than that quoted, as it could be mostly done by ordinary farm hands, under proper supervision.

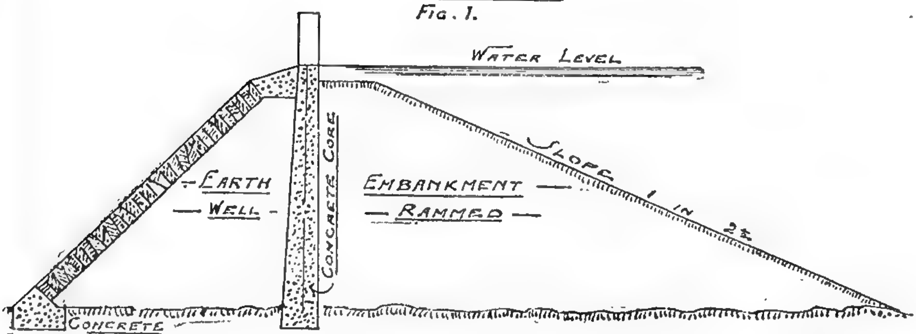
ESTIMATE OF COST FOR WEIR (Figs. 1 and 2).

| | £ | s. | d. |
|---|---|---|---|
| 5 cubic yards excavation for toe of outer slope, at 1s... | 0 | 5 | 0 |
| 65 cubic yards excavating material for and forming embankment and well ramming same, at 2s. 6d. .. | 6 | 10 | 0 |
| 12 cubic yards concrete in toe and in wall or core requiring 12 casks cement, at 16s. .. .. | 9 | 12 | 0 |
| 14 cubic yards gravel and sand, at 5s. .. .. .. | 3 | 10 | 0 |
| Labour on same, at 8s. .. .. .. .. | 4 | 16 | 0 |
| 17 superficial yards stone pitching to outer slope and grouting in with cement, at 3s. .. .. .. | 2 | 11 | 0 |
| 1 roll of barbed wire built in concrete .. .. .. | 1 | 0 | 0 |
| Total .. .. .. .. .. .. | 28 | 4 | 0 |

PLAN OF WEIR FOR GULLY




ELEVATION OF WEIR
FIG. 1.




SECTION THRO WEIR
FIG. 2.

ARTHUR MORR
4-12-12

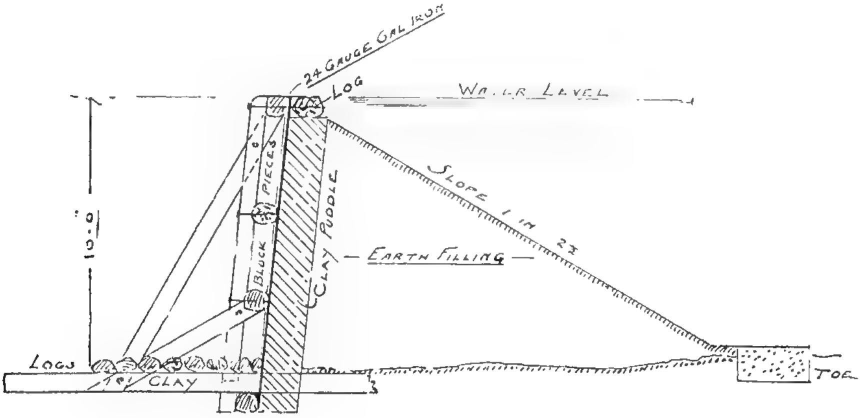
Concrete is, however, expensive when used in out-of-the-way places, even though the wall averaged only 12 inches in thickness, and some more economical method of construction is looked for by the general farmer, though it should not give the same durable results.

To dam a small gully about 18 feet wide and not more than 8 or 10 feet in height, the following specification will be found economical in cost and valuable in results (see diagrams Figs. 3 and 4). Select a site in a position where the banks rise abruptly on either side, where the gully does not fall too rapidly, and, if possible, some distance below where tributaries join the main gully.

Excavate a trench across the gully and about 4 feet or more, according to the width, into each opposite bank; if rock level it off with hammer and gads to form bed for sill piece. If soil is porous fill in the trench up to bed for sill piece with good clay and well ram same.

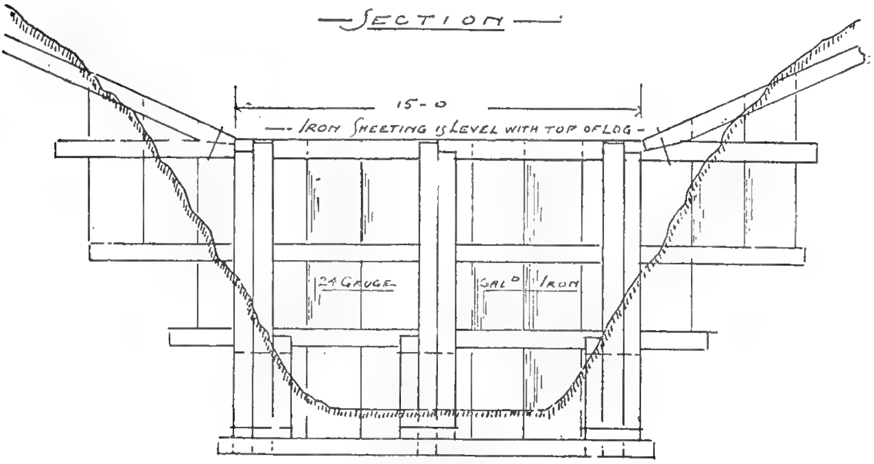
Provide ironbark or other suitable logs and dress off the face with the adze. Lay a sill piece across the bottom at least 12 inches below the bed of the gully well embedded in clay and into each bank. Fix the other logs at a distance of not more than 3 feet above each other, level horizontally, and bed them securely into each bank. Provide a sufficient number of 24-gauge galvanised corrugated iron sheets, and fix in all joints horizontal and vertical strips of two-ply malthoid or rubber insertion, and securely bolt the same together with galvanised screw bolts, such as are generally used for the purpose. When the sheets are fixed in position, twice coat them with cement wash, carefully puddle on both sides at the bottom with well rammed clay and fill in at the back with clay puddle in layers of 12 inches at a time and 18 inches in thickness, well rammed in position; this clay puddle is to extend into the cutting at each end of the dam, and be thoroughly well rammed in position. At the same time, form the slope on the inner or water side at a grade of 1 in 2½ by filling up with earth dug out of the gully, and thoroughly consolidate same by ramming. Excavate a trench 3 feet wide and 18 inches deep at the toe of the slope and fill in with clay, stones, and earth, and well ram. This will form an abutment for the slope and will prevent slipping. Usually a weir of the above type does not require a bywash, but if danger is apprehended from an excessive flow collected from a large catchment area, construct a bywash, &c.

Construct a bywash on the side most suitable for the purpose by excavating a trench about half the width of the gully, and carry round in such a way that the water will be conveyed quite free from the front of the weir. The top and outer slope of the bywash to be either logged with suitable timber, grouted in with concrete, or pitched with large stones placed on edge and also grouted in. To prevent the soil from being washed out, it is very important that the bywash should be made sufficiently wide to carry away all surplus water. The distance the iron sheeting and crest logs should extend up the slope of the banks must be determined by the quantity of water likely to pass over in heavy storms; for this, local knowledge is necessary, but provision should be made for a flow of at least 2 feet in depth and more if the volume of water passing down during storms is known to rise to any considerable height. Unless this is done the water will gradually find its way round the ends of the weir and soon cut a course for itself below the level of the crest. It is often found that the water does not hold at first in some soils, but gradually a deposit of soil and clay takes place which in time makes them impervious.




— FIG. 3 —

— SECTION —




— FIG. 4 —

— ELEVATION OF FRONT —

ESTIMATE OF COST FOR WEIR (Figs. 3 and 4).

| | £ | s. | d. |
|---|---|---|---|
| 11 cubic yards excavating, trenches, &c., at 1s. .. .. | 0 | 11 | 0 |
| 42 cubic yards filling in, slope, at 1s. 6d. .. .. | 3 | 3 | 0 |
| 16 cubic yards clay puddle, at 2s... .. .. .. | 1 | 12 | 0 |
| 1½ cubic yards filling in to toe with stone, &c., at 3s. .. | 0 | 4 | 6 |
| 312 lineal feet logs, and fixing, at per foot 6d. .. | 7 | 16 | 0 |
| 125 lb. wrought iron bolts, washers, &c., at 4d. .. .. | 2 | 1 | 8 |
| 20 sheets 24-gauge galvanised iron, at 3s. .. .. | 3 | 0 | 0 |
| Screws, bolts, insertion, and small sundries .. .. | 1 | 0 | 0 |
| | £19 | 8 | 2 |

(TO BE CONTINUED.)

# Dairying.

## THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RECORD OF COWS FOR MONTH OF APRIL, 1912.

| Name of Cow. | Breed. | Date of Calving. | Total Milk. | Test. | Commercial Butter. | Remarks. |
|---|---|---|---|---|---|---|
| | | | Lb. | % | Lb. | |
| Lerida ... | Ayrshire ... ... | 4 Mar., 1912 | 1,157 | 4·0 | 51·71 | |
| Redrose ... | Shorthorn... .. | 23 Mar. ,, | 1,055 | 3·9 | 45·90 | |
| Nellie II. ... | ,, ... ... | 1 Feb. ,, | 989 | 4·1 | 45·37 | |
| Lark ... | Ayrshire ... ... | 29 Nov., 1911 | 932 | 3·9 | 40·55 | |
| Lavinia's Pride | ,, ... ... | 23 Feb., 1912 | 928 | 3·9 | 40·38 | |
| Linda .. | ,, ... ... | 3 Mar. ,, | 877 | 4·0 | 39·19 | |
| Glen ... | Shorthorn... ... | 30 Sept., 1911 | 676 | 5·1 | 38·95 | |
| Miss Hayden | ,, ... ... | 21 Mar., 1912 | 819 | 3·9 | 35·64 | |
| Honeycomb | ,, ... ... | 29 Aug., 1911 | 713 | 4·2 | 33·55 | |
| Laura ... | Ayrshire ... ... | 6 Mar., 1912 | 754 | 3·8 | 31·91 | |
| Queen Kate | ,, ... ... | 9 Feb. ,, | 727 | 3·9 | 31·64 | |
| Davidina ... | ,, ... ... | 29 Dec. ,, | 726 | 3·9 | 31·60 | |
| Lady Moreton | Shorthorn... ... | 9 Feb. ,, | 697 | 4·0 | 31·15 | |
| Burton's Maid | ,, ... ... | 2 Feb. ,, | 653 | 4·2 | 30·72 | |
| Butter ... | ,, ... ... | 6 Nov., 1911 | 643 | 4·2 | 30·25 | |
| Mist ... | Holstein ... ... | 2 Oct. ,, | 665 | 4·0 | 29·72 | |
| Lass ... | Ayrshire ... ... | 16 Oct. ,, | 587 | 4·3 | 28·29 | |
| No. 6 ... | Shorthorn... ... | 12 Jan., 1912 | 634 | 3·9 | 27·58 | |
| Flora ... | Jersey ... ... | 10 Feb. ,, | 527 | 4·6 | 27·27 | |
| Daisy ... | Holstein ... ... | 2 Feb., 1911 | 593 | 4·0 | 26·50 | |
| Duchess Fanny | Shorthorn ... | 24 Aug. ,, | 591 | 3·9 | 25·71 | |
| Helen ... | Ayrshire ... ... | 3 Jan. ,, | 480 | 4·7 | 25·40 | |
| Dilly ... | Shorthorn... ... | 9 Feb., 1912 | 616 | 3·7 | 25·35 | |
| Careless ... | Jersey ... ... | 16 Dec., 1911 | 431 | 5·1 | 24·82 | |
| Miss Lark ... | Ayrshire ... ... | 17 Jan., 1912 | 540 | 4·1 | 24·77 | |
| Norma ... | Shorthorn... ... | 12 Aug., 1911 | 522 | 4·1 | 23·94 | |
| Bracebridge II. | ,, ... ... | 16 Mar., 1912 | 580 | 3·7 | 23·87 | |
| Pauline ... | ,, ... ... | 7 Nov., 1911 | 547 | 3·9 | 23·80 | |
| Burton's Lily | ,, ... ... | 7 Dec. ,, | 474 | 4·2 | 22·29 | |
| Dewdrop ... | Holstein ... ... | 3 Nov. ,, | 493 | 4·0 | 22·03 | |

## ADVICE ON THE ROUTINE OF THE DAIRY.

By E. GRAHAM, Dairy Expert.

To keep the dairy utensils in good order, thorough cleansing is necessary.

Using an original can of warm water to rinse a dozen or more dirty utensils should in no way be considered as meeting the requirements of washing.

An appropriate room with means for obtaining hot and cold water, fitted with wash sink, draining rack, and steam jet for sterilising, are the least that can be expected in the way of washing equipments.

In the absence of live steam, a bountiful supply of clean, boiling water may be used as a substitute, and in lieu of exposing the wash vessels to the steam jet, they can be submerged in the boiling water.

The washroom may or may not be detached from the separator or milkroom, but it will, of course, be better if separate.

Nothing short of a good cement floor meets the needs of a washroom or dairy-house, both in view of its lasting properties, comparatively low expense, and greater sanitation.

The flooring should be set with an even surface with plenty of slope to the drain, and abundance of light and ventilation in the room should be provided for.

When one thinks of the vast amount of careful cleansing that dairy work entails, it is surprising to note the crude methods generally adopted in carrying out this all-important portion of the work. Thorough cleansing of dairy products becomes well nigh impossible in the absence of proper conveniences, and it is safe to say that only a small percentage of the dairies are equipped with adequate cleansing appliances.

The actual work of washing dairy utensils is an important operation, though it involves but a few single considerations. Always use a brush, but never a cloth, as the latter cannot be kept in a sanitary condition. First rinse the utensils in luke warm water, always avoiding hot water, for the first washing for its use at this stage only tends to cook the milk fast to the tin. After the bulk of the adhering milk is thus removed, the utensils should be scrubbed in water containing sal soda or other similar cleansing ingredients, but under no circumstances should ordinary soaps be used. Buckets, dippers, strainers, parts of the separator, &c., should all be treated in a like manner.

In cleansing cans, a special brush may be procured which is very effective, and with its aid the shoulder portion of the cans may be reached more easily than with the ordinary scrub brush.

Thorough rinsing after scrubbing in hot water and soda is essential; then the utensils should be steamed over a jet of live steam or submerged into clean boiling water. After this treatment the various pieces should never be touched with a drying cloth, but allowed to dry of their own heat. This not only prevents rust, but leaves the vessels sweet and clean. Exposure to sunlight is desirable if same can be accomplished away from the dust, but by all means avoid the dust—probably the surest means of contamination.

Sandsoaps or similar preparations that are by their use inclined to erase the tinning from the utensils should be strictly avoided.

Although constant scrubbing with a brush is to be recommended, no dairy utensil should be allowed to fall into such a state of uncleanliness that a scouring soap should be necessary for its proper cleansing.

Tin is a metal which more effectively resists the action of the acid that milk or cream naturally develops than does the baser metal over which it is coated.

Hence, to remove the coating of tin from a dairy utensil is to render the vessel unsuitable for the purpose of containing milk or cream.

We will now revert to the process of milking and the treatment the milk and cream should undergo preparatory to its despatch to the factory.

Recognising the fact that the time of milking is the critical period in the life of milk or cream, and that the cleanly habits of milking are important as influencing the keeping properties of the milk, or the flavour of the cream, it is therefore always desirable to remove the milk from the milking-shed to the milkroom as soon as practicable.

Open cans or vessels containing milk should never be allowed to stand in the milking-shed. Either a few pails with covers or large cans fitted with fine dust-proof gauze or cover lids should be in use to receive the milk from the milker's buckets and be transported to the milkroom at frequent intervals. In some dairies the milkers pass to a convenient room at the side or end of the milkshed where the milk is strained into pans for prompt removal to the milkroom. Others again convey the milk from the milkshed by gravity in chutes to a receiving tank in the milkroom. This latter practice is not recommended, as the exposure of the milk to dust and flies as it flows down the chutes leaves the milk open to sources of serious contamination.

Circumstances must determine the best method to follow, and the system that succeeds in getting the milk from the cow to the milkroom without contamination is good, provided that it is accomplished with the minimum amount of labour.

Of vast importance is the straining of the milk.

The milk should be strained immediately it is drawn from the cow.

It is true that the milking process should be so conducted that there is nothing in the form of dirt to extract from the milk, but what a splendid check upon the perfectness of the milking operations the strainer provides.

Examine the strainer after the milk has passed through it, and note the dust particles on the sterilised cotton wad, then you will readily discover the necessity of straining the milk promptly after it is drawn from the cow, and the need for the greatest care during the extraction of the milk from the cow will be apparent.

The pattern of the strainer employed to carry out the process of straining has much to do with the perfectness of the process.

When a strainer is used of a kind which temporarily detains the dirt particles to be driven through later and incorporated with the milk, its service is of no advantage and may eventually increase the germ content of the milk.

The type of strainer fitted with sterilised cotton wads, to be renewed at least every milking, is the only design of strainer worthy of recommendation, and when dairymen are encouraged and trained to the fact that quality counts, this pattern of strainer will assuredly be in more common use on the dairy farms.

[TO BE CONTINUED.]

## NOTES ON DIPPING FLUIDS.

BY J. C. BRUNNICH, Chemist to the Department of Agriculture and Stock.

The Department of Agriculture and Stock has carefully watched the effect of various dipping fluids, and results of experiments spreading over several years, since dipping was first started about fifteen years ago, and observations made by the stock inspectors in all parts of the State, have clearly proved that the departmental dipping fluid, prepared in accordance with the regulation, is superior to all other dipping mixtures used in Queensland. When owners, however, use inferior dipping fluids, as is frequently the case, the results of dipping have been unsatisfactory, although the owners, after a cursory examination of their cattle a few days after dipping, have been satisfied of the efficacy of the dipping mixture, because a majority of the ticks were killed; whereas, if the proper ingredients are used, the whole of the ticks on the cattle should be killed.

Everyone used to the dipping of stock is quite aware of the fact that simple solutions of arsenic and soda, containing from 8 to 10 lb. of arsenic per 400 gallons of fluid, will kill a large majority of the ticks on the beasts, but in order to get absolutely clean stock, as it is required for all animals travelling by road, train, or boat, a dipping mixture containing certain necessary emulsifying agents, similar or equivalent to those contained in the departmental formula, will be insisted upon and enforced after 30th June, 1912, in all dips used for the dipping of travelling stock.

It may here be stated that the necessity of emulsifying agents is fully corroborated by numerous experiments and practical trials made in other tick-infested countries, as in South Africa, the Argentine, &c.

The departmental formula contains Stockholm tar and tallow, made soluble with the aid of caustic soda, or emulsifying compounds, and these not only make the fluid more adhesive and forming a fine film of poison enveloping each tick, and therefore the action of the arsenic more effective, but the fluid has a distinct healing effect on the animal skin, and furthermore makes the liquid more obnoxious, so that cattle are not so liable to drink the liquid during dipping.

The ease of preparing simple arsenical solutions, the greatly reduced cost, has induced a large number of stockowners to use such solutions, either prepared by themselves or in form of concentrates, several of which are manufactured without emulsifying agents. There also exists a quite unjustified prejudice against the use of Stockholm tar in dipping fluids amongst a number of stockowners, who state that the Stockholm tar causes scalding of the animals dipped. Any dipping fluid, and even pure water, may cause scalding, unless certain reasonable precautions are taken when the animals are being dipped. Only Stockholm tar of the best quality, entirely soluble in water after being boiled with caustic soda, should be used, and if the tar is really dissolved it will be found that even much larger quantities, up to 2 and 3 gallons per 400 gallons, would have no bad but rather a beneficial effect. Tallow is recommended in the original departmental regulation, because it is cheap, and readily obtainable nearly everywhere, but any animal or vegetable oil may be substituted, and particularly common fish oils are very suitable for the preparation of fluids, as they dissolve much more readily than tallow when boiled with caustic soda. Soap, ready prepared, may be substituted for the tallow or oil.

Experiments have shown that only comparatively small quantities of such emulsifying agents are necessary, and for this reason, and in order to make the cost of the fluid as low as possible without affecting the efficacy, the amount of tallow and tar have been cut down in the departmental formula. The dipping fluid as prepared in accordance with the amended formula may be safely guaranteed not to injure even the most sensitive skin, if the animals are treated reasonably, and at the same time kill all ticks in five days.

Many dipowners are in doubt when receiving the reports of the analysis of their fluids in which certain amounts of arsenate have been disclosed by the analysis. All arsenical solutions containing the ordinary white arsenic or arsenious acid in solution in form of sodium arsenite are liable to change under influence of the oxygen in the air, which is intimately mixed with the fluid by the splash made by the animals on being dipped, into the higher oxidised form of arsenate, which has a very much reduced poisonous effect on ticks. As soon as the oxidation has reached a certain stage the fluid becomes less effective and often quite useless, and will have to be renewed. As it is known that fluids containing up to 11 or 12 lb. of arsenic per 400 gallons may be used without injury to the cattle, in the case of dips containing only small amounts of arsenate the extra addition of arsenic up to these limits is recommended, but as soon as the amount is too high, more than 40 or 50 per cent. of the arsenic being oxidised, the required addition of arsenic would make the fluid too strong and dangerous to cattle. No. remedy has as yet been discovered to counteract this slow oxidation, and it is very improbable that ever a remedy will be found, as so many factors influence this chemical change.

With reference to the testing of the strength of dips, all dipowners are cautioned against the use of spindles (hydrometers, or salinometers) sold for the purpose of testing, as these instruments are more than useless, even misleading. Only by a chemical analysis can the strength of a dipping fluid be ascertained, and the low fee of 5s. per analysis, charged by the Department of Agriculture and Stock, should encourage all stock-owners to have their dips tested at least four times a year.

# Poultry.

## REPORT ON EGG-LAYING COMPETITION, Q.A. COLLEGE, APRIL, 1912.

The ninth egg-laying competition commenced on 1st April, with thirty competitors. There are twenty-six pens of White Leghorns, one of Brown Leghorns, one of Black Leghorns, one of S.L. Wyandottes, and one of Black Orpingtons. Taken all round, they are a likely looking lot, but several of the pens are not nearly matured enough to lay at once, and will lose too much time before getting a decent start. There are also several which do not appear to know what bran and pollard and wheat are, for they eat barely sufficient to keep themselves alive. It is a pity that intending competitors do not accustom their birds to the feed used here, details of which are published every year in the report. Some of the birds appear to have been raised on maize, and these must certainly get a set back when their food is entirely changed. Eleven hundred and forty-nine eggs were laid during the month. Mr. Padman wins the monthly prize with 118 eggs, a very good total for the month of April. The following are the individual records:—

| Competitors. | Breed. | April. |
|---|---|---|
| A. H. Padman, Adelaide, S.A. ... ... | White Leghorns ... .. | 118 |
| Mrs. Beiber, Childers ... ... ... ... | Brown Leghorns ... ... | 92 |
| A. T. Coomber, Bundaberg ... ... ... | White Leghorns ... ... | 75 |
| B. Holtorf, Beaudesert .. ... ... | Do. ... ... | 66 |
| E. A. Smith, Paddington, Brisbane ... ... | Do. (No. 1) .. | 62 |
| H. Tappenden, Maryborough ... ... | Do. ... ... | 61 |
| E. A. Smith, Paddington, Brisbane ... ... | Do. (No. 2) ... | 58 |
| Yangorella Poultry Farm, Indooroopilly ... | Do. ... ... | 56 |
| J. Gosley, Childers ... ... ... | Do. ... ... | 50 |
| W. D. Bradburne, Bexley, N.S.W.... ... | Do. ... ... | 50 |
| Range Poultry Farm, Toowoomba ... ... | Do. (No. 1) ... | 48 |
| J. Holmes, Toowoomba ... ... ... | Do. ... ... | 47 |
| Mrs. Dredge, Bundaberg ... ... ... | Do. ... ... | 47 |
| J. R. Wilson, Eudlo ... ... ... ... | Do. ... ... | 43 |
| J. F. Dalrymple, Bexley, N.S.W. ... ... | Do. ... .. | 37 |
| A. R. Wooley, Cairns, N.Q. ... ... ... | Do. ... ... | 37 |
| W. W. Hay, Warwick ... ... ... | Black Leghorns ... ... | 35 |
| T. Fanning, Ashgrove, Brisbane ... ... | White Leghorns ... ... | 31 |
| R. Burns, Sladevale, Warwick ... .. | S.L. Wyandottes ... ... | 30 |
| Cowan Bros., Burwood N.S.W. ... ... | White Leghorns ... ... | 23 |
| F. G. Cornish, Toowoomba ... ... . | Do. ... ... | 21 |
| R. Burns, Warwick ... ... ... .. | Black Orpingtons ... .. | 20 |
| Mrs. G. Craig, Miriam Vale ... ... ... | White Leghorns .. ... | 15 |
| H. Hammill, Kogarah Bay, N.S.W. ... | Do. ... .. | 14 |
| Range Poultry Farm, Toowoomba ... ... | Do. (No. 2) ... | 7 |
| Mrs. Sprengel, Boonah ... .. ... | Do. ... ... | 4 |
| R. Burns, Warwick ... ... ... .. | Do. ... ... | 2 |
| J. Zahl, Boonah ... ... ... ... | Do. (No. 1) .. | 0 |
| J. Zahl, Boonah ... ... ... ... | Do. (No. 2) ... | 0 |
| D. Grant, Boonah ... ... ... ... | Do. ... ... | 0 |
| Total ... ... ... ... | ... | 1,149 |

## THE GOOSE.

The goose as a table bird does not apparently enjoy the favour it formerly found amongst gastronomers, and hence has fewer attractions for the poultry breeder. Why this once favourite bird should be so neglected is possibly accounted for in the following note on "Fattening Geese," in a late issue of "Garden and Field":—

"The general decline of the goose in public favour and the increasing demand for the turkey, may not only be attributed to that capricious thing called 'fashion,' but to more practical reasons. The goose prepared its own grave, so to speak, in its own grossness. The public demanded a fat article, and they were given one that waxed fatter and fatter as the seasons passed. And an already overfed and adipose people sickened of this carcase of bilious blubber. They cast it from them as an evil thing, and turned their attentions towards the more delicate turkey.

"There is, however, no need to despair, and I offer a word here to those who have a flock of geese on the subject of fattening, which is not—be it eternally remembered—the laying on of a super-abundance of nauseating, oily fat, which helps to weigh, no doubt, but which melts away in the cooking, leaving only a greasy carcase of skin and bone. Of course, a certain proportion of fat is very essential if the flesh of beast or fowl is to be good, but it should be, as far as possible, ingrained in the tissue and muscle, and not stored up in heavy layers in the abdomen nor beneath the skin.

"In preparing geese, therefore, running on grass and having two moderate meals a day, the next move on the part of the owner should be to increase the daily rations and see that they are of the right kind.

"For a morning meal the following mixtures may be given: (*a*) boiled potatoes mashed with barley-meal and coarse middlings, (*b*) ground oats and middlings mixed crumbly, with separated milk or buttermilk, (*c*) 'tail corn' (steamed) mixed with equal parts of middlings and barley-meal, using meat broth or buttermilk for moistening, if necessary. Those three mixtures may be supplemented in cold weather by adding a little maize-meal, linseed cake, or butchers' scraps, boiled and minced. During the day, the birds should always have some turnips and mangolds to nibble, and in the afternoon the grain feed may for preference consist of wheat or the best short oats. Barley may be given for a change, and an occasional feed of maize is useful, but the latter must not be used largely, or yellow fat will accumulate, rendering the carcase gross, as I have explained.

"I am no great advocate of penning geese during the fattening process, except it be towards the last few weeks. Even then the place should be continually changed to fresh ground. One advantage of penning is that the flock may be kept off the water—too much swimming and drinking being inimical to good fattening. Another is that quietness, which is so essential, may be better assured. And, again, it is, of course, possible to feed penned birds in greater security from the visits of cattle, pigs, and the like, to the feeding trough. Care must always be taken, however, in restricting the birds' liberty, to see that it is done gradually, or they will fret and pine, when fattening becomes hopeless. It is also very desirable to allow them an occasional wander if only as an incentive to appetite, the latter being what the feeder must watch with assiduous attention. Drink must always be given to the birds when they cannot procure it for themselves, and if separated milk or buttermilk can be spared for this purpose nothing will answer better. Both are wholesome (and it does not matter is the former is sour), they help to lay on flesh and to keep the skin white. Equally important is a good supply of grit or earthy matter, such as coarse ashes or broken slag. Overcrowding and dirtiness must be strenuously avoided; cleanliness, comfort, and quietness maintained at any cost.

"The secret of producing geese with a really good flavour and free from coarseness is in providing them with as much natural food as they will eat. Geese, as everybody knows, are grazers, and the quality of the land upon which they live has much to do with their flavour and general succulency on the table. And, as far as my experience goes, there is nothing like old pasture and a good supply of home-grown corn and roots for producing goslings of the first quality from a consumer's point of view. A little rough fat, stirred into the food every day or so for a fortnight before killing, improves the flesh and increases weight without promoting grossness, and this is particularly the case in hard, frosty weather.

"It is to be hoped for the sake not only of the producer, but the public generally, that the goose will again attain to that popularity and favour of which it could once boast. But it will only be done by a demand from the public, in the first instance, for a moderate-sized bird of first-rate quality and flavour, and by the producer who acknowledges that demand and honestly endeavours to supply it in his poultry."

---

## OSTRICH FARMING.*

Judging by several letters we have received asking for information about ostriches, and about the districts where they could most successfully be bred, there would appear to be considerable interest taken in the matter, and it is quite possible that at least one or two of our correspondents will make a start with a pair or two of birds, as soon as they are satisfied with the climatic conditions, and with the certainty of an Australian market.

In view of this we republish a very excellent paper on the subject by Mr. W. J. Slatter, Greytown, Natal, which appeared in this Journal in October, 1907, and, which, in the absence of any later literature on ostrich farming, gives the information required by the new beginner in this industry.

Our illustrations of ostriches are from photos taken by Mr. H. W. Mobsby, artist to the Department of Agriculture and Stock, at Mr. Barraclough's ostrich farm, South Head, Sydney.

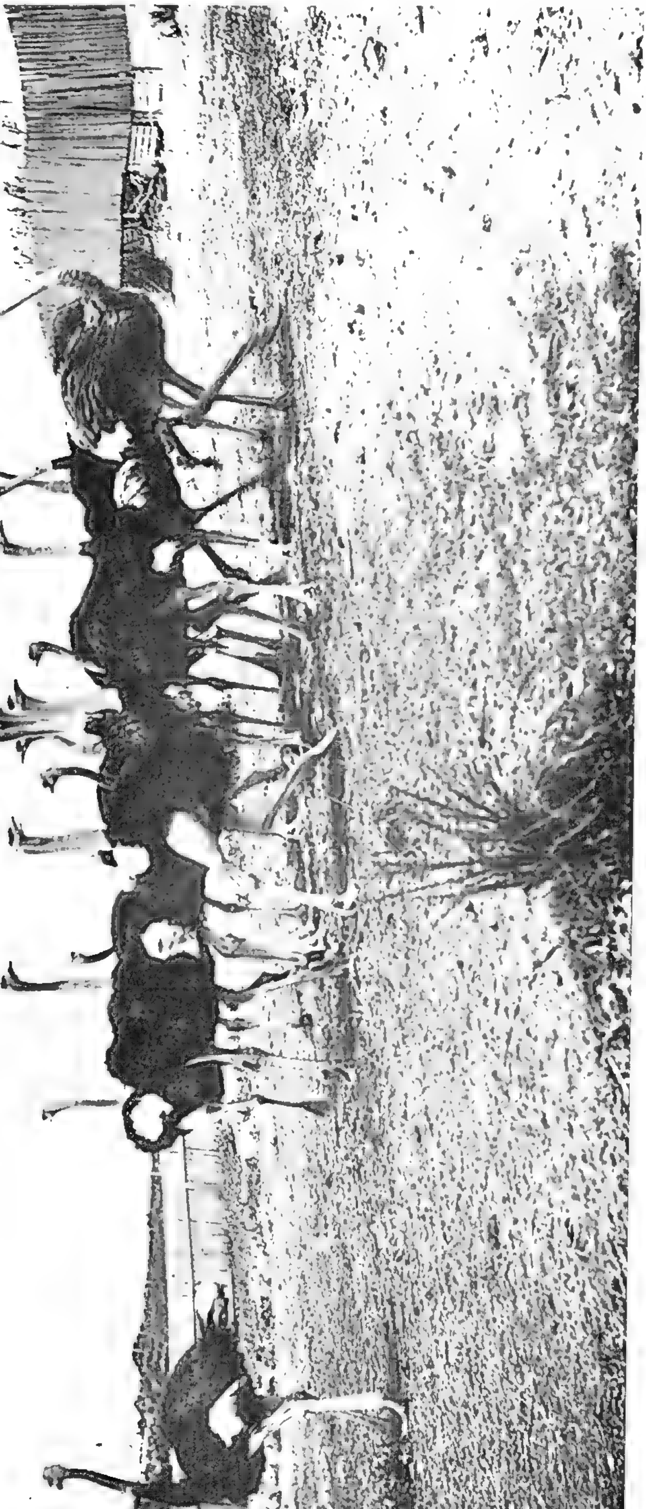


PLATE 85.—PORTION OF THE OSTRICH FLOCK AT BARRACLOUGH'S OSTRICH FARM, SOUTH HEAD, SYDNEY.

All accounts of this industry in countries where, as in South Africa and Egypt, the business is carried on with much profit, agrée in admitting that, under suitable conditions, the profits are very considerable. In Queensland there is a very large range of country admirably adapted for rearing the birds. Some two years ago, a gentleman who had made a study of ostrich farming, suggested the formation of a company for the utilisation of Stradbroke Island in this manner. He said that the island was singularly suitable for the raising of ostriches. The labour connected with the business is very light, consisting mainly of watching and feeding the birds, and hence he suggested that the inmates of Dunwich, who are physically fit for light work, could be employed in this manner, earning a fair wage for themselves and also relieving the State of considerable expenditure, since the birds would bring in a very handsome return for the outlay, provided always that expert scientific management were kept in view. He reckoned the outlay of the State would be:—

| | |
|---|---|
| 10 pairs of ostriches, at £150 per pair.. .. | £1,500 |
| Carriage from South Africa, at £20 per pair | 200 |
| Fencing 16 miles, at £40 per mile .. .. | 640 |
| | £2,340 |

Besides this, incubators would have to be bought, the cost of which for ostrich eggs he could not correctly estimate, but set it down at £300 at the outside, which would bring the expenditure up to £2,640, or, with unforeseen incidentals, to £3,000. Much valuable information on the business could be obtained from the manager of the Hetonan Ostrich Farm, Egypt, which is conducted on the latest and most scientific principles, and realises enormous profits.

The paddocks there are laid out in circular form, each paddock holding one pair of ostriches during the breeding season. At the centre is a raised platform, where a man supervises the whole work.

At the late exhibition of the Queensland National Association there was an exhibit of ostrich feathers in the Central District exhibit, which came from Jericho, 206 miles west of Rockhampton. Ostriches are also bred at the Hawkesbury College, New South Wales, and also in South Australia.

The Principal of the Hawkesbury College stated, in reply to inquiries from this Department in 1907, that it is about six years since the birds were introduced there. The results have, so far, been satisfactory, though some trouble was at first experienced in getting the birds to mate. They are easily managed, and any class of poultry food suits them when grazing is not available. The latter is the cheapest, because the birds are better for the exercise in looking for the food. It has been found that much depends on environment to secure a high percentage of feathers, for which there is always a payable market for feathers of a high class. As much as from £3 to £4 has been obtained from the annual picking of three-year-old cock birds. The climate at Hawkesbury suits them admirably, the birds are rarely sick or ailing, and the losses with mature birds have been very slight. Such testimony is incontrovertible, and, if ostriches can be profitable in New South Wales, there would seem to be no reason why they should not be more so in this State, which has a climate in all probability more suited to their requirements.

The "Agricultural Journal of Natal" contains the following interesting account of an ostrich farm run by Mr. W. J. Slatter, of Holm Lacy, near Greytown. The author writes under the *nom de plume* of "Ergates," as follows:—

The profits to be derived from ostrich farming, under suitable conditions, are tempting. Such being a fact, and it also being a fact that Natal has much land admirably adapted for rearing the birds, I determined to seek information on the subject. A good many inquiries which I made pointed to the desirability of seeing Mr. D. C. Slatter, of Greytown, on the subject. For reasons having no bearing on the profit of the enterprise, he gave up farming the birds after two and a-half years, and transferred his stock to his brother, Mr. W. J. Slatter, of Holm Lacy, near Greytown, who is also a firm believer in the profitable character of the industry.

## STARTING WITH OSTRICHES.

Mr. D. C. Slatter I found, and he consented to be "interviewed." His previous experience had been chiefly in connection with prospecting for gold, but in 1895 he determined to give a trial to the quiet of farm life. For stock he selected ostriches. In 1882 he had something to do with these birds. In partnership with his brothers and Mr. Chas. Raw, he bought some breeding birds from a Mr. Frisby, whose importation of Cape birds will be well and, in some instances, sorrowfully remembered by many colonists. In the following year there was a tremendous slump in ostriches, and they became practically valueless. The birds in which Mr. Slatter was interested were run in the neighbourhood of Maritzburg—an unsuitable locality. They were totally neglected, and died or disappeared. On the farm of his brother, Mr. W. J. Slatter, Holm Lacy, in the "Thorns" portion, he started his second venture in 1896, with a plot of 10 acres under water and as much run as he wanted. The birds—four pairs—were bought from Mr. G. S. Keel, and cost together £125. He made no attempt to select the birds, but placed himself in the hands of Mr. Keel, and had every reason to be satisfied with the result.

## PREPARATORY.

The first work was the making for the four pairs of birds of four 5-acre paddocks—wire interlaced with bush, and the putting of crops into the 10 acres of irrigable land. He put in half an acre of lucerne—he says he would have done better to have put in 4 acres—quarter-acre cabbages and root crops, and the remainder was used for mealies and forage. He never had greenstuff to spare for the old birds. Lucerne he considers the sheet anchor in ostrich rearing. Despite this absence, his birds were always in prime condition, their feathers never showing bars—the result, like breaks in wool, of insufficient food. In every paddock there should be running water, wood ashes, and a box of crushed bones. In September, 1896, appeared the first hatch of chicks, and the last in September of the following year, giving in all 60 chicks, of which 53 were reared, the others having died from accidents, delicacy, &c.

## HATCHING.

As soon as one or two eggs are laid, a round-hole, 2 yards wide and 18 in. deep, should be dug close to the eggs, and the hole filled in level with coarse sand or gravel. A few days later the eggs should be moved on to the nest. The object of waiting a few days before moving the eggs is to avoid the risk of the hen taking fright. As soon as the eggs have been laid the cock takes upon himself almost the whole of the family cares and anxieties resulting therefrom. He does the most of the sitting on the nest; an ostrich's nest is left untended during the hot part of the day. If, however, a change in the weather is threatening he shows signs of concern, and in the event of a sudden shower scuttles off and spreads himself over the nest, his mate placidly feeding the while. The chicks having emerged from the shell, they are left with the parents for three or four days. Then the chicks are removed. This work is of sporting character, for the cock becomes furious. While the chicks are being taken away he is kept under control by a forked stick held against his neck. On the robbery being completed, he will sometimes throw himself on the ground, giving forth grunts or groans of despair and anger, his mate on the other hand showing absolute indifference. Some breeders take away the chicks immediately they are hatched, but Mr. Slatter holds that the initial care of the parents is better than can be given artificially, and that all the advantages of hand-rearing are just as obtainable as if the birds were taken away at the moment of hatching. Mr. Slatter tried both systems, and found that by following that which he advocates the chicks become altogether stronger and more robust.

## EARLY LIFE.

For five or six days the chicks are kept in a small enclosure—say, 20 ft. by 12. They must have plenty of clean water, river sand, bones broken very small, and wood ashes in which to clean themselves. Lucerne is the best food, and only food, required by the young chicks. It must be quite fresh; if stale and fermenting, it will certainly kill them. An umfaan is their constant attendant, and takes upon himself the duties of the mother, or, rather, the father. He teaches the chicks what to feed on by working his forearm up and down, the wrist bent, and the end of the pointed fingers just touching the food. Where he makes this movement the chicks gather round and pick up the food so indicated. If he leaves them, the fact soon becomes known by the noise they make.

## DREAD OF DOGS.

"I may here," said Mr. Slatter, "say something about dogs. Dogs and barbed wire fences are the curses of an ostrich farmer's life. Ostriches have naturally the greatest possible dread of a dog. A dog stampedes them, and such is their instinctive dread that they bolt off instantly in whichever direction their heads may be pointing at the time. They are blind with terror, and rush through fences, or are maimed by them, and flung helpless to the ground. The injuries they do themselves would appear to many incredible, and the quick recoveries they also make if the wounds do not affect the vital parts would also appear just as incredible. When I first stitched up a bird which had the neck ripped down and the breast laid open, exposing the gizzard, &c., I would not have given much for its chance of life. But it recovered quickly; it began feeding as soon as the stitching was finished, and from that moment it was never again off its feed. The curious look of ostriches when they see strange cattle or horses become alarmed at them is most amusing. Now I am coming to the point. My umfaans had dogs, and thus the chicks became introduced to the dreadful species from the very start of life. Chicks seem too young to be subject to the instinctive fear. There was, however, aversion. I have seen a chick hardly bigger than an ordinary hen walk aggressively up to a dog, and with its diminutive legs try to give the astonished dog the cutting-down stroke. This early intimacy with the dogs I consider desirable, for I have noticed that in their after life birds so brought up, although greatly excited by the presence of a dog, have not stampeded."

## SECOND STAGE.

The hatch (as the brood is called) after the fifth or sixth day should be put into a wire-net enclosure of about 20 ft. by 20, on lucerne. The umfaan still remains with the chicks to afford them parental company and protection. The picking motion with his arm soon teaches them to pluck the leaves themselves. Always shift the wire-net enclosure on fresh lucerne after a few days' feeding; the enclosures can be enlarged as the chicks get older.

## WET AND COLD WEATHER.

"Weather which is wet and cold is fatal to chicks—and it must not be forgotten that while the weather is extremely hot in the 'Thorns' as a rule during the daytime, it is somewhat cold at night, and with rain from the south the cold is intense in comparison with the usual temperature. If such weather as the last comes on, I put the birds into paddock boxes, partially covered over with sacks, in a kafir hut, where a screened fire is burning. Chicks which have once suffered badly from cold and wet are always delicate in after life. This plan was most successful. If I had continued I should have built a brick house about 45 feet long by 12 feet broad, and thatch roof. One-third would be cut off by a partition wall, and in that room I would have put a fireplace for use when necessary."

## THIRD STAGE.

"When they are about a couple of months old they may be taken among the mealies. They devote all their attention to the weeds, and do no injury to the crop. Two months later they can be taken to graze on the veld, but until they are about six months old they should still be shedded every night. Arrived at that stage of life they require no more

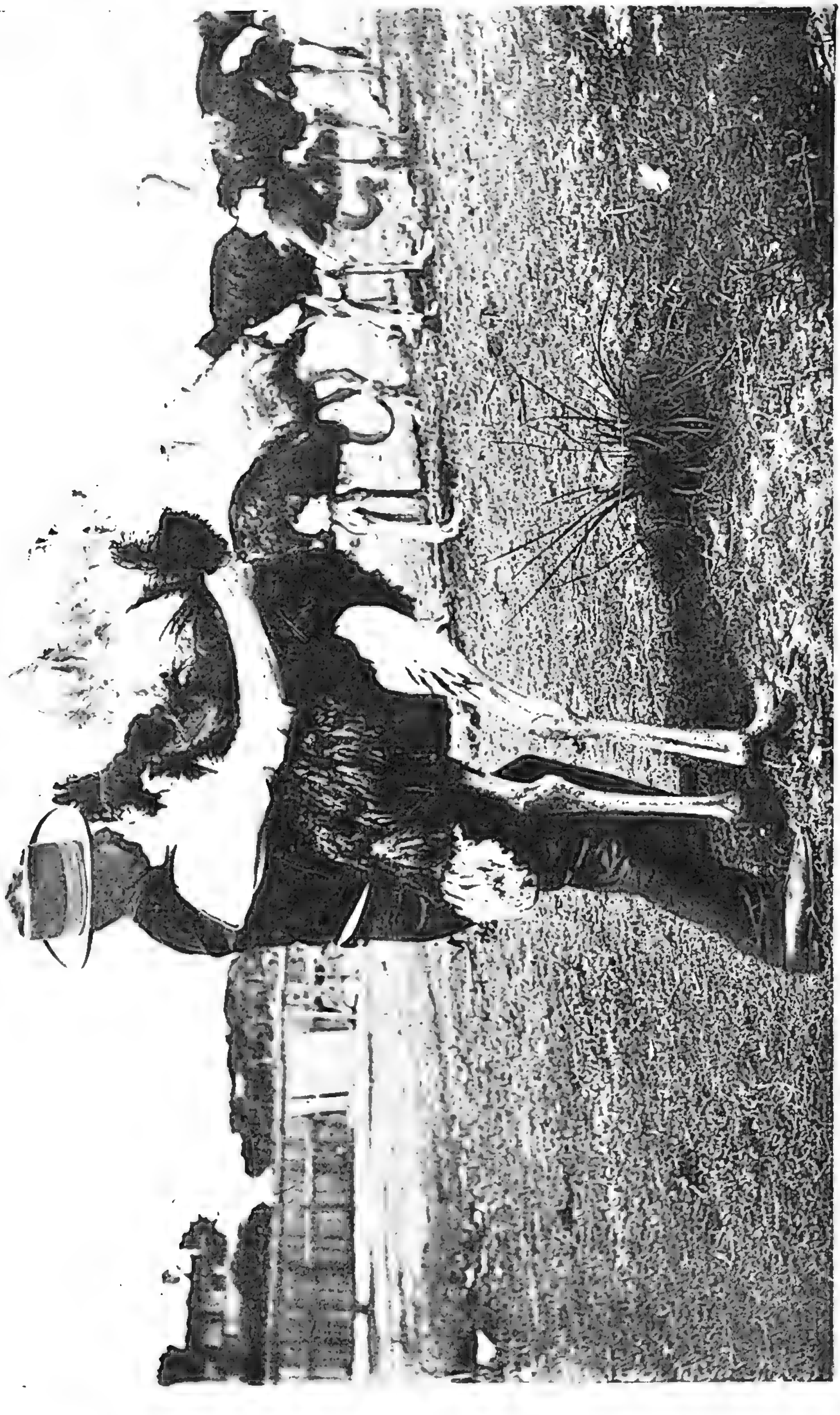


PLATE 86.—BARRACLOUGH'S OSTRICH FARM, SOUTH HEAD, SYDNEY.—PLUCKING THE MALE BIRD

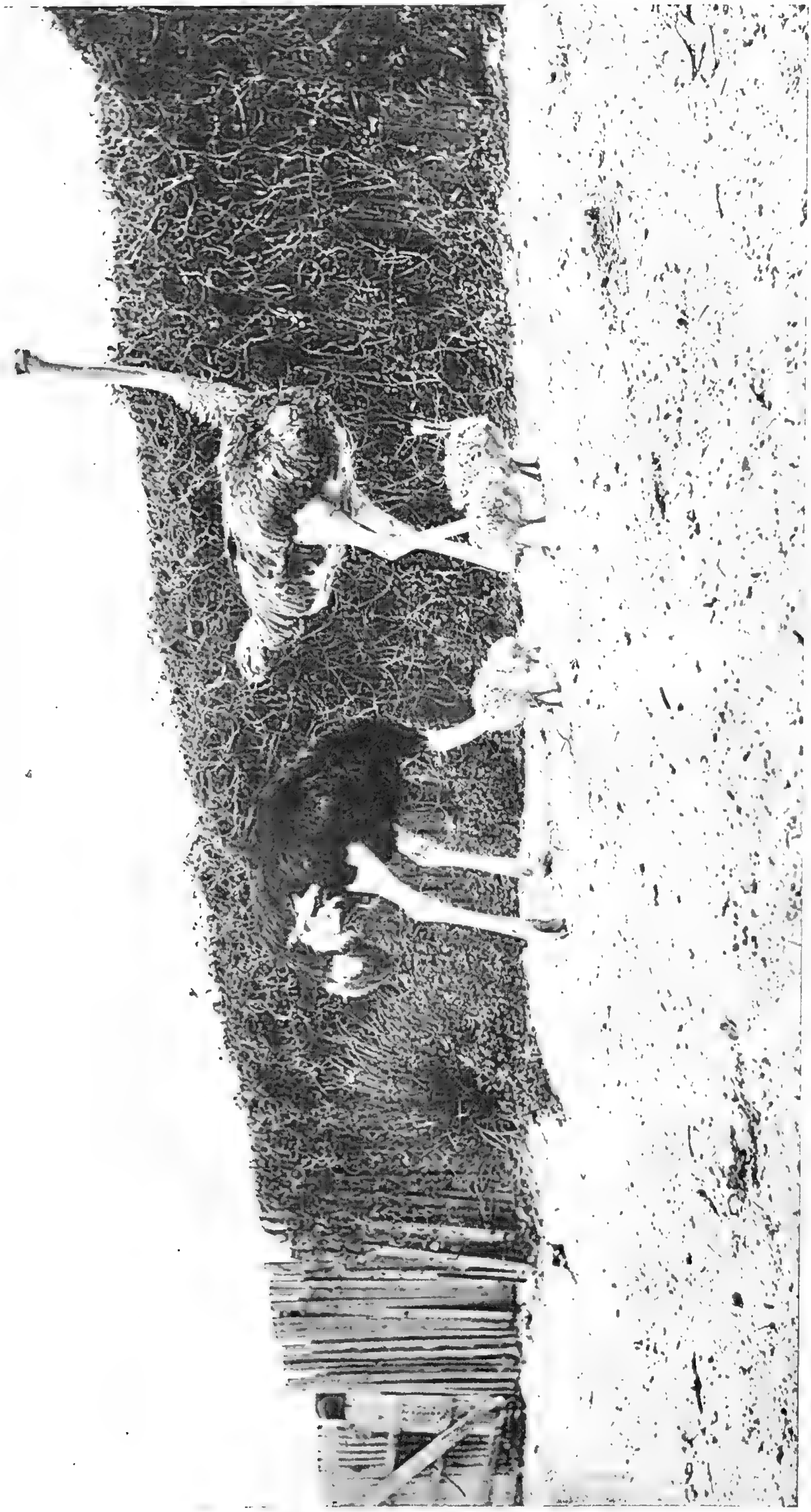


PLATE 87.—A FAMILY OF OSTRICHES.

night shelter, and may be left at sundown in the home paddock. There are ostrich farmers who continue artificial feeding till the birds are six months old, but I do not in the least hold with that system. At eighteen months the birds are thoroughly strong. They begin breeding when four years old, and go on till they are twenty. While in the chick stage —until the end of six months—the birds must be turned out early and brought back to their shed before the sun goes down.

## PLUCKING.

" Chicks should have their feathers clipped when six months old, the stumps being drawn out two months later. The first plucking will be worth about 18s. The next plucking, taken six months after the drawing of the stumps, will be worth about 30s., and subsequent pluckings will vary in value from £3 to £5. Chicks are worth £5 or £6, and breeding pairs fully £30."

## THE PROFITS.

" And what did you clear?"

" I cleared within two and a-half years £318 gross profit on my small investment of £125. I cannot think of anything else in farming that pays better. It must be borne in mind that the ostrich farmer does not rely on the local market—a market which is always going up and down. In the £318 profit I have made no allowance for the interest on the capital I put into the paddock, fences, and sheds—say, £30 altogether —nor for the more important item of labour for herding and cultivation, which, however, was very small, because the conditions vary much as to rates of wages, and because the cost of labour grows proportionately smaller as the flock grows bigger. My success drew attention, and half a dozen have followed in the neighbourhood. My brother bought my original breeding birds, and subsequently he bought others. Ostrich farming in the 'Thorn' country of Natal is a solid and most profitable industry; there is no mistake about that. And it is a comfortable, easy-going occupation—just the thing for a man not wishing to be extravagant in the expenditure of energy. But the man must know how to do what is wanted, and his supervision should be constant. Staying at home he may often think that he has hardly anything to do, but if he goes away much he will soon have reason to rue it. Hired white men can only rarely be relied on. On careful selection I think capitalists might do well in letting out birds on shares. A good book on the subject? Yes, Douglass's 'Ostrich Farming,' published by Cassells, is good, and I agree with most, but the writer dwells so much on the ailments to which birds may be subject that he is apt to frighten a beginner. Just keep to the 'Thorns' and the edge of the 'Thorns' country in this colony, and follow with common sense on the lines I have tried to sketch out, and success must be certain."

Singular to say, in the two accounts of ostrich farms which we publish, no mention is made of the time of duration of incubation. From a paper on "Ostrich Farming" read before the British Association on the occasion of the visit of that body to the Transvaal in October, 1905, by the Hon. Arthur Douglass, and recorded in the "Transvaal Agricultural Journal," we find that the eggs hatch out in six weeks.

# The Orchard.

## THE FRUIT-GROWING INDUSTRY AT COOKTOWN.

The following report on a visit of inspection to the orchards in the neighbourhood of Cooktown has been forwarded to the Cooktown Chamber of Commerce by Mr. G. Williams, Inspector under the Diseases in Plants Act. Mr. Williams made a careful examination of the existing orchards and of the lands adapted for fruit-growing and farming in the district. Respecting the condition of the trees and prospects for the future, he says:—

"CITRUS FRUITS (Orange and Mandarin).—The areas planted were much in excess of what I had been led to anticipate, and though fair returns have been realised in the past, a fairly wide margin remains for improvement, which can only be effected by the display of a little more energy and attention. That trees have done well in the past, when not subject to disease, as at present, is no criterion that they will continue to do so in the future; and the presence of injurious insect pests amongst old trees cannot fail to in turn cause young trees to become infested—as the majority are—and result in stunted growth and premature decay. By attending to the cultivation of soil—keeping the surface in a friable condition, and land clear of weeds—a great deal will be accomplished in the direction of keeping the trees healthy. An error has been made in planting trees too close together, and not confining them (by annual pruning) within the space allotted. As a consequence the development could not be considered satisfactory. A great deal may be done toward rectifying this by heading back the trees later in the year, and by a little attention to pruning the young trees they may be trained to develop in a much more satisfactory manner. The choice of young trees for planting is in favour of seedling orange and Emperor Mandarin, and a considerable number of young trees of comparatively recent planting were noted. I may point out that the cost of grafted trees in the first instance is a very minor consideration in the face of advantages derived, more particularly in the season of fruiting. Before the seedling has attempted to flower, the worked tree would yield a fair annual return.

"So far as the natural conditions go, there is apparently nothing to be desired that is not amply provided for the cultivation of the orange and mandarin on a very extensive and profitable scale, but to obtain the best results a little energy must be applied, and up-to-date measures adopted. In this respect I found the growers in the district most desirous of instruction, and I hope to see that the benefits of keeping the land clear of weeds and well worked are appreciated. The most economical means of bringing on an orchard of young trees has been detailed, as well as other matters in connection with cultivation, and have been brought under the notice of those interested. It is not possible to give demonstrations and instructions applicable to the whole year at any one time, but I hope to arrange to visit the district at intervals, and use my best endeavours to bring the cultivation of this class of fruit to a more successful issue, and on an extensive basis, being quite convinced that it is at least equal to any part of the State for that purpose. I certainly prefer it to any that have come under my observation. Inquiries are being made as to cost, &c., of the necessary spraying and other outfits, and the information will be transmitted direct. I would mention that the initial cost is a fairly big item, but in the case of outfit for cyaniding or spraying, there should be nothing to prevent the growers combining, and procuring something efficient and lasting. It would not appear necessary that each individual should possess one.

"In addition to the cultivation of citrus fruits, the district is eminently suitable for growth of other fruits, particularly mangoes and pineapples, but owing to the keeping qualities, of the former, particularly, being very limited, there may be some doubt about the financial aspect. Pineapples sent from this district to Sydney last year yielded fair returns, which I learned with surprise, after seeing the quality and condition of the fruit sent.

"Apart from the successful cultivation of fruits, the general conditions of the district impressed me as being most admirably adapted for agricultural purposes, generally, and only require to be better known to be turned to account."

## THE BANANA IN QUEENSLAND.

We now resume our instructions as to the management of the banana crop, harvesting, &c.

### THE CROP.

The flower bract, when it first appears through the top of the stem, has both male and female flowers, the latter only developing fruit. The first kind, on coming through the stem, bends over and hangs down with a purple oval clump at the end of the stem. Later on, these purple bracts open, curl up, many dropping off, thus leaving the flowers exposed. The female flowers are the first to appear, and, as soon as the bracts have dropped, the young fruit is seen to be formed, and the "hands" can be counted. As the fruit increases in size, the bunch of flowers hidden in the remains of the bract, not being fruit-bearing, is no longer of any use. The size of the bunch depends on the number of fruit-bearing flowers, and, as no fruit can be expected from the male flowers still covered up in the bud, the latter is often cut off. In very wet weather, such as experienced in the banana-growing district of North Queensland, the dead remains of flowers cling to the ends of the fruit, with the result that, in some cases, the decayed flowers convey infection into the fruit, which is thus destroyed. These dead flowers are easily brushed away, and it pays to remove them, as the damaged fruit reduces the value of the bunch. In most parts of Queensland the Banana, under suitable conditions, bears very heavy bunches. I once saw, on a plantation of Cavendish Bananas, holes dug in the ground to allow the bunches to hang properly; but this was a very rare case. The average number of fruit per bunch is 12 dozen; but it frequently happens that bunches of 25 or 30 dozen fine fruit are obtained on rich, new land.

## HARVESTING THE CROP.

The Banana fruits in Queensland throughout the year, particularly in the tropical districts; and thousands of bunches are despatched every fortnight by the coasting steamers leaving the Northern ports for the Southern States. As many as 20,000 or more large bunches frequently leave by a single steamer, and the repeated bringing of this quantity to the port of shipment gives employment to numbers of men on the plantations, on the tram lines, to teamsters, wharf labourers, and small coastal steamers plying between the rivers on which the plantations are numerous and the final ports of shipment—Cairns and Bowen. The shipment of a heavy cargo of Bananas presents a very busy scene that is not soon forgotten; the thousands of bunches of fruit that are either piled up on the wharf, or that are being unloaded from railway trucks, small steamers, and sometimes Chinese junks, forming such a mass of fruit that one often wonders how it is possible to consume it all before it becomes over-ripe, and one wonders still more how the inspectors under the Diseases in Plants Act can manage to get through their work, seeing that every bunch has to be carefully examined before shipment to prevent, as far as possible, the condemnation of possibly a whole shipment on arrival at Sydney or Melbourne on the unwarrantable assumption that, if one or two bunches out of 10,000 are found affected by fruit fly or any disease at all, the whole shipment must be diseased, and consequently is destroyed, to the enormous loss of the shippers.

A Banana plantation in full bearing is a very pretty sight, the thousands of plants, each with their one or more bunches of fruit, for where there are several stems it is not at all uncommon to find one or more bunches of fruit in different stages of development on the same plant, forming a mass of vegetation that must be seen to be appreciated. This is the case with the Cavendish variety, but with strong-growing varieties the growth is so excessive that the wonder is how the soil can support it.

In some years the production of Bananas in Queensland has amounted to 2,000,000 bunches; and, when it is considered that each bunch will average about 12 dozen fruit, it will be seen what an enormous crop had to be harvested in a good season.

I have, however, digressed from that portion of this paper which deals with the harvesting of the crop.

## THE TIME TO HARVEST.

The first crop—given proper cultivation, good soil, and a suitable climate—may be gathered in twelve months after planting, and, as some plants may be backward, whilst others are forward in their growth,

PLATE 88.—BANANAS GROWN AT REDLAND BAY, SOUTHERN QUEENSLAND.

bunches will be gathered at all times of the year, and, as far as the maturity of the fruit is concerned, it may be cut at the proper time when the fruit is full and ripening or ripe (a condition known by the fruit assuming a yellow colour, or in the case of the Spanish Red variety a pink tinge), or it may be cut when green. This is all a matter to be settled by the experience of the grower, and depends largely on whether the fruit is intended for export to the South or for local consumption. If for the latter, the fruit may be allowed to almost ripen before cutting; but fruit for export cannot be allowed to attain such a degree of ripeness, for, if shipped in such a condition, it would speedily attain the ripeness of decay in the hold of a steamer, and reach the terminal port in an unwholesome and, of course, in an unsaleable condition. Still, the fruit, although cut in the green state, must be allowed to "fill," not showing any angles, and this filling out will occur so long before ripeness that it is perfectly safe to cut the bunches at that stage for export purposes, since, having filled out, they will, during the voyage, ripen so gradually that, as a whole, they will still be green on being landed after ten days or even a fortnight.

The bunches must not be cut off close to the fruit, but a stem of from 1 ft. to 18 in. should be left to facilitate handling. Another reason for leaving this long thick "handle," as it may be called, is that it is said to assist in keeping the fruit fresh during transit between ports.

In harvesting, every care must be taken not to bruise the fruit. I have seen tall-growing plants, from 12 to 20 ft. high, cut down to get the fruit, which, falling from such a height, was not only much bruised but many fruits were broken off the bunch, many in bits. The proper way to harvest the bunches from the tall-growing varieties is to gently cut into the stem about half-way up, and so allow the top with the bunch to fall so slowly that it may be stopped in its descent, cut off, and thus escape all injury. The bunches, when gathered, should have a metal tag attached to them denoting the ownership, as, perhaps, there may be consignments by more than a dozen owners sent in the same ship.

Many of the Bananas are shipped in crates from North Queensland, especially from Innisfail (Geraldton), and from places where the fruit is first loaded on to small river steamers and junks to be transhipped at Cairns. If bunches are sent uncrated from these centres, they are liable to receive much damage from over-handling. The crates are made of roughly split silky oak timber, and the bunches are secured from knocking about by being packed in dry banana leaves. Crate-packed bananas always arrive in better order than loose bunches, as they escape the enormous pressure of the mass of fruit, and, furthermore, receive no more handling until they reach the consignee at the port to which they are forwarded.

I understand that in Hawaii the Cavendish Bananas are wrapped in dried leaves and bound round with cord at a cost of about 5 cents. per bunch. Some are also shipped in crates. In the Canary Islands, when the Cavendish or Chinese variety is grown for the London market, Mr. Higgins (whom I have already quoted) says that they are very carefully packed, being first wrapped in cotton wool, then in paper, and finally placed in a crate with dried banana leaves packed in about them to fill all vacant spaces. In this form they appeal to the fancy trade, and sell at prices 100 per cent. above those obtained by the Jamaica Bananas in the same market.

An immense quantity of our Queensland fruit shipped in bunches, worth a large sum of money, is lost every year by the rough handling it receives on being unloaded at Southern ports. Much of it is bruised, and, although these bruises may not be apparent at the time of removal from the wharf, they will soon cause decay of the delicate structure of the fruit, and this decay, once set up, is liable to spread to other fruit in the vicinity. In the culture of all kinds of fruit, one of the first things to learn is, "Care in the handling of the produce"; and the planter will have to be constantly on the alert to see that his labourers exercise this necessary care. He can, of course, not control the business of unloading at the terminal port.

## IMMATURE FRUIT.

So long ago as May, 1908, the "Fruit World," in an article on the banana trade of Queensland with the Southern States, alluded to the subject of immature fruit, saying that it would be considerably better if the fruit could be forwarded in not such an immature stage as is generally the case. The sugars of the fruit are prevented from developing, and most of such fruits are not so good for food purposes—in fact, some bananas seen in Adelaide would be more likely to tax the digestive apparatus than help it.

The reason of this is, of course, the fear of fruit fly, and the receiving of green fruit only is an undoubted preventive measure for importing States; but, surely, the other extreme of sending unfilled fruit is against all sense. Could not, the writer asks, the Banana be gathered green, and therefore fly safe, and be timed to reach the Southern Markets to ripen up lusciously and full of its fine flavour and food qualities?

## WHAT QUEENSLAND SAYS.

In this connection Mr. A. H. Benson, late Instructor in Fruit Culture to the Department of Agriculture and Stock, wrote as follows to the editor of the "Fruit World":—

"*Re* the unripe condition in which you get our Bananas—that is not our fault, as, should the fruit arrive coloured, it is either condemned for fruit fly or else it is said to be too ripe for your trade, and dealers will not take it. In other words, your people demand a half-grown fruit, and you get it. If you can educate them to know better, we will be glad to send you better filled fruit, provided that we can get the steamship combine to give us better ventilated holds, so that the fruit will carry better. To land fruit as you want it at present, our growers have to cut it about half-filled.

"Our Northern growers are obliged to cut the fruit so immature, in fact, that the fruit will keep its green colour during the journey from the North to Melbourne, and still arrive in a green condition, and take days or weeks to ripen. The question of netting the fruit prior to shipment will not result in the growers allowing it to become better filled under present conditions, as, if allowed to become better filled or more mature on the plant, it will ripen up quicker in transit, and you will get fine good luscious ripe fruit on its arrival, instead of the green which your market demands.

" The present method of transporting Bananas is, in my opinion, all wrong, and this Department is in communication with the steamship companies on this matter, as, in order to give you better fruit, we must have such accommodation for it on the boats that there is some chances of its reaching its destination in good order; at present only very green fruit will carry.

"Fruit cut seven days in the tropics would not carry to Brisbane, let alone Melbourne. The bunches are covered with the netting, thus ensuring immunity from the attack of the fruit fly, and, as soon as they are sufficiently developed, with the saving clause of immaturity which your people like, they are cut and shipped right away.

" Were it possible for the fruit to be carried under more favourable conditions, and I see no reason why it should not, then it would be possible to allow the fruit to become properly matured here, so that you would get a full fruit with its full flavour instead of the immature article you usually get."

## REPLANTING.

So long as the Banana plantations of the North were practically entirely in the hands of the Chinese, no attempt was ever made by them to renovate and replant an exhausted plot. They simply abandoned it, and planted on new ground. Only the more accessible lands have been worked, and of these only the richest. Manuring is unknown in most parts. The land previously under Bananas, when not allowed to run to grass, is either put under sugar-cane or cotton, and lately rubber has been planted to some extent. The former, of course, is a very wasteful way of utilising our land; and the time will come—indeed, has come in some districts—when greater care will have to be given to it, and, once land has become impoverished by Banana culture, it will have to be put under a suitable rotation of crops, so as to fit it again for being planted to Bananas. The trouble is we have too much land and too few people to work it; hence, so far, we are unable to use it to anything like the best advantage.

Replanting should take place about every six years, although this idea has been scoffed at by many white growers, one of whom, mentioned by Mr. A. H. Benson, late Instructor in Fruit Culture to the Department of Agriculture and Stock, had a plantation which was set out over 20 years ago. There Mr. Benson saw the plants still strong and healthy, and bearing heavy bunches of well-filled fruit. I have, myself, seen small plantations, from 10 to 14 years old, still bearing good fruit, although no manure had ever been supplied to the plants.

Replanting, however, has much to recommend it for the following reasons given by Mr. Higgins:—

To restore regularity to the plantation, which may have been quite lost by the suckers pushing out in various directions;

To make it possible to plough more thoroughly;

To facilitate control of the time of fruiting.

If the latter be the aim, replanting earlier than the fifth year would be advisable, since it is easier to control the fruiting of the first plant and the first sucker than of succeeding crops. For this reason some plant between the rows of the first ratoons, the latter being removed after bearing their fruit (Higgins, " The Banana in Hawaii").

I have already shown that most wasteful methods of utilising lands for Banana culture in the North are adopted by the Chinese and some European planters both in the North and South. The general practice is to grow Bananas on the same land continuously without the addition of any manure to supply the loss of nitrogen and potash removed by the plants, and which are so vitally important to the production of heavy crops. The idea seems to be that the plantations are sufficiently renovated by cutting up the stems which have already borne fruit and leaving them to rot round the clumps of plants; but this is not only wholly insufficient, but has the disadvantage of affording a safe breeding-place for many noxious insects and other pests. What should be done on a well-ordered plantation is, either to replant entirely after the sixth year, thus enabling the land to receive a thorough ploughing and manuring, or to rotate with some other crop. What the rotation crop should be depends on the locality, since what may be a profitable crop in one district may be utterly unsuited to another.

---

## TIMES OF SUNRISE AND SUNSET AT BRISBANE, 1912.

| DATE. | MAY. | | JUNE. | | JULY. | | AUGUST. | |
|---|---|---|---|---|---|---|---|---|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. |
| 1 | 6·14 | 5·16 | 6·31 | 5·0 | 6·40 | 5·3 | 6·30 | 5·18 |
| 2 | 6·14 | 5·15 | 6·31 | 5·0 | 6·40 | 5·4 | 6·30 | 5·18 |
| 3 | 6·15 | 5·14 | 6·32 | 5·0 | 6·40 | 5·4 | 6·29 | 5·19 |
| 4 | 6·15 | 5·13 | 6·32 | 5·0 | 6·40 | 5·4 | 6·29 | 5·20 |
| 5 | 6·16 | 5·13 | 6·33 | 5·0 | 6·40 | 5·4 | 6·28 | 5·20 |
| 6 | 6·17 | 5·12 | 6·33 | 5·0 | 6·40 | 5·5 | 6·28 | 5·20 |
| 7 | 6·17 | 5·12 | 6·34 | 5·0 | 6·40 | 5·5 | 6·27 | 5·21 |
| 8 | 6·18 | 5·11 | 6·34 | 4·59 | 6·40 | 5·6 | 6·26 | 5·21 |
| 9 | 6·18 | 5·10 | 6·35 | 4·59 | 6·39 | 5·6 | 6·25 | 5·22 |
| 10 | 6·19 | 5·10 | 6·35 | 4·59 | 6·39 | 5·7 | 6·24 | 5·23 |
| 11 | 6·19 | 5·9 | 6·35 | 4·59 | 6·39 | 5·7 | 6·23 | 5·23 |
| 12 | 6·20 | 5·9 | 6·35 | 4·59 | 6·39 | 5·7 | 6·22 | 5·24 |
| 13 | 6·20 | 5·8 | 6·36 | 4·59 | 6·39 | 5·8 | 6·21 | 5·25 |
| 14 | 6·21 | 5·8 | 6·36 | 4·59 | 6·39 | 5·8 | 6·20 | 5·25 |
| 15 | 6·21 | 5·7 | 6·36 | 4·59 | 6·39 | 5·9 | 6·19 | 5·26 |
| 16 | 6·22 | 5·7 | 6·37 | 4·59 | 6·38 | 5·9 | 6·18 | 5·26 |
| 17 | 6·22 | 5·6 | 6·37 | 4·59 | 6·38 | 5·10 | 6·17 | 5·26 |
| 18 | 6·23 | 5·6 | 6·38 | 5·0 | 6·37 | 5·11 | 6·16 | 5·27 |
| 19 | 6·24 | 5·5 | 6·38 | 5·0 | 6·37 | 5·11 | 6·16 | 5·27 |
| 20 | 6·24 | 5·5 | 6·38 | 5·0 | 6·36 | 5·12 | 6·15 | 5·28 |
| 21 | 6·25 | 5·4 | 6·38 | 5·0 | 6·36 | 5·12 | 6·14 | 5·28 |
| 22 | 6·26 | 5·4 | 6·39 | 5·1 | 6·36 | 5·12 | 6·13 | 5·28 |
| 23 | 6·26 | 5·3 | 6·39 | 5·1 | 6·35 | 5·13 | 6·12 | 5·29 |
| 24 | 6·27 | 5·3 | 6·39 | 5·1 | 6·35 | 5·13 | 6·11 | 5·29 |
| 25 | 6·27 | 5·2 | 6·39 | 5·1 | 6·34 | 5·14 | 6·10 | 5·30 |
| 26 | 6·28 | 5·2 | 6·39 | 5·1 | 6·33 | 5·15 | 6·9 | 5·30 |
| 27 | 6·28 | 5·1 | 6·40 | 5·2 | 6·33 | 5·15 | 6·8 | 5·30 |
| 28 | 6·29 | 5·1 | 6·40 | 5·2 | 6·32 | 5·16 | 6·7 | 5·31 |
| 29 | 6·29 | 5·1 | 6·40 | 5·2 | 6·32 | 5·16 | 6·6 | 5·31 |
| 30 | 6·30 | 5·0 | 6·40 | 5·3 | 6·31 | 5·17 | 6·5 | 5·32 |
| 31 | 6·30 | 5·0 | ... | ... | 6·31 | 5·17 | 6·4 | 5·32 |

### PHASES OF THE MOON.

| Date | | Phase | H. M. |
|---|---|---|---|
| 1 May | ○ | Full Moon | 8 19 p.m. |
| 9 " | ☽ | Last Quarter | 7 56 " |
| 17 " | ● | New Moon | 8 14 a.m. |
| 24 " | ☾ | First Quarter | 12 11 " |
| 31 " | ○ | Full Moon | 9 30 " |
| 8 June | ☽ | Last Quarter | 12 36 p.m. |
| 15 " | ● | New Moon | 4 24 " |
| 22 " | ☾ | First Quarter | 6 39 a.m. |
| 29 " | ○ | Full Moon | 11 34 p.m. |
| 8 July | ☽ | Last Quarter | 2 47 a.m. |
| 14 " | ● | New Moon | 11 13 p.m. |
| 21 " | ☾ | First Quarter | 3 18 " |
| 29 " | ○ | Full Moon | 2 28 " |
| 6 Aug. | ☽ | Last Quarter | 2 18 p.m. |
| 13 " | ● | New Moon | 5 58 a.m. |
| 20 " | ☾ | First Quarter | 2 57 " |
| 28 " | ○ | Full Moon | 5 59 " |

PLATE 89.—MUSCAT HAMBURG.—(Bunch, one-third ; berries, natural size.)

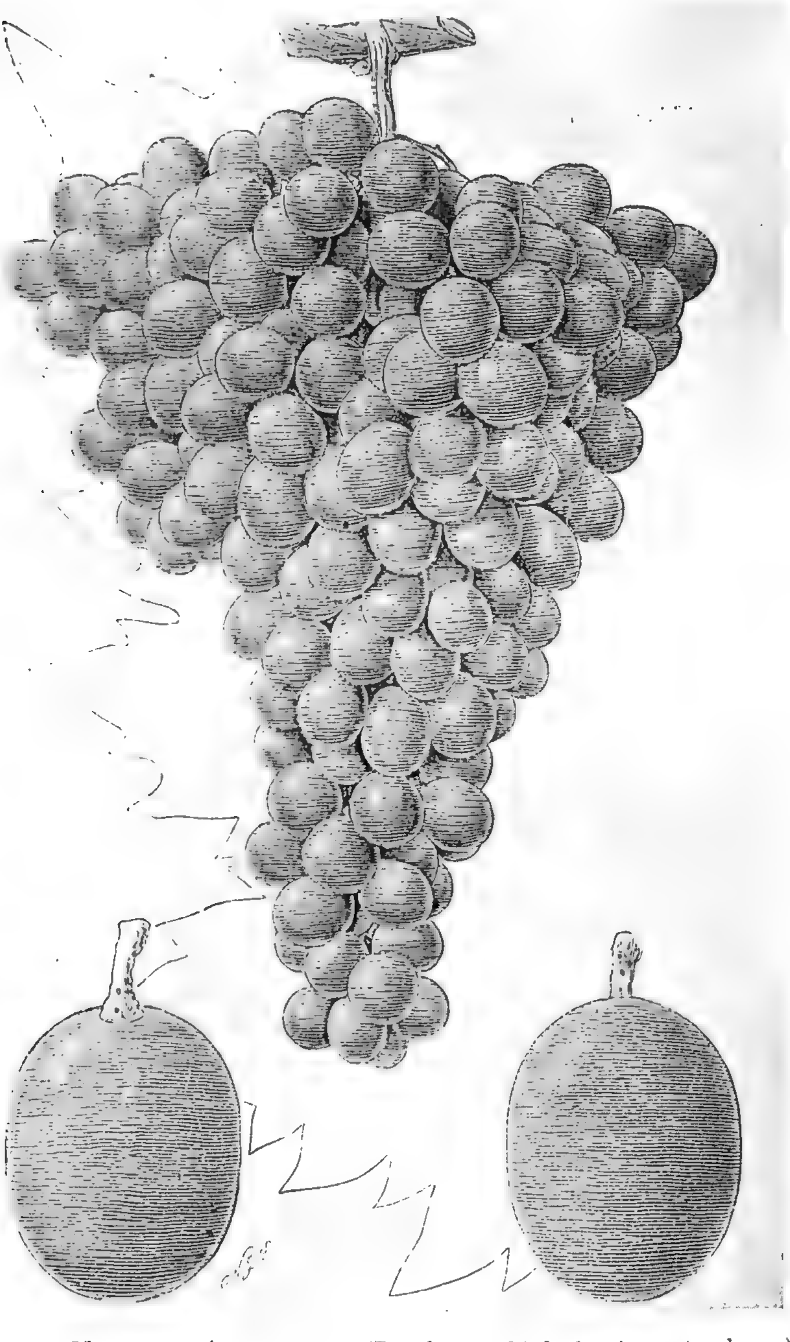


PLATE 90.—MUSCAT OF ALEXANDRIA.—(Bunch, one-third; berries, natural size.)

# Viticulture.

## OBSERVATIONS AND CULTURAL NOTES ON GRAPES—No. 6.

(*Continued.*)

29. *Royal Ascot.*—An oval black vinous grape. The berries are large and handsome with a thick skin, colouring well, long before ripeness. The bunches are small, broad, often forked, closely set, and should be thinned early. The flesh is firm with a brisk, piquant, plum-like flavour. Owing to its early colouring, it is one of the first "blacks" on the market, but to eat it at its best, the bunches should hang until dead ripe. The vine is a strong grower with good hardy constitution, not liable to disease, and suitable for coastal and inland districts. The variety is an English seedling raised at Ascot from a cross between two Muscats, although neither of the parents' flavour has been retained. It is a good bearer and carries well to market.

30. *Santa Paula.*—A very large, white grape of very elongated or cylindrical form, similar to the Ladies' Finger, but it differs from that variety in that its bunches are shorter, more divided, and shouldered. The berry is thick-skinned with a brisk, crackling flesh. It is late and a good packer. The vine is a free grower, bears well, but is subject to "spot" in very wet seasons and is more suitable for inland districts.

31. *Servant.*—A roundish-oval, greenish-white grape. A fine, handsome bunch with large thick-skinned berries, carrying a good bloom. The pulp is firm, and pleasantly refreshing. The fruit packs well, and is valuable for late markets. The vine is vigorous, of good constitution, will resist cryptogramic diseases to a large extent and is very productive. The variety is of French origin, and is largely grown there for late markets.

32. *Trebbiano.*—An oval, white, vinous grape. The bunches are of the very largest size; the record bunch of this variety in Britain weighed twenty-six pounds four ounces. The berries are medium sized, greenish-yellow, but when left to ripen well they become of a beautiful amber colour. The skin is tough, the flesh firm, thus constituting good packing qualities. The pulp is sweet, juicy, and pleasant. The vine being a strong grower requires plenty of room and is well suited for an overhead trellis. This variety is one of the hardiest at Westbrook State Farm, and should do well in both coastal and Western districts.

PLATE 91.—THE SERVANT GRAPE.

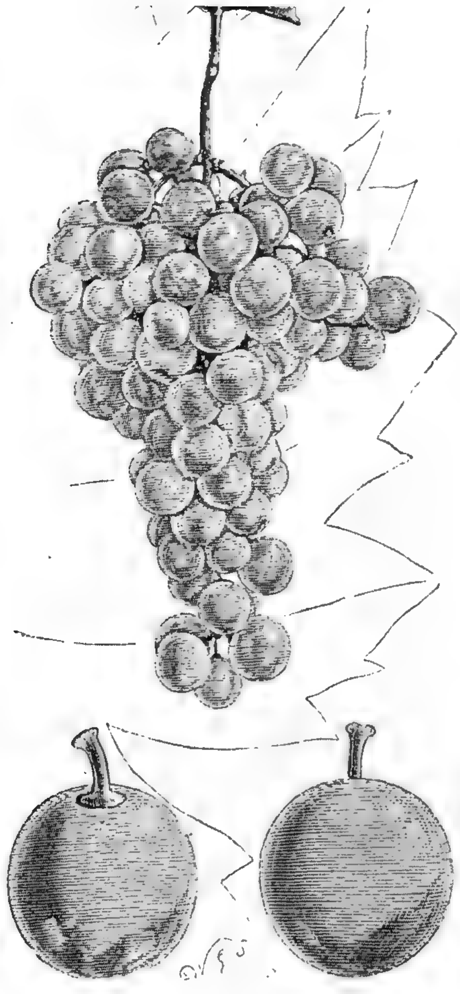


PLATE 92.—RAISIN DE CALABRE.—(Bunch, one-third ; berries natural size.)

# Tropical Industries.

## DIRECTIONS FOR CUTTING AND CURING PIPE TOBACCOS.

In cutting tobacco, if the day be cloudy, you may cut at any time; but if the sun be shining and hot, cut only late in the afternoon. Never cut or handle tobacco when it is wet, either from dew or rain. Never cut in the afternoon more than you can take up the following morning before the sun gets hot. Never cut after a hard rain, as it washes the gum off the tobacco, but wait a few days for it to gather gum again.

The tobacco cut in the afternoon may be carefully and gently laid in piles of ten or twelve plants for convenience in hanging, unless you prefer to hang as you cut.

There are several ways of harvesting the crop: 1st, by gathering the leaves as they ripen and stringing the leaves on strings or wires back to back. This method is slow and expensive, but saves barn room; 2nd, by cutting down the stalk, have all sticks made to a gauge, and a spear made to fit the end, and pierce the plant at the butt end, and push back over the stick until it is full, then remove spear and put on another stick; 3rd, this is by splitting the stalk, as in the illustration, until within a few inches of the ground, and then slightly bend the stalk over, and with a sharp stroke cut it off just below split, so you may hang the plant astride the stick.

The most convenient and economical way to hang it on the stick is to sharpen the stick at one end; and, when you want to put the tobacco on it, thrust it into the ground at an angle of about 45 degrees, and then place the plants astride it.

—Shewing how to place tobacco on Stick—

In hanging tobacco on the stick, *it should not be put closer than four to six inches apart,* according to size of plant. If put closer than this, you will have pole burn, and many leaves that will not cure, but dry up, dead, dingy, and green. After putting the tobacco on the sticks, put it on scaffolds in the open air, and if it is thoroughly wilted—that is, leaf and stem have become perfectly limber—put it close together. It is best for it not to get rained on while on the scaffold. If this should happen, however, open it out until it dries off; then close it up again.

If possible, the scaffold should be placed where it will be shaded from 11 till 2 o'clock.

Let the tobacco hang on the scaffold from one to two weeks, if the weather is not showery or rainy, until it yellows; then remove to the barn and hang it close together, owing to size of plants, and regulate plants on sticks. Bear in mind—do not hang close on the sticks, but you can crowd somewhat on scaffold or in shed, because when the tobacco begins to dry it will leave space between the sticks for ventilation.

Now begins the most particular part of the whole process of making tobacco, for it is now that you must fix in the leaf all the desirable qualities that go to make a valuable product: strength, elasticity of leaf, flavour, &c. If you wish to air-cure, your barns should be so constructed that they can be made very close or very open as may be required by weather conditions.

If you desire to fire cure, you want your barns closed in with plenty of ventilation around the eaves and in the gable-ends, and at the bottom of the sides ventilation that can be closed or opened as desired, that you may be able to control and regulate it.

If you desire to cure your leaf a bright colour, artificial heat is necessary, letting the tobacco stay on the scaffold and yellow, then fixing this colour with fire.

To cure with open fires, build small fires in pits over the floor of the barn, of slow burning woods, and keep them low and smothered, and keep a low temperature for the first twenty-four hours, not above 90 degrees, for a hot fire at the start will blue your tobacco. After the first twenty-four hours, if the tobacco has yellowed, raise your heat *very* gradually until by the end of forty-eight hours from the time of starting you may have it from 125 degrees to 135 degrees. After that, you may safely go to 160 degrees or 170 degrees. Keep careful watch of fire night and day, until the leaf and above half or two-thirds of the midrib or stem are cured, and then draw your fires, and allow the barn to cool. In a few days (from the sap left in the stalk and stem) you will find your tobacco has become soft, and the colours that were irregular before have run into each other, and formed a solid colour over the leaf. When this has taken place, then again build your fires, and continue them until the stem and stalk are entirely cured, when you will not need to fire more, unless there should be a continued rainy spell and your tobacco gets very soft, when a little fire to dry out the barn will do good.

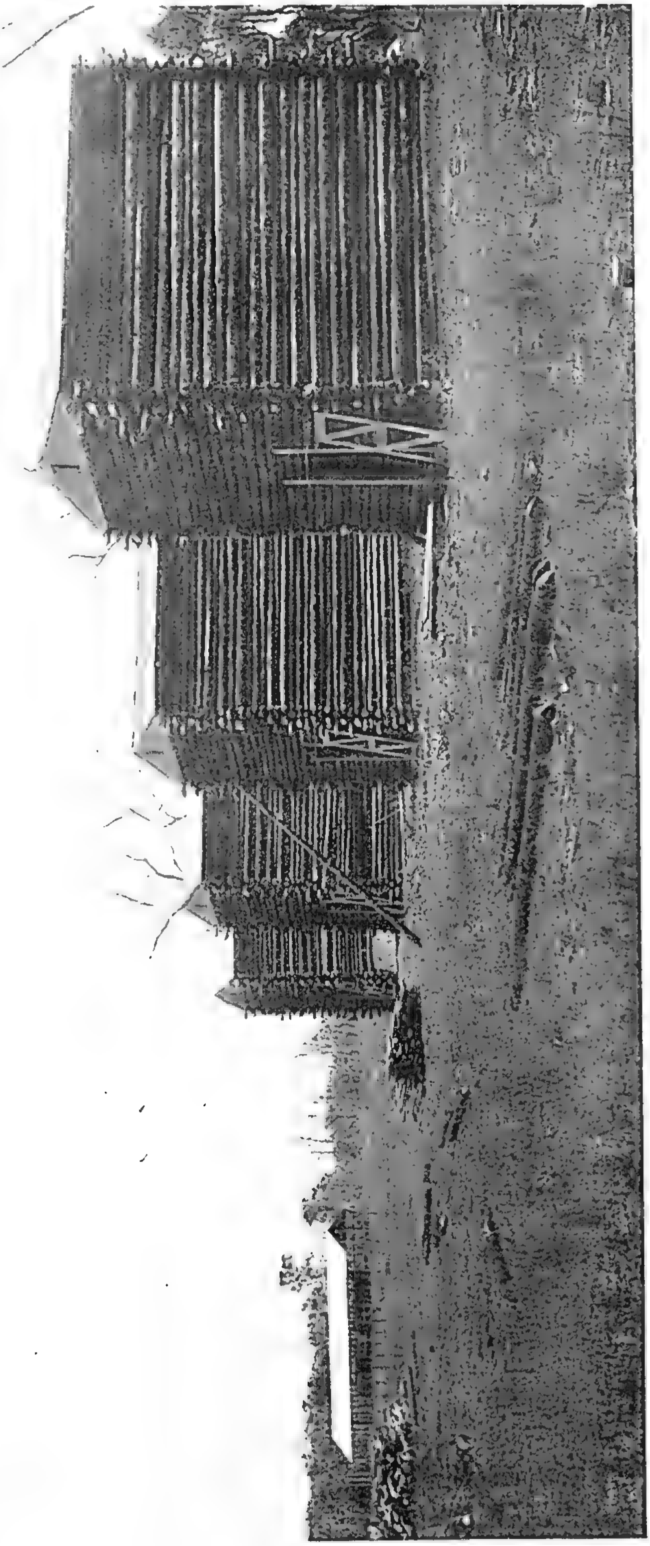


PLATE 93.—MODERN TOBACCO CURING SHEDS AT TEXAS

While firing, watch the tobacco very closely, and see if at any time it begins to sweat, which will show itself by the tobacco getting wettish. If this should happen there is then danger of pole burn, and you should open the ventilators around the bottom of the barn, and get up a free circulation of air; and when the sweating ceases, close the ventilators and proceed with your firing.

If you prefer to air-cure your tobacco, then, as before stated, your barn should be so constructed as to be very close or very open, as the season may require, and always with plenty of ventilation at top, that hot air may get out of the roof.

After scaffolding, hang in your barn as heretofore directed. In cool, pleasant weather, and at night, keep your barn open to the fullest. In very hot weather, especially when winds are blowing, or in foggy weather, keep your barn closed.

If the weather be showery, with intervals of sunshine, you may keep them open; but if the weather be continuously wet and muggy, close them; and if you find your tobacco getting very soft, with a tendency to mould, build a little fire to dry out the barn.

The idea in curing by air is to keep the tobacco curing uniformly all the time, neither too fast nor too slow; and the opening and closing the barn must be regulated with that idea.

There is also a method of flue-curing for making fancy bright tobacco, or what is commonly known to the trade as "aromatics." For this method a special shed with flues is necessary, and the tobacco must be grown on very sandy thin soil. The method is not an easy one, and I would advise those who desire to cure in this way to secure the services of an experienced man.

In curing tobacco with fire, the tips of the tobacco leaves should never be nearer the fire than 5 ft.

Tobacco is ripe when it grains up, and shows brown spots on the leaf, and a rough surface, and is very brittle, breaking readily when doubled up.

It should never be allowed to stand until the points of the leaf begin to dry up, for then it is beginning to lose weight, and is too far gone to make a good cure.

At all times be careful not to get your tobacco dirty, for dirty tobacco has no value.

Be careful in handling not to bruise the leaves, for bruised tobacco will not cure properly. Good tobacco can only be made by good curing, and good curing can come only by painstaking and experience and close observation. It is a profitable crop if well done, and, like all other things, if you do not try to do it well, had as well be left alone.

# THE UTILISATION OF SWAMP LAND IN NORTH QUEENSLAND.

By HOWARD NEWPORT, Instructor in Tropical Agriculture.

In this country land is at present under actual use—that is, cultivation—to so comparatively small an extent that there is but little difficulty in selecting (often even on the one selection of 160 acres or less) the particular kind of combination of surface and subsoils particularly desired or required for any given staple. Hence low-lying lands, or swamps as they are called here, are severely left alone as being useless, or at least not worth draining.

This is very often a correct summing up, too, for near the coast low-lying lands, where subject to occasional flooding by high tides, are too saline, and in forest flats, where the ti-tree is largely found, the land is often too clayey, heavy, and poor for successful agricultural manipulation. Moreover, the drainage operations in such cases must be substantial and permanent to overcome liability to subsequent flooding, and would be so expensive, and the result so doubtful, that the expense would not be justified where the alternative exists of selecting naturally drained localities near by. Nevertheless, swampy land on a selection is often looked upon as a detriment to, if not an actual cause of deterioration of value of, the property. A low-lying piece of land in an otherwise even pasture, even though such spots may, perhaps, only hold water in the actual wet season, is to many, an eyesore, if not worse, and several settlers have asked advice as to treatment of such areas. Suggestions as to the best method of dealing with such areas must, it can be readily understood, vary in the different instances as well as be largely qualified by the purpose for which the land is required.

The swamp lands of the Northern coastal areas may be divided up roughly into three groups. Swamp bordering water such as creeks, rivers, or inlets; ti-tree swamps; and Pandanus swamps.

The swamp land so frequently to be found bordering our coastal creeks, rivers, and inlets is generally covered more or less with mangrove and similar growths, is subject to at least occasional inundation by specially high tides, and usually is regularly under water during flood times. This is really land in course of natural reclamation and would be of little or no use agriculturally, and would be immensely costly to artificially reclaim; hence is not worth while now considering. In many instances the reclamation by natural means could be materially expedited, especially where the inundation is only periodical and by storm-water, or, some distance from the coast, by fresh water backed up by high tides, &c., by the planting on the margins suitable trees and hardy grasses, but the process would be exceedingly slow.

The swamps or low-lying patches mostly found in forest land, and where generally various varieties of the Melaleuca (ti-tree) are found growing, are more often the subject of discussion. The swampiness of these may be due to several reasons. Where one or more springs exist they are often the source of much annoyance and trouble by cattle getting bogged therein at certain times of the year. In that case there is little to be done but the cutting of a drain through to still lower-lying land or an adjacent creek bed, which in such cases is generally to be found not far off. Where the springs are numerous though small, the land may often be rendered more firm, and its boggy nature in a measure overcome, by the planting of certain trees, for which purpose sometimes Eucalypts or Wattles are used. Cases may be quoted of small troublesome springs having been entirely dried up by this means. Frequently, however, the swampiness is due to the presence of a claypan, more or less shallow, but of sufficient density to prevent the natural percolation of the water through the subsoil. In such cases the surface is frequently fairly firm, and the trouble is that the natural growths are normally reedy and rank, while only in the driest weather can it be grazed over. Such shallow swamps are often blessings in disguise and when pasture is the object the remedy lies more in the selection and use of the right kind of grasses than in any attempt to remove the water by draining. Where there is so low-lying a portion that the water may be dangerously deep, partial drainage by superficial drains may be advisable, but for the transformation of a shallow reedy swamp to a source of permanent and useful pasture *Panicum muticum* is the grass par excellence in the Northern part of this State.

This grass, said to have been introduced to the North by the late Baron von Müeller, has apparently many common names. It is known in various localities as Para grass, Mauritius grass, Giant couch, Maram grass (this is, however, a total misnomer), Baron Müeller's grass, Pentzcky's grass, &c.

Experiments with it have shown that though apparently by nature a water grass, it will thrive equally well in dry situations. It has been seen growing and flourishing in 6 feet of water; it will outgrow and smother reedy growths and otherwise useless or rank and sour herbage; and it has remained green and succulent in situations where *Paspalum dilatatum* had become brown and dry; stock and cattle will thrive on it and eat it greedily even to the extent of picking it out among other grasses of the pasture or wading into water after it. In the situation described *Panicum muticum* will grow to a height of 5 or 6 feet if allowed to, but if the ground be open will send out long runners which root at each node and spread rapidly. This grass does not seed freely, but is very readily propagated from cuttings consisting of one or more nodes. To establish *Panicum muticum* it would be necessary to plant these cuttings or roots round the edges of the swamp land, and cut away the reedy growths. It will be found to grow rapidly and in a short time to entirely replace the other useless herbage as well as render the ground more firm.

For cultivation purposes such (ti-tree) swamps are of little use and had best be left alone. Where absolute drainage can be carried out and the ground ploughed the surface soil after sweetening will be found rich in humus, but owing to the usual presence of clay very near the surface few in the way of field crops can be successfully attempted.

It is not an uncommon idea that such land would be excellent for rice culture. This no doubt arises from the fact that the wet or irrigated varieties of rice are also sometimes called "swamp" rice, but this is exceedingly misleading. One of the very first and fundamental rules for successful wet-rice cultivation is that the water shall be of a uniform depth (of, say, 6 inches, more or less) over the field, and the second that the cultivator must be able to drain the field dry when required. This, therefore, involves the careful preparation of the land for rice culture by levelling first and then arranging facilities for both putting water on and running it off. That rice can be successfully grown on or in *any* swamp is a fallacy.

Some very successful market or vegetable gardens may be seen occasionally in such localities, but usually it is better to turn them, with less expense, into pasture in the manner suggested—*i.e.*, by means of a fodder plant that thrives equally whether the swamp be temporarily dry or temporarily a miniature lake of several feet in depth, and is readily consumed by stock at either time.

The third group, however, called here Pandanus swamp, is of a totally different nature and cannot be dealt with in this manner. The bed in these lands, if it be of clay, is frequently deep, while the upper layer is peat, or an admixture of peat and soil or sand. The natural growths that favour such localities are trees or shrubs of the pandanus and such families rather than the harder wooded ti-trees, &c., and are often veritable jungles. These swamps could never be satisfactorily transformed into pasture, though they are often miniature gold mines when rightly turned to account in the cultivation of certain tropical staples. Drainage is unavoidable, and therefore their reclamation is possibly somewhat expensive, but the reclaimed soil is rich and fertile, easily cleared, worked, and kept clean; and the growth on it prolific. The cost of reclaiming such land depends on its lay and the proximity of a get-away for the water in each instance, so no estimate or value per acre can be even suggested.

Sometimes, no doubt, the draining of such swamps would not be worth even considering, though frequently the very best of land and soils are wasted for want of a drain that would cost far less in the long run than is spent in efforts to render fertile much worse though apparently better situated fields.

Now that the cultivation of the cocoanut is receiving more attention in North Queensland, such peat swamps should be sought for and their possibilities of drainage seriously considered, for such are ideal localities for this coming staple.

The illustrations of this article show an instance of a fine piece of swamp reclamation or drainage work carried out by the Rev. G. H. Schwarz, at Cape Bedford. The main escape drain in this instance was a somewhat long one, though not as long as the photograph (owing to the flatness of the country) would lead one to believe. The photographs of the main drain were taken from about the middle of it, near where the line curved, and where the depth was greatest (about 14 ft.). Looking west the drained area can be seen, and looking east the drain conducts its water to a small creek which falls into the sea close by. The other pictures are of the plantation and the land that has been rendered fit for agricultural operations. The cross drains here run at right angles to each other, cutting up the plantation into square plots of 40 ft. or more, as circumstances require, and empty themselves into the main drain.

The cross drains are 2½ to 3 ft. deep, and from 10 in. or 12 in. wide at the bottom to 2 ft. or so at the top. The main drain is of course larger, being 2 ft. to 3 ft. at the bottom and widening to 6 ft. or more, according to the height of the banks, at the surface. Owing to the firm peaty nature of the original swamp, the sides of the cross drains may be left almost perpendicular, and very little crumbling of the edges is experienced. These are also very easily and cheaply kept clean for the same reason.

The soil is, as has already been said, distinctly peaty and springy under foot, but has an admixture of sand in it which adds to its firmness, and on the surface a layer of mould is gradually forming. The fertility of it may also be judged by the two latter photographs. So far, cocoanuts, sisal hemp, and pineapples are the principal crops being grown. The cocoanut-trees shown are three years or under, and are not only exceptionally large for their age but correspondingly sturdy and healthy. Indeed, a few trees on the land that are only just five years old are bearing a first crop of well-filled nuts of good size, which is about two years earlier than is usually the case. Nor are weeds especially rampant in this land, as might perhaps have been expected. It has, of course, been kept weeded from the inception, but the seed of the usual creepers, shrubs, and grasses, &c., that are found in newly-cleaned scrub land are conspicuous by their absence. The weeds are of a class by themselves; mostly soft and succulent and easily disposed of.

It may, however, be mentioned that a few citrus trees tried in this land have not met with the success experienced with the cocoanut-trees, &c., probably on account of the presence of saline matter.

In this instance soil worth cultivating was by no means plentiful in the immediate vicinity, but nevertheless the deductions have been confirmed, and the permanent nature, as well as engineering skill displayed in the undertaking, of the drainage scheme in question, reflecting as it does the greatest credit to the reverend gentleman who undertook it, has been amply warranted by the unqualified success of the cultural operations on the reclaimed swamp area.

This plantation, whether one is looking down on to it from any of the surrounding ridges or walking through it, is equally refreshing and pleasing from its perennial and healthy greenness and obvious exuberance of vitality as from the skill and neatness with which the drainage scheme has been designed and executed.

As already stated, the reclamation of water-logged lands may appear on first thoughts almost absurdly unnecessary while naturally drained

Main Drain, looking West (towards Plantation).

Main Drain looking East (towards Sea).

Cross Drains for Soakage in Original Swamp.

Originally Swamp; now showing Luxuriant and Healthy Growth of Coconuts, Sisal Hemp, and Pineapples.

PLATE 94.—CONVERTED PANDANUS SWAMP AT CAPE BEDFORD, NORTH QUEENSLAND

land is available; nevertheless, when so reclaimed, whether the result be a pasture, a garden, or a plantation, the resulting fertility is usually obvious and admitted, and often surprising. But when a plantation such as the one illustrated is met with, the sense of surprise at what was once a disagreeable if not loathsome spot becoming a clean and sweet garden gives place to wonder at such land, so comparatively readily capable of transformation into an Eden of fertility, being so often considered a detriment instead of an advantage, and at its being in reality but the raw material needing but little knowledge and application to render it so eminently adaptable to the settler's needs and worthy his attention.

---

## NEGLECTED INDUSTRIES.

### TURMERIC.

*(Circuma longa—Zingiberaceae.)*

This plant, which is indigenous to many hot countries, is in general cultivation throughout the Eastern tropics, and is in large use by the natives of the islands of the Pacific. The virtue of the plant, for all the various purposes to which its product is put, lies in the mature tubers which form the root. These vary a good deal in size as well as form, according to species, the prevailing shape being oblong; but in colour they are all more or less of a grey or greenish-yellow externally, and of an orange-yellow inside.

The chief use, probably, to which this product is put in the economy of the arts is as a condiment and a colouring matter in culinary preparations. Its use as an ingredient of curry powder is well known, and to the presence of turmeric is probably due much of the wholesomeness of curries. Its remaining uses are in the manufacture of yellow varnishes, and, in the form of turmeric paper, as a chemical test for the presence of alkalies, which change its yellow colour to a reddish-brown.

The cultivation of turmeric is as simple as, and much resembles that of, ginger. It likes a rich and light soil, and is planted, in the form of fragments of the roots, in rows 1 ft. or more apart. Others plant in beds 3 ft. wide, with furrows intervening 12 to 18 in. apart, or in drills 8 in. apart. After the land is well prepared by digging, a layer of fresh vegetable or animal manure is laid on the surface, and the roots then dibbled in. When the plants are about 8 in. high they should be earthed up to keep the young formed tubers well covered, and they then require little further attention until fit for harvesting in the cold season. The tubers mature in about six months; but are fit for use, fresh, in three months or less.

An acre properly cultivated will yield about 2,000 lb. of fresh roots. The tubers should be dug as soon as the stems fade. They are prepared for market by drying in the sun, being previously scalded to assist in destroying their vitality.

# Botany.

## CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

BY F. MANSON BAILEY, C.M.G., F.L.S., Colonial Botanist.

### Order ORCHIDEÆ.

### SARCOCHILUS, R. Br.

**S. Bancroftii**, *Bail. sp. nov.* Plant epiphytical, stems short, scarcely exceeding 1 in. in length. Leaves linear-lanceolate 1-2¼ in. long, 3-4 lines broad at the widest part, midrib prominent with 3 or 4 more or less prominent longitudinal nerves on either side. Peduncles with racemes about 2¾ in. long (very persistent on the plants to hand) bearing 6-12 flowers. Bracts minute. Flowers on slender pedicels of about 2 lines; sepals and petals brick-red, nearly equal, of about 3 lines, ovate, the lower part very narrow, forming slender stalks; sepals somewhat broader than the petals. Labellum small, the lateral lobes white deeply stained with lilac at the base, of a thin texture, middle lobe minute, tomentose. Disc calli fringed, yellow. Column short. Pollen masses light-yellow. Capsule stout, straight (falcate when young), very tuberculose, about 1¼ in. long.

Hab.: Eidsvold, *Dr. T. L. Bancroft.*

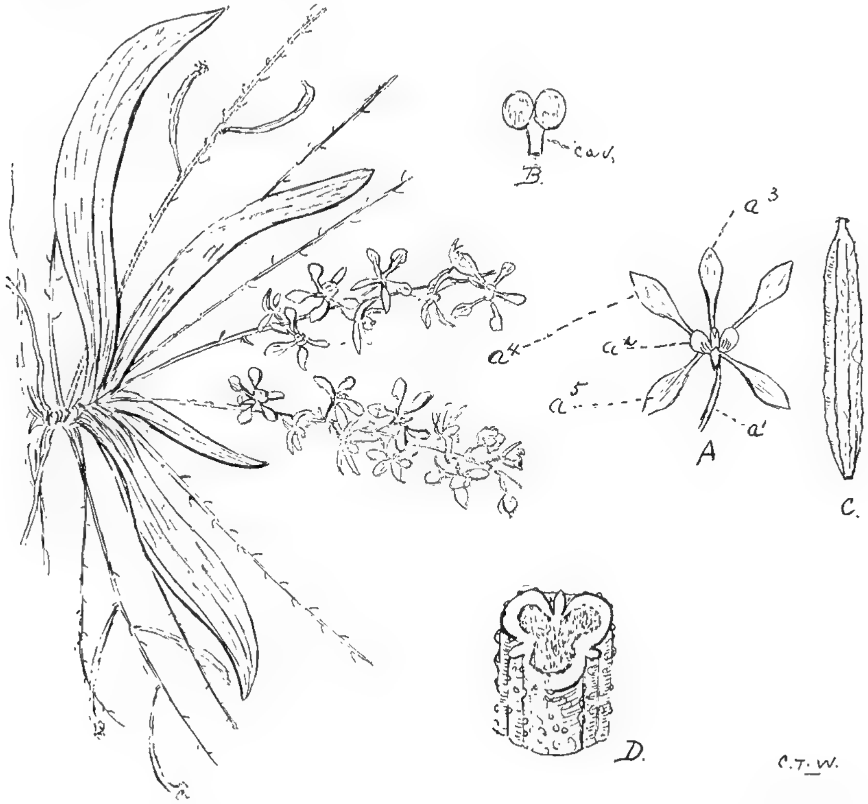



PLATE 94.—SARCOCHILUS BANCROFTII, *Bail.*: *A*, flower enl.; $a^1$, pedicel; $a^2$, labellum; $a^3$, dorsal sepal; $a^4$, petals; $a^5$, lateral sepals. *B*, pollen masses enl.; cau) caudicle. *C*, capsule, nat. size.

**S. Weinthalii,** *Bail.*, Q.A.J. XIII. (1903), 346;


PLATE 96.—SARCOCHILUS WEINTHALII, *Bail.*: *A*, flower enl.; $a^1$, dorsal sepal; $a^2$, petals; $a^3$, labellum. *B*, labellum enl. *C*, capsule, nat. size.

**S. Longmanii,** *Bail.*, Q.A.J. XXIII. (1909), 261. Having recently received fresh material of these two species collected near Toowoomba by Mr. H. A. Longman, I take the opportunity of giving herewith illustrations of these two orchids.


PLATE 91.—SARCOCHILUS LGNGMANII, *Bail.*: *A*, flower nat. size; $a^1$, bract; $a^2$, pedicel; $a^3$, dorsal sepal; $a^4$, lateral sepals; $a^5$, petals; $a^6$, labellum. *B*, labellum enl.

---

## THE AMERICAN COTTON CROP.

"The final ginners' report of the American cotton crop for 1912 (says the 'Rubber World') gives the amount as 16,050,000 bales, as against 11,966,000 bales in 1911, 10,386,000 bales in 1910, and 13,432,000 bales in 1909. Whatever the total output this season may prove to be, the crop will undoubtedly break the record of 13,828,000 bales of 1908-1909." The whole of this record crop will, of course, not be exported, as a very large proportion is utilised in the numerous cotton mills in the cotton-growing States, but it is on the cards that the price for Uplands cotton may be somewhat lower than has been obtained for the past three years.

# Animal Pathology.

## DESTRUCTION OF GRASSHOPPERS.

The grasshopper pest is at times exceedingly destructive in Queensland, more particularly in the sugar-growing districts. These insects have also caused great losses to farmers and pastoralists, who have tried many means of destroying them, but with poor success.

The following article on the subject, published in the issue of the "Journal d'Agriculture Tropicale" for March, 1912, will doubtless be read with much interest by all who are liable to the attacks of the grasshoppers. The translation of the article is as follows:—

"In a communication made to the Academy of Sciences on the 22nd May of last year, our colleague (Mons. d'Hérelle) gave an exhaustive account of an 'epizootic' (disease) of grasshoppers, which he had already observed in 1910 in Yucatan, when he visited that province in the course of a mission from the Mexican Government.

"He had recognised that the disease was of a bacterial nature, and had found, in the intestinal duct of all the dead insects, a microbe which he set to work to study at the Pasteur Institute immediately after his return to France; and he determined its action to be eminently pathogenic.

"Last December (1911) the Argentine Government invited M. d'Hérelle to undertake an official mission to that country, in order to ascertain, in a practical manner, if it were possible to undertake the destruction of the grasshoppers by propagating the disease. Every one knows what ravages and what enormous losses are sustained annually in the Argentine Republic by these grasshoppers. There are even some districts where settlement appears to be impossible even to this day, owing to this periodical scourge.

"It is therefore a question of national and primordial interest for this country to discover the most efficacious means for destroying these insects. Moreover, there has for a long time existed a commission and an organised service for this purpose. None the less should we congratulate the Argentine Government that it did not hesitate to call for the services of M. d'Hérelle, and afford him every facility to enable him to arrive at a practical result.

"This result has now been attained. In a communication to the Academy of Sciences, dated 26th February, 1912, presented by Dr. Roux, Director of the Pasteur Institute, M. d'Hérelle shows how the experiments were conducted and what were the results.

" M. d'Hérelle's first proceeding was to increase the virulence of the coccobacillus by successive inoculations of grasshoppers. When the first insects inoculated died in about forty hours, they succumbed in six hours after the twelfth inoculation. This degree of maximum virulence having been obtained, pure liquid cultures were prepared, and it was this liquid which was used to infect the bands or flights of grasshoppers.

"The first experiments were made on insects in captivity: 300 insects in spacious cages, some serving as controls, the others infected by a little of the culture spread on lucerne. At the end of forty-eight hours, the mortality had reached about 50 per cent., and five days later all the insects were dead. The microbe was almost the only thing found in the contents of the intestinal canal of the dead bodies, and in the liquid excreta which soiled the lucerne. These experiments, which were absolutely convincing, having been completed, practical experiments were undertaken in different parts of the country. On the 16th January, near Escalada, a flight of grasshoppers was enclosed by barriers of corrugated iron in a space of about ½ hectare (about 1¼ acres). Half a litre (1 litre = 1.76 pint) of the culture of the coccobacillus was scattered over the ground. After four days 75 per cent. of the insects were dead, and all the others died four days later.

"On the 18th January, a field of 35 hectares (about 87 acres), on which there were many grasshoppers in the winged stage, was infected with 1 litre (1¾ pints) sprayed over it. Five days later, an enormous number of insects had died, and dead and dying insects were found all over the field and in the adjoining forest.

"A few days later, 3 litres of culture were spread on a field where there were two swarms of grasshoppers, each occupying 2 hectares (3 acres) in extent. Next day numerous dead bodies were found and the grass was covered with excreta. Every swarm that passed the infected area and rested there was contaminated, and in a radius of several kilometers (several miles), dead grasshoppers were found. These were computed at something like 2½ millions per hectare.

"Further experiments in different localities gave identical results. If the insect is infected per medium of the stomach in digesting the contaminated grass, it dies within a period which may vary from eight to twenty-four, or thirty-six hours. An abundant fluid diarrhœa sets in, and the insect voids this on the grass, which will infect fresh swarms if they settle on the same spot. The progress of the disease rapidly extends to considerable distances, as is proved by what occurred in the province of Santa Fé. On the 16th January, the first infection took place at Escalada; two or three days later, the disease was reported as occurring at a distance of 45 kilometres (about 27 miles); on the 24th, it had spread to a distance of 80 kilometres, and it spread with the same rapidity in the Provinces of Cordova, Santiago del Estero, and Tucuman.

"There exists probably in Northern Argentina, a focus where the grasshoppers winter, and whence they issue in swarms over the country, conditions being favourable, either southwards or northwards, across Brazil, Colombia, Central America, Mexico, and even to the United States. These insects are capable of resisting very marked climatic changes, and adapt themselves very easily to exterior conditions. The distances traversed by them will appear very great, but M. d' Hérelle himself observed that in one night flights were recorded extending as far as 32 kilometres (about 20 miles).

"The experiments above recorded place beyond all shadow of doubt the efficacy of this method of grasshopper destruction. Arising from the observation of a disease (epizooty) in Mexico occurring on a species undoubtedly identical with, or closely approaching that of the Argentine (*Schistocerca Americana*), it might be apprehended that the special conditions would not allow of a very easy development of the disease amongst the South American insects. Happily, this has not proved the case; on the contrary, non-migrating grasshoppers have been found infected; therefore, it is clear that the extreme virulence of the *Coccobacillus acridorum* (d' Hérelle) permits of the destruction of the most diverse species. It is easy to make experiments in this direction.

"Even if it has already been observed that in certain regions, especially after the egg-laying period, the grasshoppers appeared occasionally to be decimated by diseases of a parasitic nature, which, moreover, doubtless occurs amongst other insects which seem to disappear one year only to reappear in the next, it must be recognised that no one prior to M. d' Hérelle had discovered the specific agent of the disease, undertaken its study, verified its pathogenic action, and above all had shown that here was a practical method, simple and cheap, which could be employed in the destruction of these insects. It is to be hoped that the numerous countries in which the grasshoppers carry on their ravages, placing their interests above all other considerations, will have recourse to this method of defence to the great advantage of agriculture."

Since the above went to press, the writer, Mons. R. Guérin, Agricultural Chemist, stated that ample information had been received confirming the first results. Every plot of grasshoppers, as soon as located, is infected, and the swarm is destroyed in five days. M. d' Hérelle was then in the Northern Departments, Catamarca and La Rioja, where the warfare was being carried on with the same success. "It is interesting," he says, "to note that ants, whose destructiveness is well known in the tropics, are also destroyed by the bacillus culture."

The Argentine Government, at the pressing instance of planters, has decided to create a special department for the preparation of the culture on a wholesale scale, in order to be able to place it with full particulars at the disposition of the local authorities. It has also been proposed to award M. d' Hérelle a national reward for the exceptional services he has rendered to agriculture.

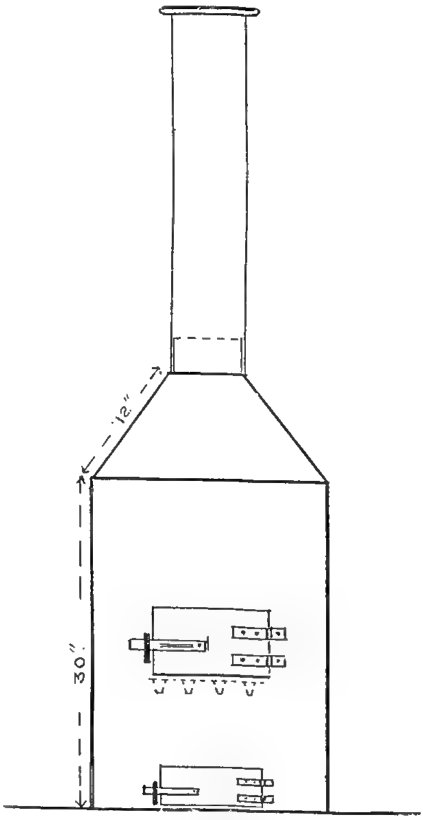
# General Notes.

## AN EFFECTIVE BRANDING FURNACE.

Mr. D. F. Roberts, Inspector under the Live Stock and Meat Export and Slaughtering Acts, Department of Agriculture and Stock, sends us the accompanying sketch and description of a branding furnace in use on Mr. Friend's selection, at Springwood, 40 miles from Springsure, which, judging from what we have heard of it, not only as a labour-saving appliance, but as a safeguard against the possibility of bush fires at branding time, should be appreciated by all stock-owners. The following specification shows the simplicity of construction, which could be carried out by any good country blacksmith:—

"Furnace to be 4 ft. 6 in. in circumference; height, 2 ft. 6 in. Firebox door to be 10 in. by 6 in., and furnace notched below to admit shank of branding iron, when being heated with closed door.

"Top of cone to be 8 in. diameter and flanged so that galvanised piping 3 ft. long may be attached, or taken off when moving the furnace.




"Two grates to be made for holding the fuel, as indicated in diagram; the grates to rest upon angle iron bolted to sides of furnace; grate to be fixed 12 in. from bottom of furnace. Ash door, 4 in. by 10 in., opened during use, and closed after use, to prevent danger of bush fire.

"The furnace rests upon the ground, and therefore has no floor.

"The body of the furnace to be made of ¼-in. iron plate, and the cone of ⅛-in. iron plate.

"The grates are made in two sections, so that they may be easily removed.

"When completed, the furnace weighs about 80 lb., and can be carried to any part of the stockyard by two lads; to remove it, simply lay it on its side, take off the galvanised piping, and place a small sapling through the furnace and carry it away.

"When using, drive two stakes in the ground in front of the furnace door, with a cross piece, so that the handles of the branding irons may be kept in a horizontal position.

"A few armfuls of wood will be sufficient to brand several hundred calves, brands never get cold, and no blotched brands are seen on cattle.

"The furnace can be constructed at a cost of about £4."

The idea of this furnace occurred to Mr. Henry Friend, of Gladstone, a well-known breeder of Shorthorns; and some years ago he had one constructed, and it has proved itself to be an unqualified success, and would be a valuable addition to any stockyard.

## LIMEJUICE.

The West Indian lime thrives to perfection in Queensland, and bears heavy crops of excellent fruit. There is, however, not much demand for this fruit in the State, and consequently the cultivation of the lime is very restricted. But there is a very large demand in most parts of the tropical world for limejuice, and orchardists might with profit devote some attention to the manufacture of this product, a business which presents none of the difficulties attending the manufacture of wine. Limejuice is very easily and simply prepared. The process is as follows:—

When limes are freshly squeezed, the juice is always very turbid, owing to the presence of mucilage and extractive matter derived from the fleshy parts of the fruit and of the rind. It consequently becomes necessary to clarify it. The same difficulty occurs with lemons, but the yield of juice from lemons is much greater than that from limes; indeed, the yield from some limes is very small, and the freshly-extracted juice always contains a large amount of pulp. This, however, on standing for a few weeks, separates out, and a clear, sherry-coloured liquid (the true limejuice) is obtained and can be either decanted or siphoned off. If time is no object, then the process of natural settling may be observed economically, but even then, it is probable that upon storage, the clear, sherry-coloured juice will get turbid, owing to the decomposition of mucilaginous matters which may still be in suspension. There are two courses open: Either treat the juice in the manner which we are about to describe, or else, allow it to stand for a few weeks, and then treat the clear liquid which is obtained, using the same process in this case also.

This process is very simple, and merely amounts to heating the juice to a temperature not lower than 150 deg. Fahr., or higher than 160 degrees. If the temperature is carried above this point, alteration will take place, and a noticeable flavour will be communicated to the juice. While the juice is still hot, it should be filtered, and almost any filtering medium will do. On the whole, we recommend crushed quartz, graded and arranged in the filtering vessel, while the smaller fragments are at the top. If this process is carried out shortly after the harvesting of the fruit, the juice will, under ordinary conditions, keep good for twelve months. But if the juice is intended for exportation, then it may be prevented from decomposition, and rendered fit for transit to any part of the world, by mixing it with one-tenth of its bulk of proof spirit. This, says the "Florida Agriculturist," is Schweitzer's recommendation. If the flavour, however, is not objected to, there is a cheaper method of preserving the juice after it has been heated and filtered, and this simply consists in adding 1 per cent. of bisulphite of calcium.

When ready for the market, the specific gravity should be 1,044·18. The percentage of citric acid should attain 8·66.

## AMOUNT OF SEED REQUIRED TO PLANT AN ACRE.

The following table prepared by Mr. H. C. Quodling, Acting Principal of the Queensland Agricultural College, Gatton, shows the amount of seed, in pounds, required to sow an acre:—

| Name of Crop. | Drilled. | Broadcast. | Approx. Distance between Drills. |
|---|---|---|---|
| | Lbs. | Lbs. | Inches. |
| Wheat ... ... ... ... ... ... | 40 to 45 | 60 to 65 | 7 |
| Barley ... ... ... ... ... ... | 40 to 45 | 60 to 65 (green feed) | 7 |
| Oats ... ... ... .. ... .. | 45 to 50 | 60 to 80 (hay) | 7 |
| Rye ... ... ... ... ... ... | 40 to 45 | 50 to 60 (green feed) | 7 |
| Canary Seed ... ... ... ... ... | 12 to 15 | 20 to 25 | 7 |
| Maize ... ... ... ... ... ... | 8 to 10 | 50 to 60 | 48 |
| Sorghums (sorts) ... ... ... ... | 3 to 5 | 15 to 20 | 36 to 42 |
| Broom Millet ... ... .. ... ... | 3 to 5 | ... | 36 to 42 |
| Setaria and the finer growing Millets ... | 10 to 15 | 20 to 25 | 7 to 14 |
| Lucerne ... ... ... ... ... ... | 12 | 15 to 16 | 7 |
| Essex Rape ... ... ... ... .. | 3 to 5 | ... | 21 to 28 |
| Swede Turnips ... ... ... ... ... | 2½ to 3 | ... | 30 |
| Cow Peas... ... ... ... ... .. | 10 to 12 | ... | 36 |
| Mangel Wurtzel ... ... ... ... | 6 to 8 | ... | 30 to 36 |
| Potatoes ... ... ... .. ... ... | 896 (8 cwt.) | ... | 36 |
| Rhodes Grass ... ... ... ... ... | ... | 5 | ... |
| Prairie ,, ... ... .. ... .. | ... | 30 to 40 | ... |
| Flax (Linseed) ... ... .. ... ... | 30 | ... | 7 |
| Field Peas ... ... ... ... ... | 20 to 25 | ... | 21 to 28 |

In estimating the approximate amount of seed required to sow an acre of land on the Darling Downs, judgment must be used in relation to the period of planting—whether early, medium, or late, the stooling proclivities of the plant, the condition and class of land; also the uses to which it is intended to put the crop.

## PASPALUM SEED.

Paspalum seed, even that which is reported to be hand-shaken, is so often disappointing in its results that special interest attaches to any practical suggestion calculated to give a better chance of germination. In this connection a New Zealand farmer gives it as his opinion that the best method is to cut the seed-heads about 18 inches long with a reaping-hook, and place them in small bundles on the grass. Great care should be taken to handle it gently, as the ripe seed easily falls. Each day's cutting is taken at once to the barn, where it is placed in rows crossing each other, so as to allow free ventilation. In three days the bundles are shaken on a sheet or floor, the ripe seed coming out freely, and the unripe seed and husks, which remain on the stalk, are carted away and spread on the paddocks. The good seed is then placed on sheets spread out to dry, and sieved, after which it is placed in the seed bins. "I have sown the seed in October and November, and cut the ripe seed in the following March and April for first crop, and a month later cut it again, thus showing that it does not take five months for the seed-heads to ripen. As to leaving the seed in stooks, that is wrong. In the first place, it is almost impossible to stook paspalum grass. To show how easily the seed falls when ripe, a heavy wind or rain will send a great deal to the ground which I know from experience, having lost much seed this season from this cause. Seed grown by men of experience can be brought up to 90 per cent. germinating-power. The grass can also be cut with machine for seed. Canvas covers are used along the row of cut grass, which is taken up and shaken on the sheet, and then thrown away for hay. You will in this way get only the very best seed, the unripe going with the hay. The machine will lay the grass down more gently than if cut by hand, and although you will get less seed it will be of the best quality."—Sydney "Daily Telegraph."

# Answers to Correspondents.

## FEBRUARY ISSUE OF THE JOURNAL.

SUBSCRIBER (Maryborough)—

The demand for the February issue of the journal was so unprecedented, that there is no copy available in this office. Perhaps one of our subscribers may be able to supply a copy, which, if sent to us, will be forwarded to you.

---

# Statistics.

## COMMONWEALTH METEOROLOGY.

### RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

| Stations. | 1911. | | | | | | | | | 1912. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | April. |
| *North.* | | | | | | | | | | | | | |
| Ayr ... ... ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 3·53 | ... |
| Bowen ... ... ... | 1·64 | 0·12 | 0·2 | Nil | 0·15 | Nil | 1·5 | 0·19 | 1·32 | 1·56 | 3·15 | 1·86 | ... |
| Cairns ... ... ... | 52·31 | 2·08 | 1 44 | 1·48 | 0·27 | 0 6 | 0·88 | 1·95 | 0 90 | 4·81 | 16·08 | 5·95 | ... |
| Geraldton (Innisfail)... | 50 53 | 3·58 | 5·10 | 6·20 | 0·79 | 0·30 | 0·73 | 1·61 | 0·75 | 5·50 | 18·24 | 6·01 | ... |
| Gindie State Farm ... | 0·29 | 0·29 | Nil | Nil | 0·49 | ... | 0·81 | ... | 3.50 | 0·68 | 2·59 | 1·88 | 0·63 |
| Herberton ... ... | 14·17 | 0·58 | 0·36 | 0·40 | 0·5 | Nil | 0·9 | 0·62 | 5·36 | 5·29 | 2·82 | 1·47 | ... |
| Hughenden ... ... | 6·29 | 0·4 | 0·2 | 0·2 | Nil | Nil | Nil | 1·37 | 0·69 | 5·78 | 1·84 | 3·52 | ... |
| Kamerunga State Nurs. | 52·28 | 1·51 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Mackay ... ... ... | 3·14 | 0·77 | 0·22 | 0·43 | 0·18 | 0·3 | 0·93 | 0·17 | 0 41 | 2·08 | 8·04 | ·93 | ... |
| Mossman ... ... | 37·10 | 1·44 | 0·33 | 1·28 | 0·39 | 0·09 | 0 55 | 0·86 | 3 31 | 6·08 | 18·32 | 17·60 | 6·40 |
| Rockhampton ... ... | 1·44 | 0·56 | Nil | 0·24 | 1·17 | Nil | 0·40 | 0·6 | 0·81 | 2·50 | 3·24 | ·14 | ... |
| Townsville ... ... | 3 02 | 0·7 | 0·11 | Nil | Nil | Nil | 0·39 | 0·31 | 2·84 | 1·64 | 7·57 | 6·35 | ... |
| *South.* | | | | | | | | | | | | | |
| Biggenden State Farm | ... | ... | ... | ... | ... | 0·79 | ... | ... | ... | ... | ... | ... | ... |
| Brisbane ... ... | 0·88 | 0·90 | 0·9 | 1·70 | 2·22 | 0·84 | 4·95 | 0·84 | 1·94 | 1·85 | 2·13 | 1·03 | ... |
| Bundaberg ... ... | 1·46 | 0·56 | Nil | 0·37 | 1·15 | Nil | 2·36 | 1·30 | 2·98 | 3·96 | 2·47 | ... | ... |
| Bungeworgorai (Roma State Farm) | ... | ... | ... | ... | ... | ... | ... | ... | ... | 0·73 | ... | 2·19 | Nil. |
| Crohamhurst ... ... | 2·94 | 1·21 | 0·13 | 3·58 | 2·62 | 0·51 | 6·27 | 1·74 | 3·02 | 5·62 | 8·72 | 31·73 | 1·77 |
| Dalby ... ... ... | 0·76 | 0·91 | Nil | 0·68 | 0·43 | 0·42 | 3·45 | 1·99 | 1·55 | 1·76 | 2·58 | ·53 | ... |
| Esk ... ... ... | 0·99 | 1·90 | Nil | ... | 1·51 | 2·04 | 4·17 | 0·47 | 0·44 | 1·38 | 8·26 | ·22 | ... |
| Gatton Agric. College | 1·38 | 0·58 | Nil | 0·72 | 0·90 | 0·96 | 3 77 | 0·49 | 1·90 | 3·56 | 3·31 | 7·86 | 0·31 |
| Gympie ... ... ... | 1·88 | 0·32 | Nil | 0·97 | 0·48 | 0·26 | 2·42 | 0·50 | 2·10 | 2·92 | 4·47 | ·15 | ... |
| Ipswich .. ... ... | 1·38 | 0·42 | Nil | 0·59 | 1·12 | 0·34 | 4·71 | 0·25 | ... | 1·87 | 3·00 | ·41 | ... |
| Maryborough ... ... | 2·61 | 0·16 | 0·11 | 0·62 | 1·47 | 0·9 | 2·81 | 0·90 | 4·98 | 2·39 | 3·93 | ·11 | ... |
| Roma ... ... ... | 0·14 | 1·13 | Nil | 0·67 | 1·55 | 0·87 | 1·9 | 1·55 | 1·19 | 0·74 | 0 76 | ·85 | ... |
| Roma State Farm ... | 0·04 | ·02 | ... | ... | 1·39 | 0·74 | 1·31 | 1·29 | 1·45 | ... | 0·60 | ... | ... |
| Tewantin ... ... | 1·78 | 0·57 | 0·22 | 2·53 | 1·07 | 0·4 | 7·48 | 1·14 | 2·13 | 5·60 | 4·25 | ·85 | ... |
| Toowoomba ... ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ·52 | ... |
| Warren State Farm ... | ... | ... | Nil | 0·6 | 1·01 | ... | 0·64 | ... | ... | 0 82 | 1·75 | 2·04 | 0·22 |
| Warwick ... ... | 0·74 | 1 04 | Nil | 1·20 | 1·50 | 0·80 | 1·78 | 2·26 | 0·70 | 1·57 | 3·45 | ·56 | ... |
| Warwick, Hermitage State Farm ... | ... | ... | ... | ... | ... | ... | 0·60 | ... | ... | ... | ... | ... | ... |
| Westbrook State Farm | 5·50 | 0·79 | 0·1 | 1·1 | 0·54 | 0 82 | 1·77 | 2·68 | 0·23 | 1·16 | 2.33 | 4·48 | Nil. |
| Yandina ... ... | 2·68 | 0· | Nil | 2·43 | Nil | 0·30 | 2·90 | 1·36 | 1·87 | 5·95 | 4·84 | ·95 | ... |

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered as approximate only.

GEORGE G. BOND, Divisional Officer.

# The Markets.

## PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR MAY, 1912.

| Article. | | MAY. Prices. |
|---|---|---|
| Bacon, Pineapple | lb. | 6½d. to 8d. |
| Bran | ton | £7 |
| Butter | cwt. | £6 |
| Chaff, Mixed | ton | £6 to £6 5s. |
| Chaff, Oaten (Victorian) | ,, | £7 |
| Chaff, Lucerne | ,, | £7 to £8 |
| Chaff, Wheaten | ,, | £6 10s. |
| Cheese | lb. | 9½d. |
| Flour | ton | £10 |
| Hay, Oaten (Victorian) | ,, | £6 to £6 10s. |
| Hay, Lucerne | ,, | £7 |
| Honey | lb. | 2d. to 2¾d. |
| Maize | bush. | 5s. 6d. |
| Oats | ,, | 4s. 2d. |
| Pollard | ton | £8 |
| Potatoes | ,, | £10 10s. to £11 |
| Potatoes, Sweet | ,, | £3 |
| Pumpkins | ton | £2 10s. to £3 10s. |
| Wheat, Milling | bush. | 4s. 6d. to 5s. |
| Onions | ton | £14 |
| Hams | lb. | 1s. 1½d. |
| Eggs | doz. | 1s. 8d. to 1s. 10d. |
| Fowls | pair | 3s. to 4s. 6d. |
| Geese | ,, | 6s. |
| Ducks, English | ,, | 3s. 6d. to 4s. |
| Ducks, Muscovy | ,, | 4s. to 5s. |
| Turkeys (Hens) | ,, | 6s. 6d. to 8s. 6d. |
| Turkeys (Gobblers) | ,, | 14s. to 17s. |

## SOUTHERN FRUIT MARKETS.

| | |
|---|---|
| Apples (Choice Eating), per case | 8s. to 12s. |
| Apples (Cooking), per case | 4s. to 6s. |
| Bananas (Fiji), G.M., per bunch | 3s. to 11s. |
| Bananas (Fiji), G.M., per case | 7s. 6d. to 17s. 6d. |
| Bananas (Queensland), per bunch | 1s. to 5s. |
| Bananas (Queensland) per case | 11s. 6d. to 14s. |
| Cocoanuts, per dozen | 2s. 6d. to 4s. |
| Lemons (local), per gin case | 12s. to 14s. |
| Mandarins (Emperors), per case | 10s. to 12s. |
| Oranges (Maryborough), per bushel | 8s. to 10s. |
| Papaw Apples, per half-case | 3s. 6d. to 7s. |
| Passion Fruit (local), per half-case | 10s. to 11s. |
| Peanuts, per lb. | 5½d. |
| Pears (local), per bushel case | 7s. to 12s. |
| Persimmons, per half-case | 2s. 6d. to 5s. |
| Pineapples (Queensland), common, per case | 7s. to 9s. |
| Pineapples (Queensland), Ripley's, per case | 7s. to 9s. |
| Pineapples (Queensland), Queen's, per case | 9s. to 10s. |
| Pomegranates, per gin case | 5s. to 9s. |
| Quinces, per gin case | 4s. to 5s. 6d. |
| Tomatoes, per half-case | 2s. to 4s. |

## PRICES OF FRUIT—TURBOT-STREET MARKETS.

| Article. | MAY. Prices. |
|---|---|
| Apples (Eating), per case ... | 9s. to 10s. |
| Apples (Cooking), per case | 9s. to 10s. |
| Apricots, per case ... | ... |
| Bananas (Cavendish), per dozen ... | 4d. to $4\frac{3}{4}$d. |
| Bananas (Sugar), per dozen | 3d. to $3\frac{1}{2}$d. |
| Cape Gooseberries, per case | 5s. to 8s. 6d. |
| Cherries, per quarter-case | ... |
| Citrons, per cwt. | 11s. 6d. to 12s. |
| Custard Apples, per quarter-case | 3s. 6d. to 4s. 3d. |
| Grapes, per quarter-case ... | ... |
| Lemons (Italian), per case | ... |
| Lemons (local), per half-case | 5s. 6d. to 7s. 6d. |
| Mandarins, per case | 6s. to 8s. |
| Mangoes, per case ... | ... |
| Nectarines, per quarter-case | ... |
| Oranges (Navel), per case ... | ... |
| Oranges (Other), per case ... | 4s. to 5s. |
| Papaw Apples, per quarter-case ... | 2s. to 3s. |
| Passion Fruit, per quarter-case ... | 5s. to 7s. |
| Peaches, per quarter-case ... | ... |
| Peanuts, per lb. | $3\frac{1}{2}$d. |
| Pears, per case | ... |
| Persimmons, per half-case ... | ... |
| Plums, per quarter-case ... | ... |
| Pineapples (Ripley), per dozen ... | 2s. 6d. to 5s. 6d. |
| Pineapples (Rough), per dozen ... | 2s. to 5s. |
| Pineapples (Smooth), per dozen ... | 3s. to 6s. |
| Rockmelons, per dozen ... | ... |
| Rosellas, per quarter-case ... | 1s. 6d. to 3s. |
| Strawberries, per tray ... | ... |
| Tomatoes, per quarter-case | 3s. to 6s. 6d. |
| Watermelons, per dozen ... | ... |

## TOP PRICES, ENOGGERA YARDS, APRIL, 1912.

| Animal. | APRIL. Prices. |
|---|---|
| Bullocks ... | £7 17s. 6d. to £9. |
| Bullocks (single) ... | £12 7s. 6d. |
| Cows ... | £5 10s. to £7 2s. 6d. |
| Merino Wethers ... | 17s. |
| Crossbred Wethers ... | 20s. 9d. |
| Merino Ewes ... | 17s. 9d. |
| Crossbred Ewes ... | 20s. |
| Lambs ... | 16s. |
| Pigs (Baconers) ... | ... |
| Pigs (Porkers) ... | 32s. 6d. |

# Farm and Garden Notes for July.

FIELD.—The month of July is generally considered the best time to sow lucerne, for the reason that the growth of weeds is then practically checked, and the young lucerne plants will, therefore, not be checked by them, as would be the case if planted later on in the spring. If the ground has been properly prepared by deep ploughing, cross-ploughing, and harrowing, and an occasional shower occurs to assist germination and growth, the lucerne will thrive so well that by the time weeds once more appear it will be well able to hold its own against them. From 10 to 12 lb. of seed drilled or 15 to 16 lb. broadcast will be sufficient for an acre. This is also the time to prepare the land for many field crops, such as potatoes, maize, oats, and barley for green fodder; also, rye, vetches, tobacco, cotton, sugar-cane, field carrots, mangolds, swedes, canaigre, &c. Early potatoes, sugar-cane, and maize may be planted in very early districts, but it is risky to plant potatoes during this month in any districts liable to late frosts or in low-lying ground. Under such conditions, it is far better to wait until well into the following month. The greatest loss in potatoes and sugar-cane has been, on more than one occasion, experienced in September, when heavy frosts occurred in low-lying districts in the Southern portion of the State. During suitable weather, rice may be sown in the North. The coffee crop should now be harvested, and yams and turmeric unearthed. (See article on Turmeric in this issue.)

KITCHEN GARDEN.—Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. Never walk over the land during wet weather with a view to sowing. The soil cakes and hardens, and good results cannot then be expected. This want of judgment is the usual cause of hard things being said about the seedsman. In fine weather, get the ground ploughed or dug, and let it lie in the rough till required. If harrowed and pulverised before that time, the growth of weeds will be encouraged, and the soil is deprived of the sweetening influences of the sun, rain, air, and frost. Where the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans, lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, salsify, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower, and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts, it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities, it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops.

FLOWER GARDEN.—Winter work ought to be in an advanced state. The roses will now want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, hollyhocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolor, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. Put away dahlia roots in some warm, moist spot, where they will start gently and be ready for planting out in August and September.

# Orchard Notes for July.

## THE SOUTHERN COAST DISTRICTS.

The notes for the month of June apply to July as well. The first crop of strawberries will be ripening during the month, though extra early fruit is often obtained in June, and sometimes as early as May, under especially favourable conditions. Look out for leaf-blight, and spray for same with Bordeaux mixture, also watch for the first signs of the grey mould that attacks the fruit, and spray with the sulphide of soda wash. The larvæ of the cockchafer, that eats the roots of strawberries, should be looked for, and destroyed whenever found. Pruning of citrus and other fruit trees may be continued; also, the spraying with lime and sulphur. Where the ringing borer, that either attacks the main trunks or the branches at or near where they form the head of the tree, is present, the main stems and trunks should either be painted or sprayed with the lime and sulphur wash during the month, as the mature beetles that lay the eggs that eventually turn to the borers sometimes make their appearance during the month, and unless the trees are protected by the wash they lay their eggs, which hatch out in due course and do a lot of damage. Keep the orchard clean, so that when the spring growth takes place the trees may be in good condition. There is usually a heavy winter crop of pineapples ripening during this and the following months, particularly of smooth leaves. See that any conspicuous fruits are protected by a wisp of grass, as they are injured not only by frost but by cold westerly winds.

## THE TROPICAL COAST DISTRICTS.

See the instructions given for the month of June. Keep the orchards clean and well worked. Prune and spray where necessary.

## THE SOUTHERN AND CENTRAL TABLELANDS.

Where pruning of deciduous trees has not been completed, do so this month. It is not advisable to leave this work too late in the season, as the earlier the pruning is done after the sap is down the better the buds develop—both fruit buds and wood buds; thus securing a good blossoming and a good growth of wood the following spring.

Planting can be continued during the month; if possible, it should be finished this month, for though trees can be set out during August, if a dry spell comes they will suffer, when the earlier planted trees, which have had a longer time to become established, will do all right—provided, of course, that the land has been properly prepared prior to planting, and that it is kept in good order by systematic cultivation subsequent to planting.

Do not neglect to cut back hard when planting, as the failure to do so will result in a weakly growth.

As soon as the pruning is completed, the orchards should get their winter spraying with the sulphur limewash, and either with or without salt, as may be wished. See that this spraying is thoroughly carried out, and that every part of the tree is reached, as it is the main treatment during the year for San José and other scale insects, as well as being the best time to spray for all kinds of canker, bark-rot, moss, lichens, &c.

Where the orchard has not been ploughed, get this done as soon as the pruning and spraying are through, so as to have the land in good order for the spring cultivations. See that the work is well done, and remember that the best way to provide against dry spells is to keep moisture in the soil once you have got it there, and this can only be done by thorough and deep working of the soil.

When obtaining trees for planting, see that they are on good roots, and that they are free from all pests, as it is easier to prevent the introduction of pests of all sorts than to eradicate them once they have become established. Only select those varieties that are of proved merit in your district; do not plant every kind of tree that you see listed in a nurseryman's catalogue, as many of them are unsuited to our climate. The pruning of grape vines may be carried out in all parts of the tablelands other than the Stanthorpe district, where it is advisable to leave this work as long as possible, owing to the danger of spring frosts.

Where grape vines have been well started and properly pruned from year to year, this work is simple; but where the vines have become covered with long straggling spurs, and are generally very unsightly, the best plan is to cut them hard back, so as to cause them to throw out good strong shoots near the main stem. These shoots can be laid down in the place of the old wood in following seasons, and the whole bearing portion of the vine will be thus renewed.

Where vineyards have been pruned, the prunings should be gathered and burnt, and the land should receive a good ploughing.