THE

Queensland Agricultural Journal,

ISSUED BY DIRECTION OF

THE HON. THE SECRETARY FOR AGRICULTURE.

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

NEW SERIES.

VOLUME I.

JANUARY TO JUNE, 1914.

BY AUTHORITY:
ANTHONY JAMES CUMMING, GOVERNMENT PRINTER, BRISBANE.

1914.

QUEENSLAND AGRICULTURAL JOURNAL.

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QUEENSLAND AGRICULTURAL JOURNAL

VOL. I. JANUARY, 1914. PART 1.

THE YEAR 1913.

As we enter upon the New Year 1914, it will be encouraging to look back and reflect upon the results achieved both in the Pastoral and Agricultural interests and in business circles generally, especially in our Interstate and Overseas Trade. In whatever direction we look, we find ample evidence of increased prosperity. Pastoral products—such as wool, sheep, cattle, &c.—have been in abundance, and prices realised all round have been highly satisfactory. The same may be said of the dairying industry, which has progressed all over the State in what may be described as an almost phenomenal manner. The sugar season just brought to a close has also proved highly successful—so much so that at least three new mills of the latest class, capable of turning out over 100 tons of sugar a day, are in course of erection. The wheat industry on the Darling Downs has shared in the general prosperity; and, although the area under this crop (132,345 acres) was not equal to the area sown in 1904, yet the probabilities are, when full statistics are available, that the yield will be over 2,000,000 bushels. Throughout the year there have been no industrial troubles. There has been no cessation in the labour required in our various industries; employers and employees have worked harmoniously together, with great benefit to the community at large. The seasons have, on the whole, been propitious, although fears were, on two occasions, entertained that we were on the eve of a drought. Happily the first genial rains fell at a critical time, with the result that crops were saved, the sugar, wheat, and other harvests were got in without loss. The abnormal heat and absence of rain in November and part of December gave rise to serious forebodings. Parts of the country were swept by bush fires, and hundreds of miles of grass was destroyed. No rain fell for some weeks. Fortunately, in the early days of December, the short drought broke, and copious rains fell in almost all parts of the State in time to be of service to farmers, graziers, and sugar planters. Generally speaking, the year's operations give reason for thankfulness on the part of the whole community. And this reminds us that, in the United States and in Canada, a day is set apart after the crops have been secured—about the month of October, we believe—called appropriately "Thanksgiving Day."

Last October the "Nor'-West Farmer," Canada, had the following article on

THANKSGIVING,

which will find an echo amongst the people of Queensland:—

"In setting aside a special day, officially denominated as a time for thanksgiving to God for the bounty of the year, the rulers of our country not only offer a good example in their recognition of the Source of all good things; but they also exercise a wise leadership which we as a people can well afford to follow.

"We live in an age of wonderful human achievement. Day by day tells the story of the triumph of man over the obstacles that have always beset his pathway. New inventions, new methods, new discoveries, new truths—we meet them at every turn. Human progress is leading onward at a good stride.

"But let us not become presumptuous. Let us not forget that behind all the bustle of human activity there is a great Unseen Hand, a kind Providence, that operates the gigantic forces of the universe; and that even the best of man's endeavours would be totally unavailing in the absence of the beneficence of sunshine and shower with which He so graciously blesses the world.

"It is a great truth—a truth which Canada nationally as well as Canadians individually should never forget—that God's share in the partnership of raising the harvests, and of carrying forward all our other enterprises, is always absolutely essential to their success. It is to direct men's minds particularly to this thought that Thanksgiving Day is set aside.

"There is very much for which Canadians ought to give thanks this year. The bounteous harvest, gathered in such excellent condition, naturally suggests itself as the first great blessing. Then there has been the almost total preservation from great disasters of all kinds, whether by fire, flood, frost, or disease. Our diplomatic relations have been favourable throughout the year, and no threatening war cloud shrouds our political horizon. Our trade with other lands has gone on expanding —we have received from them an even increasing supply of the good things that we need, and we have found them, in return, good customers for what we have to sell, And, more and better than all these, this has been a year in which Canada has increased the number and, let us also hope, the quality of its homes.

"Let us interpret the thanksgiving proclamation of 1913 not as an indicator simply of a day, but rather as having reference to an attitude—an attitude of heart and mind which will be marked by the ever blessed grace of thankful recognition of blessings received."

"QUEENSLAND AGRICULTURAL JOURNAL."

NEW SERIES.

WITH this number of the Journal we commence a New Series of issue, dating practically from the 1st July, 1913, on which date the Journal completed its sixteenth year of publication. That the Departmental Journal has met with the approval and favourable appreciation of those in whose interests it was first initiated by the then Minister for Agriculture (the Hon. A. J. Thynne) is evidenced by the large increase in the circulation and in the number of subscribers since its first appearance in July, 1897. Since that time the Journal has been received with such favour that to-day some 60,000 copies a year are mailed to subscribers throughout the States of the Commonwealth, New Zealand, and in many other parts of the world.

For many years the Department refused to make the Journal a general advertising medium, it only being intended as a vehicle for information and instruction on pastoral, agricultural, dairying, horse-breeding, and other industries engaged in by country settlers. Since, however, its sphere of influence has so greatly widened, it has been found necessary to modify this determination to the extent of accepting advertisements having reference solely to productions of the land or to manufactured articles needed by rural occupiers, thus not interfering in any way with the general run of advertisements in the public Press.

The Annual Subscription to the Journal payable by *bonâ fide* farmers, and by those who gain their livelihood solely by rural pursuits, was fixed at One Shilling per annum, to cover cost of postage. As will be seen by the published scale of subscription, it varies—for schools of arts, and for persons not engaged on the land or who are resident in other States of the Commonwealth or in other countries—from Five Shillings to Ten Shillings per annum.

Complete Sets of Thirty Volumes, to July, 1913, may be obtained from the Department, bound, for £25, or in separate numbers for £10; single numbers of late issues, Six Pence per copy; and any available issues of early years, One Shilling per copy.

Agriculture.

ONION-GROWING.

The great possibilities of onion-growing in this State are not properly realised by farmers or market gardeners, as would appear from the fact that Queensland imports large quantities of onions from Japan. At this moment of writing a consignment of 1,200 bags has arrived from Japan, and has been selling at £10 per ton, whilst Queensland onions are being sold at the same time at £8 10s. There is no reason—whether on the score of cost of labour, climate, or soil—why the most favoured parts of Queensland should not make more of the onion industry. So far back as 1864, farmers at Oxley Creek imported seed from Portugal, and grew enormous crops of onions, which were easily sold at prices up to from £50 to £100 per ton. Grown in the field, the yield was from 6 to 10 tons per acre, according to soil and care in cultivation. These onions averaged 8 oz. in weight for the largest, and the most favoured sorts went about four to 1 lb.

The crop has the valuable advantage of being one of the few possible to the market gardener that need not be marketed at the moment of attaining maturity. A good crop of onions well harvested will provide something to go to market with all through the winter and well into spring and summer. Onions, to be successful, must be grown on clean land. The most suitable soil 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 such case the land should be well drained. Ideal lands for onion-growing, in the writer's experience, are the high scrub lands near Forest Hill, Laidley, and Gatton, where the soil answers to the above description. An eastern or south-eastern aspect has been proved to be better than if the land sloped to the west, as the onion does not require intense heat to bring it to perfection.

It has been stated above that the land should be clean and clear of weeds and of their fallen seeds. This applies equally, of course, to the seed beds. Hence, by sowing in April or May, there is little trouble from this source. Still, it is advisable that the land, both of the seed bed and of the area proposed to be planted out, should be turned up and exposed to the weather for some time previous to sowing—say, in February. Then between that month and April, if the land be scuffled two or three times, there will be not much future trouble from weeds.

As soon as the land is dry enough after the February rains to be properly worked, and when that work is completed, sowing begins. Getting the land into proper order means—if the land is not virgin soil, or if it has borne crops for many years in succession without manuring—

that it should be reduced to a fine tilth, and thoroughly well manured with stable dung, ashes, bonedust, soot, sulphate of iron, and sulphate of potash. A good manure for onions is a light dressing of dung, supplemented by 4 to 6 cwt. of superphosphate, 1 cwt. of sulphate of potash (or 4 cwt. of kainit), and 4 cwt. of ntrate of soda. Potash is of vital importance to onions, and should on no account be neglected. It is valuable in improving the keeping quality, and sulphate of iron is a preventive of onion mildew.

Getting the land in good order includes well rolling it, for an indispensable cultural condition for onions is to get the soil well firmed underneath without " panning " it. This condition is often lost sight of. If the soil is carefully worked, reduced to a fine tilth, and the plants are set out in a soil which is loosened to a depth of, perhaps, 8 in., no good results can be expected without rolling. The onion requires a firm bed; otherwise the plant, instead of making a large, well-shaped bulb, will run to " neck," and have more the appearance of a leek than an onion.

The best way to sow onions is to drill them in, although for small areas the seed may be sown in a seed bed, and the young seedlings be planted out. The drills should be from 8 in. to 15 in. apart, which will require from 2 lb. to 10 lb. of seed per acre. The seeds should be dropped at a distance of 2 to 3 in. apart in the drills, and the plants will afterwards be required to be thinned out with the hoe to 6 in. apart in rich land. The drills should be slightly raised, and the *roots* of the plants be firmly embedded in them. The *bulb* is not the root, and it should be allowed, so to speak, to squat *on* the surface, not *under* it.

As the plant grows, the soil must be kept perfectly clear of weeds; and where the working of the ground has thrown the soil against the bulbs, it must be drawn down so that only the root is in the ground. Where this has not been attended to, the remedy for the resulting want of bulb-formation is to wring the necks of the plants, or, at least, to bend them down with a twist. This will have the effect of inducing the formation of bulbs.

When sowing the seed, it need only be put just under the ground, as it requires but a very slight covering of soil. If sown deep, many seeds fail to germinate, and most of those that do appear will make an abnormal growth of neck, causing much labour in drawing away the soil from the incipient bulbs. There are few seeds so annoyingly deceptive as onion seed, as old seed will lose its germinating power, and imported seeds, unless carefully packed in airtight bottles or soldered tins, will scarcely germinate at all. Therefore, it is well to make sure of getting new seed. After sowing, germination should take place in about a week, and the onion comes to maturity in from 120 to 180 days (spring onions in from 60 to 90 days). They may be known to be ripe by the drying up of the tops. As soon as this happens, pulling should be done quickly, because, if wet should come on, the bulbs may start a fresh root action. This, besides making them harder to pull, will seriously impair their quality. After they are pulled, the onions are left in narrow

" windrows " to get well dried and ripened, and may then be removed to a dry barn, subject to a free current of air. Should they show any signs of heating, they must be at once turned over, and the bad ones picked out during the process.

The best varieties for our Queensland climate are—Mammoth Silver King, Brown Spanish, Brown Globe, Yellow Globe, and Silverskin.

For spring onions, sow White Tripoli in drills about 9 or 10 in. apart. Besides a little hoeing in summer, they require no attention.

In the old country very heavy crops of onions are harvested. There the average market-garden crop is from 12 to 15 tons per acre. An average onion as sold in the London markets weighs about 8 oz., and has a circumference of 10 in. in the widest part. Many are larger and heavier (up to from 1 to 3 lb.) ; others are so small as to run to three dozen to the lb.

The great possibilities of onion-growing may perhaps be realised from the following figures given in " Commercial Gardening "—Vegetable-growing for Market:—

" Assuming the rows to be 1 ft. apart, and the plants, after thinning out, to be 3 in. apart, as a fair distance for market-garden culture, there would be 174,240 to an acre. At an average weight of 8 oz. each, the yield per acre would be nearly 39 tons. At £4 per ton, this would represent £156 per acre for the matured crop, without counting the thinnings—all saleable for salads. If the plants are thinned out to 6 in. instead of 3 in. apart, there would be 87,120 bulbs to an acre. These would yield 19 tons on the 8-oz. basis, and £76 per acre at £4 per ton."

Think what such crops would represent if sold at the usual Queensland prices of £8 to £10 per ton!

From experiments carried out on the " Times " Experimental Farm in 1910, the following results were obtained from a square chain of land (1/10 of an acre) from seed sown in boxes in February, and transplanted 12 in. by 3 in. in April (174,240 bulbs to the acre) :—The varieties of onion were: " Ironhead," 2,640 lb. (= 11.7 tons per acre) ; " Cream Globe," 2,878 lb. (= 12.8 tons per acre) ; " Wroxton," 3,960 lb. (= 17.6 tons per acre) ; "Ailsa Craig," 4,950 lb. (= 22.1 tons per acre).

The onion has few enemies in this State. Sometimes the crop suffers severely from the ravages of a green grub which is numerous in some soils, especially badly tilled ground. These come forth at night, and cut the young plants off level with the surface. Hence land intended for onions should be previously carefully examined for these pests, and, if possible, receive a dressing of soot, which is not only obnoxious to the grubs but is a valuable manure for onions. One of the best preventives is to use the hoe frequently, this being beneficial from a cultural point of view; while the green grubs, wire worms, &c., are brought to the surface in view of birds, which soon destroy them. Spraying with kerosene emulsion may also be tried, but the hoeing is the most effective plan.

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. Anyone 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 the custom 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 hundredweight of sulphate of potash per acre will have the effect above described.

THE SOYA BEAN.

Much has been written in the Australian Press during late years of the Soya bean as a profitable crop for farmers, and experiments have been made with it at the State Nursery at Kamerunga, but nothing has resulted from the experiments beyond proving that the soils and climate of some parts of Queensland are well adapted for the cultivation of this crop.

A communication has lately been received by the Department of Agriculture and Stock from Messrs. Thompson and Co., Dalny, South Manchuria, giving interesting information concerning the commercial possibilities and actualities of the bean, and suggesting that the Department experiment with the seed at the State Farms and in Western districts like the Maranoa, where the rainfall is comparatively small and uncertain, offering at the same time to supply the necessary seed, and, if the experiments proved successful, the firm would consider the taking up of a large tract of land in Queensland and growing the bean in quantity, as there would be no difficulty in disposing of the product. The present price of the beans in Europe is £9 per ton.

Messrs. Thompson and Co. furthermore enclosed an extract from the report (for 1912) of the Trades Commissioner for the Government of the Union of South Africa on the subject, which we summarise as follows, premising that the bean is a native of South-eastern Asia, which requires about the same temperature as maize, that it endures drought well, and is not easily injured by excess of moisture. Like other leguminous crops, it accumulates nitrogen in the nodules on its roots, and thus enriches the soil for the next crop:—

Although it has been grown and used as an article of diet in China and Japan even before the time of Confucius, its cultivation seems to have spread very slowly to the surrounding countries. Up to the year 1907, the export of Soya beans from Manchuria did not exceed 120,000 tons, of which the bulk was absorbed by Japan, and as a commercial oil seed it was first introduced to the notice of the British and Continental manufacturer towards the end of 1908, when large quantities were exported to the oil mills of the United Kingdom. Those oil mills crush annually upwards of 1,000,000 tons of oil seed, of which about 600,000 tons are cotton seed, 350,000 tons Soya beans, and the balance linseed. It is estimated that Great Britain and the Continent of Europe can take 10,000,000 tons of Soya beans per annum, and the annual crop in Manchuria is estimated at only 1,600,000 tons. In that country the yield per acre is from 1,100 to 1,600 lb. The average height of the plant is from 2 to 3 ft., with from 42 to 105 pods per plant, each pod bearing from two to three seeds. The flowers are self-pollinated. Under favourable circumstances the seeds will germinate and appear above ground in six days after being sown, and attain a height of from 2 ft. to 4 ft. in six to ten weeks, and the crop may be secured in from five to six months.

At the Government Experimental Farm in South Africa, where 80 varieties were tested (there are over 300 varieties of the bean), yields up to 2,000 lb. per acre were obtained. If grown for forage, as much as 12 to 13 tons of fresh fodder per acre may be produced, which may be used for hay or for silage purposes.

Growing Soya beans for grain is distinctly profitable, owing to the large demand in Europe. But the question to our mind is, whether, under our labour conditions, it would pay as well as it does in cheap-labour countries. A 1,000-lb. crop, at the highest price for the beans, would sell for £4 10s. in Europe, and, deducting labour for production, freights, commission, &c., there would appear to be little in it to attract the attention of farmers, who can make far more out of dairying, sugar-planting, potato, onion, and maize growing. As a catch-crop amongst coconut and rubber trees, the Soya bean would doubtless prove of great value.

As far as the feeding value of the bean is concerned, it is said to be at least twice as valuable for food as maize, as it is very rich in protein, but it is best fed in conjunction with maize. As a green manure, it is undoubtedly valuable in restoring the soil, being a leguminous plant.

The expenses per ton for bags, railage, and freight from Harbin to Vladivostock are set down at £1 13s.; add ocean freight to England, £1 10s.—£3 3s.

The expense of transport from South Africa to England is set down in the report we quote from at £1 9s.

But Queensland is further from England than South Africa; and, whilst it might pay to grow and export Soya beans thence to Europe, we cannot see that the crop could be profitably produced in this country, even although oil mills were erected.

The following summary of the uses of the Soya bean and its products, given by "Tropical Life," April, 1913, is interesting:—For dynamite and high explosives, soap, linoleum, india-rubber substitute, margarine, paints and varnishes, in place of linseed oil, various edible foods, toilet powder, salad oil, vegetable cooking oil in place of lard, oil, &c., preserving sardines, lamp oil, lubricating, as food in place of peas, flour for soups, biscuits, brown bread, artificial milk and cheese, substitute for coffee, for sauces; cake for feeding cattle, and for manure.

SEWAGE AS A MANURE.

"The Wealth of India" says that Dr. J. Grossmann, in discussing "The Utilisation of Sewage in Agriculture" before the British Association—Agricultural Section, stated that the total value of the nitrogenous matter, phosphates, and potash compounds contained in the liquid part of sewage was equal to £20,000,000 per annum. The value of its solid matter, termed "sewage sludge," was about £1,000,000 per annum, and he had succeeded in designing a practicable method by which this amount could be made available. By his process the dried sludge was mixed with a small percentage of acid and subjected to the action of superheated steam, which carried off the fatty matters (which were condensed in water) and left an inodorous brown powder, completely sterilised, which contained, on an average, 1·5 per cent. of nitrogen, 3 per cent. of phosphate of lime, and ·5 per cent. of potash, distributed in almost molecular state over from 30 to 40 per cent. of organic matter similar to humus, and mixed with a certain amount of carbon in an extremely fine state of division. The process did not add to the cost of sludge disposal, was automatic, and worked day and night without a break.

THE HISTORY OF COTTON-GROWING IN QUEENSLAND.

BY THE EDITOR.

FIRST PHASE—1852 TO 1870.

The possibilities of cotton cultivation in Southern Queensland attracted the attention of far-seeing, enterprising colonists about sixty years ago (1852), when experiments were made by Captain Logan and Messrs. Ambrose Eldridge and Poole on the Brisbane River. In that year 70 bales and 18 bags of cotton were shipped by them, through the agency of Messrs. J. and G. Harris, to England; and in 1854, 18 bales of 600 lb. each were shipped to Sydney to be forwarded to London by the s.s. "Great Britain." Mr. Eldridge's cotton was grown at what is now the populous suburb of Milton. In 1853 and in succeeding years the Brisbane River frontage between Messrs. A. and J. Carmichael's sawmills and the South Brisbane Cemetery was largely planted with cotton, as were several other places on the river.

In a letter to the "Moreton Bay Courier," now the "Brisbane Courier," Mr. Eldridge gave the following particulars of his experiment in cotton-growing, which was the precursor of many millions of pounds of cotton being grown in East and West Moreton a few years later: —

The quantity of land cultivated was 5 acres, and the seed was planted in the latter part of October, 1852—

	£	s.	d.
Breaking up and preparing the land for seed	12	10	0
Planting and weeding	10	0	0
Gathering 2,500 lb. of seed cotton, at 1d. per lb. ..	10	8	4
Drying, baling, bales, carting to market, &c.	5	0	0
	37	18	4
Return from 2,500 lb. seed cotton	52	1	8
Profit	£14	3	4

No mention is made of the variety of cotton planted; but, presumably, it was Sea Island cotton, as it brought 2s. 6½d. per lb. in England, where it had to be hand-cleaned by gaol labour, as there was no cotton gin in Europe at that time.

In 1860 Captain Towns, who was the founder of Townsville in North Queensland, took up 240 acres on the Logan, granted him free for the purpose of growing cotton, sugar, or coffee. This was the beginning of Townsvale (not to be confounded with Townsville, on Cleveland Bay, in North Queensland).

In 1863 kanaka boys were employed on the plantation. Captain Towns's partner (Mr. Walker) was an enthusiastic advocate of cotton-growing; and in 1869, when 500 acres were under cotton in the colony, Townsvale cotton took the first prize in the Paris Exhibition against the whole of the cotton-growing centres of America. Mr. Walker predicted that some day cotton would be one of the main products of Queensland. "Queensland," he said, "will yet be one of the greatest cotton-producing centres of the earth."

The largest output of cotton at Townsvale for a single year was 380 bales, and, as the Government granted a bonus of £10 on each 500-lb. bale of clean cotton, the bonus on this quantity was £3,800. Presuming that the cotton was sold in England at 2s. 6d. per lb., the total revenue for this shipment amounted to £27,550.

The bonus was afterwards reduced to £5, then to £2 10s. per bale, and finally ceased altogether; and when cotton was once more grown in America, after the Civil War, it was found impossible to compete with that and other cotton-growing centres, and the industry died.

The first cotton gin in Australia was introduced by a Mr. Elliott, who was persuaded to come to the colony by the celebrated Dr. Lang, who was really the initiator of the industry in Northern New South Wales. The machine was a very crude, rough one, with wooden rollers, and was not a success; but Mr. D. F. Longlands improved somewhat on it.

In 1861 Mr. Henry Jordan, immigration lecturer in England, created a furore in that country by his lectures on cotton-growing in Queensland. His writings on the subject were eagerly read, and Dr. Lang's book on Queensland was bought by thousands of intending emigrants.

I should have mentioned that at the World's Fair in 1862 prizes for Queensland cotton were awarded to W. Cairncross, Bulimba (1); J. Pratten, Cooper's Plains (2); W. Thompson, Norman Creek (3), for Sea Island cotton; and for Uplands cotton, W. J. Rodé, German Station (near Nundah), took first prize.

The winners received silver and bronze medals.

The Sea Island cotton exported in those days (1864) was such a vastly superfine fibre that it attracted the attention of Mr. Bayley, a Manchester cotton spinner. He said, "I saw at once that from such a cotton a yarn could be manufactured superior to any that could be spun in England." The yarn was ultimately sent to Calcutta, as the Lancashire weavers of that period could not produce a fabric from it, as it was so delicate; neither could the weavers of Scotland and France succeed. In due time, however, Mr. Bayley received a sample of the finest muslin ever manufactured, produced by the skill of the Indian weavers from Queensland cotton.

Owing to the labours of Dr. Lang and Mr. Henry Jordan, general attention was directed in the United Kingdom to Queensland as a field for investment in cotton cultivation, and a continuous stream of immigrants poured into the colony, amongst whom were six families of the first section of the Lancashire and Queensland Co-operative Emigration Society, Limited.

This society, which promised to become one of the most important of cotton-growing companies, was founded on the co-operative principle; the lands and crops to be the common property of the whole, and the profits to be used in securing the speedy immigration of the members still in England. The company were to take up land represented by the land orders (then granted to every immigrant arriving in the colony) of its members, and make a preliminary outlay of £5,000. I must here explain that in the sixties the Queensland Government granted to each immigrant a land order (transferable and saleable) for £40, to be used in the purchase of land. A first order for £28 was received by the immigrant on arrival, and the balance of £12 was payable when the immigrant had resided continuously in the colony for two years.

The first of the society's members arrived in the Black Ball ship "Sunda"; and a Mr. W. Lee, manager of the Lancashire Co-operative Cotton Company, came to Queensland, and, at a large meeting at the old school of arts, explained the objects for which the company had been formed. He said that they were all aware that great distress had occurred and was occurring in Lancashire through the people of America having ceased to grow cotton, and "had taken to killing each other instead." He had determined, with others, to start a company, and, if the black niggers of America did not grow cotton, to come to Queensland and grow it for themselves. "If," he said, "Queensland had been availed of by the Home Government fifteen years ago (*i.e.*, about 1850), the great slaughter in America would never have been, for this colony would have been producing cotton which would have made the manufacturers at home indifferent to American cotton."

The prominent men of Queensland of that day numbered amongst them Mr. (afterwards Sir Charles) Lilley, the Rev. George Wight, Mr. Ham, Mr. George Board, and many others. It was Mr. Ham and Mr. Board who directed Mr. Lee to the block of land on which the company were going to commence operations. Most of the company had determined to go on to the land and work it for two years, receiving no wages during that time. Messrs. Perry Bros., W. Brookes, J. Markwell, and others had been most liberal in their assistance towards the project.

The land was between the Pimpama and Coomera Rivers, known as McKay's paddock, and in full view of Moreton Bay. As to the company, 25 shares had been set aside for the working men, and they were all taken up, and the £12 10s. they had paid would be worth £50 in twelve months. All would work for rations only (at cost price) for two years, and at the end of the time everyone would have his share of the company's profits. About sixteen of the working members had amongst them upwards of £600.

About this time the Right Rev. Dr. Quinn, then Roman Catholic Bishop of Brisbane, received a communication from the Manchester Cotton Supply Association, intimating that the association had forwarded by the "Chatsworth" six cotton gins as a present to, and for distribution by, the promoter of the emigration from Ireland to Queensland. These gins were, on arrival, offered as prizes to small settlers who might be the producers of the best sample of cotton exhibited at the various agricultural shows throughout the colony.

The gins were hand gins, which could only turn out a very limited quantity of cotton per day, and, of course, would be useless for commercial purposes.

As the American War progressed, the cultivation of cotton expanded in Queensland; and soon the lands on the Brisbane, Bremer, Logan, Albert, Mary, Burnett Rivers, and at Booval, Bundamba, Redbank, Oxley, &c., were largely devoted to cotton.

About this time (1867) the Government bonus was reduced to £5 per bale of 300 lb. of ginned cotton of any variety. This was afterwards reduced to £2 10s., and finally ceased.

The only cotton ginners in the colony in 1867 were—Messrs. J. and G. Harris, Alexander and Armour, Frazer and Buckland, G. Raff and Co., O'Reilly, and Pritchard, at Brisbane; A. J. Boyd at Oxley; in Ipswich, Messrs. Cribb and Foote and the Ipswich Cotton Company; and J. and G. Harris at Harrisville.

The usual charges then were for freight, insurance, warehouse and dock expenses, commission, &c., a little over 2½d. per lb. for Uplands, and 3d. per lb. for Sea Island cotton.

It may be mentioned that the Booval (West Moreton) Cotton Company realised 2s. 6½d. per lb. for their cotton in 1867. Thirty bales were sent to England per "Centurion," and the gross return amounted to £1,450. The crop for that year was expected to reach 150 bales.

To show the rapid reduction in the price of cotton in England at the close of the American War, the writer, who had been growing, buying, and ginning and shipping cotton during the boom time, had some 25 bales, the last of the season's crop, ready for shipment. Messrs. J. and G. Harris, through whose agency all his cotton was shipped, strongly advised him to sell to them at 7¾d. per lb. (the prices previously obtained for Uplands and mixed cotton having been from 1s. 2d. to 10d. per lb., plus bonus). He preferred to ship the cotton at his own risk, and when the account sales arrived the highest price the shipment realised was 7d. per lb., leaving a balance on the wrong side.

As evidence of the eager demand for cotton by the British spinners, it may be recorded that at the writer's ginnery a considerable quantity of discoloured cotton had accumulated, and was used, as occasion required, as waste for engine-cleaning purposes. When the season closed, the whole of this cotton, stained red, blue, and green, was put through the gin, baled, and sent to England, plainly branded, "damaged cotton." When the account sales were received in Queensland, one halfpenny per lb. was deducted from the price, owing to the consignment having been apparently "slightly damaged by salt water." The best Uplands was then bringing 1s. per lb.; and this lot, which was looked upon in Queensland as waste, brought 11½d. per lb.

The price paid to the primary producer in those days for Uplands cotton—usually of a very mixed character—was 3d. per lb.; and, as the crop usually ran to from 1,000 to 1,500 lb. of seed cotton per acre, the farmers averaged about 1,200 lb., which at 3d. per lb. was worth £15. The seed was not considered of any value, and was allowed to rot in heaps or was dumped into the river. To-day the seed is worth from £4 to £6 per ton.

The decline in the production of cotton ending in 1886 was due to various causes, chief among which was the inability to compete with the excessively low prices consequent on the cessation of the Civil War in

America. Cotton-growing had by that time regained its premier position in the United States, and had again become its leading export article. Other factors were the inability to cope with the insect pests which were responsible for heavy losses that since have been avoided by reason of experience gained in treating crops in a manner preventive of loss from this source.

Planters, moreover, had neglected the improvement of the varieties of cotton; seed used from the gin, as was the usual custom, never proved satisfactory, hence the quality and yield fell off to an unremunerative position. The earlier trials of cotton, carried on in the absence of a local knowledge of suitable soil and climatic conditions, resulted in many instances in poor returns discomfiting to all interested.

The advance of sugar-growing was also a strong factor in the abandonment of cotton; the rich coastal areas, not so well adapted to the cotton plant, proved ideal for cane, requiring, as it does, more fertility and moisture than cotton, and led farmers to engage in the sugar business in lieu of the latter.

The large drop in price of Upland fibre from 1s. 3d. to about 4d. per lb. in Liverpool, with no reduction in cost or expedition in the transport of the article to England; the general uncertainty of the market oversea; the extension of manufacturing enterprises, drawing from the farmer the juvenile element on whom the grower largely depended for his picking staff; the allurements of the dairying business—were all contributing factors bringing about the cessation of cotton-growing.

Despite the fact that the cotton industry collapsed in so signal a manner, it had fulfilled its mission; inasmuch as the East and West Moreton districts had been proven to be good cotton-growing centres. The export of raw cotton at that period exceeded the export of wool—a feature not to be lost sight of, and one that in later times impressed the former planters with a desire to again carry on an industry that had accomplished so much to advance rural pursuits in as yet a new and untried country.

Anyone travelling in those early days through the districts of the Logan, Ipswich, Fassifern, and on the Darling Downs, would find clear evidence of prosperity, the sequence of the cotton crop. Many notable farmers who, with their descendants, rank amongst the most prosperous settlers in those regions, first learnt the principles of rural economy through their acquaintance with the cotton plant. One feature of this is to be seen in the closer settlement promoted through cotton-farming.

In those days 80 acres was considered a fair-sized holding; and if a grower had 20 to 40 acres under cotton, the residual product gave a sufficient return amply compensating for his season's work.

Hence it cannot be regarded in any sense that because growers abandoned this vocation the effort had been a failure. While prices in Liverpool were good, growers realised up to £50 per acre on a crop of cotton; prices receding made the return less profitable, hence the gradual diminution of the land under this crop.

Settlement, despite the absence of railways, spread into districts which, but for the high value of the cotton crop, would not have been settled for years; and the distance which farmers transported their fibre in those days over bad roads proved the mettle of the pioneers of farming in Queensland.

To-day, however, the acclimated varieties, known to thrive all over this State from Cape York to Point Danger, indicate that much has been learned on the question of cotton-growing. Perhaps the most important fact recognised is the wonderful drought-resisting capacity of the plant.

During the 1901 drought, when forest trees were dying, the cotton shrub thrived right through the ordeal. Hence it has been demonstrated that cotton can defy drought as no other crop can, and is, by reason of this valuable feature, eminently suited for the dry regions of our Western country.

Another important feature related to this pursuit is the fact that, in conjunction with sheep farming, it can aid the settlement in a much more effective way than is possible without this combination. Cotton being in most Western areas grown as a perennial, it can be depended on for forage for sheep in times of scarcity.

West of Rockhampton, settlers have been able to tide their sheep over a period of drought by turning them on to the cotton areas. The small sacrifice of cotton was more than compensated for in the saving of the sheep, and subsequently the cotton plant resumed its vigour.

A cotton farm is Nature's silo to the sheep farmer, and the certainty of relief in this way at a critical time will enable the farmer to keep more sheep to the acre than is now prudent in the absence of a reserve such as the cotton plant.

By the rotation of cotton, the pasture for sheep can be materially improved as herbage, such as is generally produced among cotton plants, invariably proves much superior pasture than the native grasses. As proving the wide range in which the cotton shrub can be grown, the results of records of the ginning at Ipswich this season show that cotton has been sent of excellent quality from such remote places as Inglewood and Miles, west of Brisbane; Capella and Gogango, west of Rockhampton; and Hughenden, west of Townsville; while at the recent Exhibition at Bowen Park superior types of long-stapled cotton of the arboreous and herbaceous varieties were exhibited by Mr. Joseph Campbell, of Cairns.

[TO BE CONTINUED.]

COST OF GROWING WHEAT IN WESTERN AUSTRALIA.

The President of the Perth Chamber of Commerce recently gave the following figures as the mean cost of growing wheat in Western Australia:—Ploughing, 6s. 6d. per acre; first cultivation, 2s. 6d.; second cultivation, 2s.; drilling and harrowings, 3s.; grading and pickling, 1s.; superphosphate, 4s.; seed wheat, 4s.; sowing and harvesting, 6s. 1d.; bags, 3s. 6d.; total, £1 12s. 7d. Taking the average yield of 11·56 bushels at 3s. per bushel, there is a gross return of 34s. 9d. per acre, leaving a return of 2s. 2d. per acre. But against this has to be put cartage to railway, and nothing is allowed for rent or interest.

TEACHING THE YOUNG IDEA—WHEAT COMPETITIONS IN WESTERN AUSTRALIAN SCHOOLS.

We take the following highly interesting article on the subject of "Wheat Competitions in Western Australian State Schools" from the "Town and Country Journal," Sydney, to which journal we are also indebted for the illustrations:—

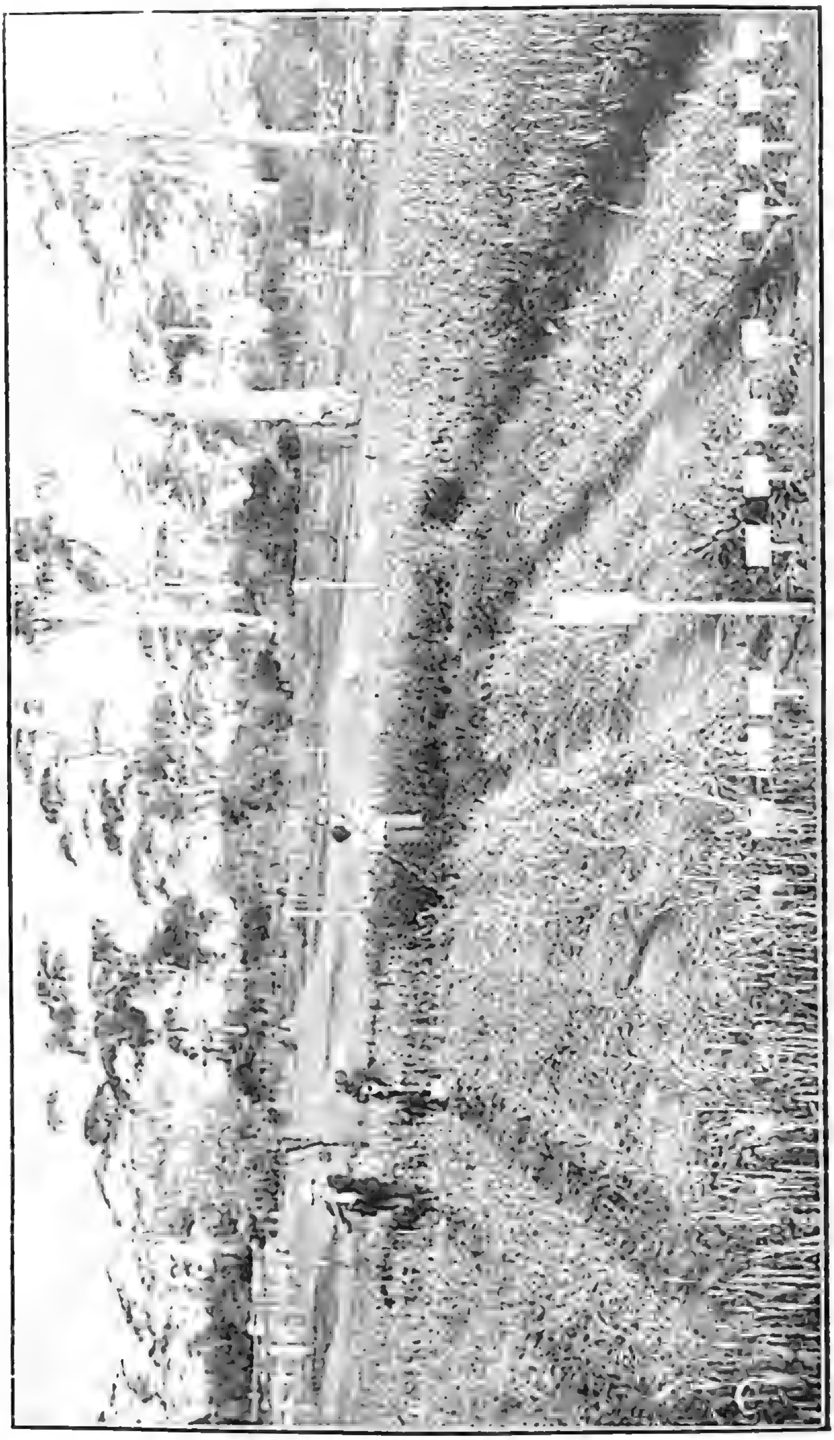

PLATE 1.—EXPERIMENT PLOTS AT THREE SPRINGS STATE SCHOOL (W.A.)

In New South Wales and other States of the Commonwealth, gardening now plays a most important part in school curriculum—flowers, vegetables, grasses, and cereals being cultivated, according to the location of the school and the suitability of the soil. The growing of vegetables is mostly undertaken by boys, as is also that of cereals, while girls and smaller children devote their attention to floriculture.

WORTHY OF IMITATION.

To Western Australia, however, belongs the honour of starting a competition in wheat growing in the schools that has been productive of good results, and is worthy of being imitated by schools in New South Wales and other States. Mention of the competition was made in the "Town and Country Journal" recently, and in connection with it Mr. Carmichael (N.S.W. Minister for Education), on his attention being drawn to it, spoke of it as being a good idea, and also said he would endeavour to introduce a similar competition here. Our illustrations depict some of the wheat plots grown in school gardens in Western Australia, which competed and won prizes in the competition.

THE COMPETITION.

Dr. Ellis, of Coolgardie, was the originator of the wheat-growing competition. He takes a very keen interest in nature study in the schools throughout the State. To the three most successful competitors in the wheat competition, Dr. Ellis presents prizes; a gold medal for the first, silver for the second, and bronze for the third.

The conditions of the competition are as follows:—Children may set any number of single grains of wheat of any variety or varieties that they choose, and grow them under any conditions whatever. There is absolutely no limitation at all in this respect. It is, however, necessary that an accurate account of the conditions under which the grains are grown shall be kept. When the wheat matures the best yield from any single grain is to be gathered by the teacher, who will count the total number of grains produced by the original single grain, place them in an envelope, certify to the accuracy of the conditions having been observed, and enclose the pupil's account of the conditions under which the original single grain of wheat produced the yield which the teacher has gathered and forwarded to Dr. Ellis. The child who can produce the most grains from the original single grain will receive the prize.

COMPETITION RESULTS.

The results of this competition for 1912 were as follows:—1. Norman Oliver, Jennapulin, Turvey wheat, 64 heads, 2,049 grains. 2. Jas. A. Scott, Kellerberrin, Bearded White, 38 heads, 1,264 grains. 3. Charles Clinch, Three Springs, Club or Square Head, 26 heads, 1,177 grains. 4. Lionel Brimson, Three Springs, Club or Square Head, 24 heads, 1,048 grains. 5. Wilfred Birch, Kellerberrin, Tardent's Blue, 49 heads, 1,010 grains. 6. Richard Brayster, Kellerberrin, Correll's No. 3, 27 heads, 978 grains. 7. Gilford Haines, Three Springs, Correll's No. 3, 22 heads, 925 grains. 8. Doris Garston, Moojebing, Lott's, heads, 726 grains. 9. Walter Gilsenan, Middle Swan, Baroota Wonder, 13 heads, 454 grains.

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The competition was taken up with much enthusiasm, and surprisingly good results were obtained. It is worthy of notice that late

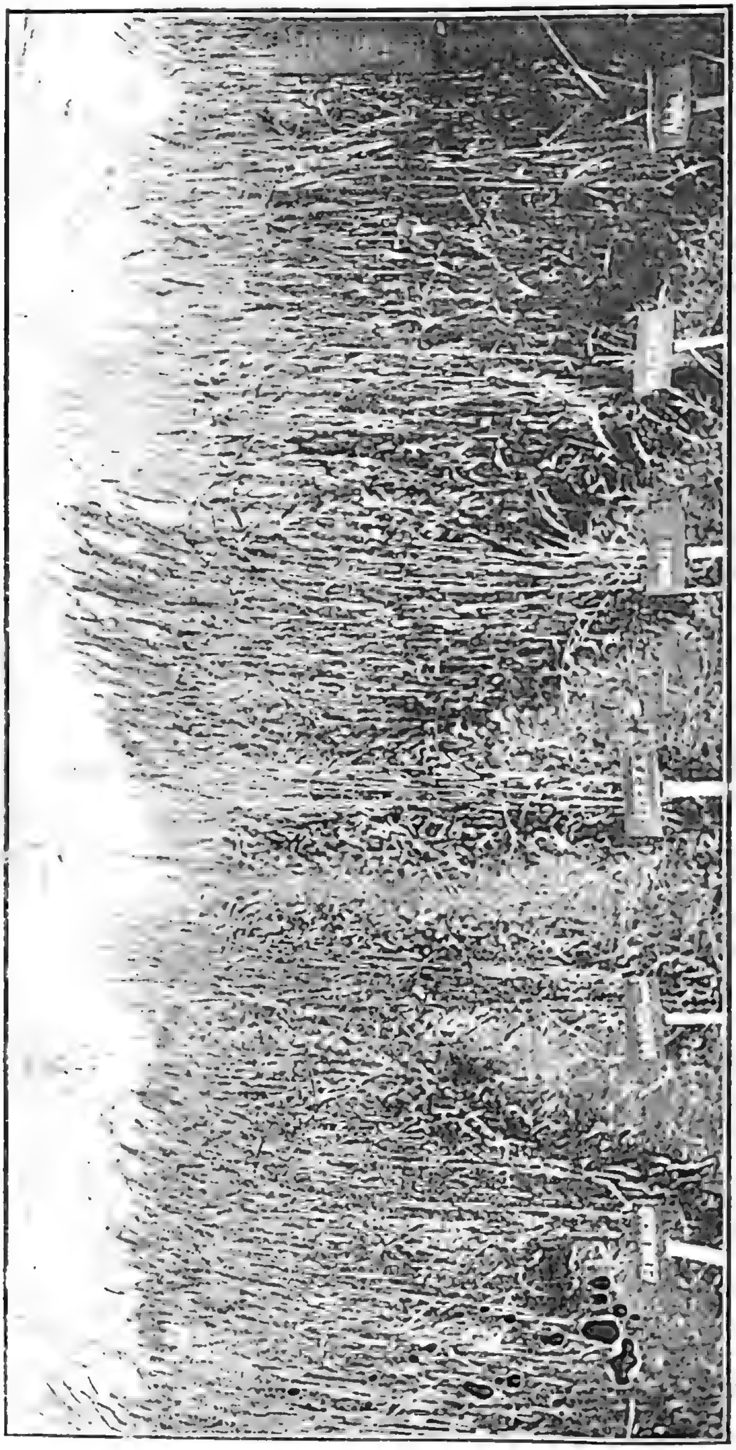

PLATE 2.—SOME OF THE VARIETIES OF WHEAT GROWN AT THREE SPRINGS SCHOOL.

varieties—viz., Turvey, Bearded White, Club Head, and Tardent's Blue—headed the lists.

MATERIALS SUPPLIED.

The Government of Western Australia assists in every way possible the gardening lessons given in the State schools. The Education Department supplies tools, fencing, and seeds of flowers, vegetables, and economic plants free of charge. Many of these are provided by the Agricultural Department, the officers of which are at all times ready to give valuable help. Trees, shrubs, &c., are supplied to schools through the Forestry Department, which distributes many thousands of young trees each year. The demand for these is so great that their stock is invariably exhausted before the end of the planting season. Chemical manures have been presented to schools by private firms, whose generous assistance in this respect is gratefully acknowledged. Nearly 300 schools received supplies during 1912. The Royal Agricultural Society has greatly assisted the department in drawing public attention to the nature of the work done by arranging each year for children's industries to be represented. This year prizes to the value of over £50 were offered for work done by school children. Business firms and private individuals have also done much by advice and help freely given to individual schools.

It is interesting to mention that Mr. G. L. Sutton (Commissioner of the Wheat Belt), who has given special assistance to the gardening movement in the State schools, has supplied seed for the purpose of carrying out an experiment showing the effect of treating seed wheat for smut. Many schools are carrying out the work, in order to demonstrate the efficiency of treating seed before sowing.

THE OBJECT IN VIEW.

The general idea is that the teachers who are carrying on this work shall endeavour to arouse interest in the culture of plants suitable to the locality. The pupils care for and observe the plants grown, and study the relations between plant life and the surroundings. In this way a very broad view of plant life is obtained, so that the chief features of plant life, growth, and culture may be noticed, while a mass of information on plant structure, growth, weather, soil, water supply, and the operations of agriculture is gradually gathered by the pupils themselves.

It is considered that such a course will lead up to the more definite and scientific studies which find a place in the curricula of the secondary schools, colleges, technical schools, and agricultural or farm schools. School gardening, therefore, supplies a link between the informal nature study of the lower classes and the studies in the sciences which are taken up after the child leaves the primary school.

DIVISION OF SUBJECTS.

The work may be divided up as follows:—

1. Ornamental flower gardening.

2. Tree-planting and ornamentation of school grounds and surroundings.

3. Vegetable growing, usually more or less experimental.

4. Experiments in the cultivation of economic plants, including rotations, cultivation methods, water conservation, seed selection, &c.

5. Special experiments in wheat-growing.

INCENTIVE TO OTHERS.

Undoubtedly the excellent results of the experiments in wheat culture in the schools of Western Australia should be a strong incentive to schools situated in wheat-growing districts in other States of the Commonwealth to go and do likewise.

[Especially in the Roma district, where wheat-growing is scientifically carried on at the Roma State Farm.—Ed. "Q.A.J."]

THE SUGAR CROP OF 1913.

The Government Statistician, Mr. Thornhill Weedon, has issued the following estimate of the results of the sugar crop for 1913, and comparative results of the 1912 season:—

Division, &c.	Area Crushed.	Cane Crushed.	Sugar at 94 N.T.
No. 1 District—	Acres.	Tons.	Tons.
Estimate, 1913	26,904	453,049	62,268
Actual, 1912	22,691	334,343	42,110
Increase, 1913	4,213	118,706	20,158
No. 2 District—			
Estimate, 1913	36,921	754,217	86,044
Actual, 1912	26,605	288,644	31,946
Increase, 1913	10,316	465,573	54,098
No. 3 District—			
Estimate, 1913	36,301	800,129	87,063
Actual, 1912	26,029	322,764	33,995
Increase, 1913	10,272	477,365	53,068
No. 4 District—			
Estimate, 1913	2,964	57,749	6,121
Actual, 1912	2,817	48,461	5,009
Increase, 1913	147	9,288	1,112
Whole State—			
Estimate, 1913	103,090	2,065,144	241,496
Actual, 1912	78,142	994,212	113,060
Increase, 1913	24,948	1,709,932	128,436

PUBLICATION RECEIVED.

We have received from the author (Mr. Henry Tardent) an essay on "The Life and Poetry of George Essex Evans, written for the Brisbane 1913 Eisteddfod." The story of the poet's life is given from his earliest youth, and will surprise many who have known him only through his literary abilities. The essayist quotes several appropriate fragments of some of the poets, and particularly a portion of what is well termed an approach to the perfection of the Virgilian Georgics, as relating to modern farming and dairying, in which the late poet was proficient—"The Song of the Australian Dairyman."

Mr. Tardent has certainly handled his subject in a most interesting manner, and we recommend all admirers of George Essex Evans's poetry and prose to read the essay.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF NOVEMBER, 1913.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lady Loch ...	Ayrshire	31 Aug., 1913	1,081	4·4	53·40	
Glen ...	Shorthorn... ...	27 Oct. ,,	1,059	4·2	49·82	
Bluebelle ...	Jersey	13 July ,,	692	4·7	36·62	
Butter ...	Shorthorn... ...	27 Sept. ,,	877	3·6	35·80	
Honeycombe	,, ...	7 June ,,	607	4·6	34·67	
Auntie ...	Ayrshire	15 July ,,	775	4·0	34·63	
Pauline ...	Shorthorn... ...	8 Oct. ,,	852	3·6	34·08	
Miss Bell ...	Jersey	25 Sept. ,,	717	4·2	33·73	
Bell ...	,, ...	7 July ,,	669	4·4	33·04	
Silver Nell ...	Shorthorn... ...	26 Sept. ,,	723	4·0	32·31	
Nellie II. ...	,, ...	5 June ,,	776	3·6	31·04	
Madame Melba	Holstein	10 Nov. ,,	863	3·2	30·44	
Burton's Lady	Shorthorn... ...	23 June ,,	692	3·8	29·30	
Lonesome ...	Ayrshire	26 Oct. ,,	729	3·6	29·16	
Miss Edition	Jersey	19 July ,,	652	4·0	29·13	
Lennie ...	Ayrshire	1 Sept. ,,	697	3·7	28·68	
Cocoatina ...	Jersey	19 May ,,	529	4·8	28·61	
Sweet Meadows	,, ...	20 Aug. ,,	409	5·8	26·97	
Gem	Shorthorn... ...	8 Aug. ,,	604	3·7	24·76	
Daisy ...	Holstein	14 Feb. ,,	745	3·0	24·52	
Miss Melba	,, ...	22 Jan. ,,	590	3·6	23·60	
Countess of Brunswick	Shorthorn... ...	22 July ,,	641	3·2	22·61	
Miss Morton	,, ...	14 Oct. ,,	666	3·0	21·92	
St. Elizabeth	Jersey	19 June ,,	332	5·8	21·89	
Lady Brunswick	Shorthorn ..	27 Oct. ,,	511	3·7	21·03	

RESULTS OF THE QUEENSLAND ENTRIES IN THE COMPETITIONS FOR BACON, BUTTER, AND CHEESE AT THE DAIRY SHOW, ISLINGTON, 21st and 24th OCTOBER, 1913.

BUTTER.

Although not successful in obtaining a first prize, Queensland was first in number of awards with 13; New South Wales was second with 11; Victoria third with 6; New Zealand fourth with 4; and South Australia fifth with 1.

The following were the points awarded:—

SALTED BUTTER.

—	Flavour, 55.	Texture, 20.	Colour, 10.	Salting, 10.	Packing, 5.	Total, 100.	Remarks.
Taieri, N.Z.	53	20	10	10	5	98	1st Prize
Dungog, N.S.W. ...	54	18	10	10	5	97	2nd Prize
Warwick	52	19	10	10	5	96	3rd Prize
Downs (Toowoomba) ...	50	18	10	10	5	93	H.C.
Downs (Clifton)	48	18	10	10	5	91	
Downs (Miles)	51	20	10	9	5	95	Reserve and V.H.C.
Pittsworth	50	16	10	10	5	91	
Warwick (Texas)... ...	50	16	10	10	5	91	
Maryborough (Kingaroy)	48	16	10	10	5	89	
Maryborough	48	16	9	10	3	86	
Maryborough (Biggenden)	50	16	8	10	4	88	
Marburg	50	16	10	10	5	91	
Esk	50	14	10	10	5	89	
Chinchilla	50	16	9	10	5	90	
Gayndah	48	17	9	10	4	88	
Nanango	48	16	9	10	5	88	
Logan and Albert ...	49	15	10	10	5	89	
Mount Bismarck	45	12	10	10	5	82	
Maleny	48	16	10	10	5	89	
Wide Bay	48	17	9	10	5	89	
Pommer Bros.	50	18	7	10	4	89	
Caboolture	48	14	10	10	5	87	
Silverwood (Terror's Creek)	45	15	9	10	4	83	
Silverwood (Gatton) ...	50	16	10	10	5	91	
Stanley River	45	18	9	9	5	86	
Grantham	52	17	10	10	5	94	V.H.C.
Boonah	48	17	10	10	5	90	
Laidley	50	18	10	10	5	93	H.C.
Booval	52	16	10	10	5	93	H.C.
Warwick (Allora) ...	50	16	10	10	5	91	

UNSALTED BUTTER.

—	Flavour, 60.	Texture, 25.	Colour, 10.	Packing, 5.	Total, 100.	Remarks.
Taieri (N.Z.)	57½	24½	10	5	97	1st Prize
Downs (Miles)	56½	23½	10	5	95	2nd ,,
Denman (N.S.W.)	55½	23	9½	5	93	3rd ,,
Downs (Toowoomba)	53½	22	8	5	89½	Reserve
Pittsworth	50	19½	8	4	81½	Com.
Nanango	50	19	8	5	82	,,
Pommer Bros.	52	20½	8½	4	85	,,
Grantham	50	19	8	5	82	,,
Warwick (Allora)	51½	19½	8½	4	83½	,,

CHEESE.

The condition of the whole of the Queensland cheese was spoilt through its being carried at too low a temperature, it having been stowed with the butter on the ship. The cheese being new, the low temperature prevented it maturing. The condition of the cheese was soft, those from the Warwick Factory being in very bad condition, they having been packed in crates with no ventilation, the battens being close together; the best cheese made would not carry under such conditions. One of the Warwick cheeses burst on the stand. It is imperative that a space be left between each batten of crate. Under different circumstances the cheese would have made a creditable exhibit, as they were well made and good flavoured.

The shape was good, but those from the Mount Tyson Factory were spoilt through being put in crates that were too small for them, thus leaving the batten marks on sides of cheese.

BACON.

The two exhibits of bacon from Queensland did not compare very favourably with the exhibits from the British Isles. The principal faults were in the butchering, suitability of side, flavour, and colour. The butchering was not clean, the cuts being jagged. Too much cheek left on. Too much left on the hocks. Oyster bone should be removed, leaving round bone of gammon exposed.

The following were the points awarded the sides which secured the 1st prize, and also the points secured by the exhibits from Queensland:—

BACON POINTS.

—	Highest Possible Points.	1st Prize. Herts. and Beds. Bacon Factory, Hitchin.	Darling Downs Co-operative Bacon Company.	J. C. Hutton, Brisbane.
Style and workmanship	15	14	10	5
Suitability of side, its general proportion	20	20	10	10
Firmness of fat	10	8	6	6
Fineness of rind	5	4	3	3
Colour	20	16	12	10
Flavour (which includes mildness)	30	25	20	18
TOTAL	100	87	61	52

Bacon experts at the show were of opinion that there will be a great future for Australian bacon.

HERD TESTING.

By E. GRAHAM, Dairy Expert.

Fortunately, a vast area of the land within this State is specially adapted to the purpose of dairy farming, and in many districts Nature has generously provided a fertile soil, frequently coated with suitable natural pasture or ever ready to respond to cultivation; while a bounteous supply of water and the other essentials that make for the successful development of the industry are to be found associated in a manner that betokens the possibility of the expansion of dairying to almost unlimited proportions, provided a fair measure of remuneration can be concurrently maintained.

Certainly our conditions are equally as favourable as those appertaining to the Southern States, but, on the other hand, it is on record that the average yield of milk and the quantity of butter fat produced by the milch cows utilised for the purpose of dairying in this State are comparatively lower than is the case in either New South Wales or Victoria. Some years ago I drew attention to this fact, and, with a view to assist in effecting an increase in the general productiveness of the dairy herd, the present system of herd testing was devised and sanctioned by the then Minister for Agriculture.

In framing the conditions necessary to be observed in connection with the performance of herd testing, an effort was made to simplify the operations as far as possible, and at the same time to preserve a reasonable accuracy in the results obtained.

The expense of the convenience to the dairymen was also made a consideration, and it is doubtful whether any other dairying community is able to secure a similar service to that offered here, in return for such a small sacrifice of labour or monetary outlay.

Outside the labour involved in weighing, sampling, and recording the milk yields of the individual cows, the work of herd testing is performed by an officer of this Department, practically free of any further cost to the dairyman concerned.

The forms necessary for recording the weekly and monthly milk yields of the dairy cows are supplied, and two explanatory leaflets are available for distribution to those interested in the work. One leaflet sets out the objects of herd testing, and the other conveys information as to the manner in which the samples of milk should be taken and the weights of milk recorded by those submitting their herds for the purpose of testing.

In view of the numerous communications received from divers Farmers' Progress Associations and Farmers' Unions seeking information relative to herd testing, it may not be out of place to give here the particulars contained in the leaflets above referred to, especially as they convey in detail the information that in reality forms the basis of the system under which herd testing is at present conducted within this State:—

THE OBJECT OF HERD TESTING.

The object of the dairy herd testing shall be to raise the standard of productiveness of the milch cows in the dairying districts of Queensland, and to give the dairymen such instruction in milk testing as shall enable them to test and record the milk yields of their cows and compute the butter produced.

The method adopted will be to systematically weigh and periodically test the milk yielded by individual cows, and on these results will be computed the amount of commercial butter produced during a given period.

When the earning capacity of each animal is arrived at, it will then be possible to eradicate from the dairy herds any unprofitable cows that may now be utilised for dairy purposes.

The supervision of the scheme and the testing of the herds will be controlled by the Department of Agriculture and Stock, and the actual testing of the milk yielded by the cows entered will be carried out by an officer appointed by that Department. No fee will be charged for such service.

The work shall be carried out in such manner that an approximation may be made of the value of every cow in the herd, calculated solely from a productive point of view, and with disregard to the breed of the animal submitted.

A dairy farmer desirous of having his herd of cows tested must make application, in writing, to the Under Secretary, Department of Agriculture and Stock, Brisbane; set out the number of cows in profit owned by him; give an assurance that he is willing to daily record the weights of milk drawn form the individual cows; and give such other minor assistance as may be found necessary to render the test results reliable and valuable.

It is the wish of the Department that the full benefits of the officer's services may be available to both the dairymen and the State, and that all milch cows proven unremunerative as butter-fat producers will be withdrawn from the herds, and replaced by more suitable and profitable animals. It is not expected that any faulty or unprofitable cows divulged through the efforts of our officer will be disposed of by an unscrupulous dairyman to his more guileless neighbour.

DIRECTIONS FOR TAKING SAMPLES FOR TESTING, ETC.

In taking the sample of milk the greatest care must be exercised, as upon this practically depends the value of testing.

As soon as the milk is drawn from the cows it should be weighed. A small spring balance is the most suitable for this. Immediately after weighing pour the milk from one bucket to another, and without delay take a small quantity with the ladle as supplied and pour into the sample bottle. The larger sized ladle is to be used for taking the morning sample, and the smaller sized ladle for taking the evening sample of milk.

The composite sample bottles as supplied contain a preservative, and must be kept securely corked after each sample is taken. Do not wash out the bottle before putting the milk in.

Write the name of the cow plainly in the column on the sheet supplied for that purpose, and attach the name of the animal to each sample bottle; then, as the cows are milked, mark the weight of milk below their names, and take the samples as above directed.

When the sample bottles are sufficiently full, they must be sent to the officer in charge of the testing in your district. The officer will furnish you with his address, and give such other information as you may require.

The weighing and recording of the weights of milk yielded by each animal shall be continued throughout the period of lactation. The taking of the composite samples will be done at intervals of about three months. The sample bottles will be periodically supplied by the testing officer.

As far as possible the testing officer will instruct dairy farmers in the practice of testing milk by the Babcock method.

In every instance the full complement of cows in profit in the herd must be entered by dairymen.

It is not intended that the testing officer will give results relative only to a few selected animals from each herd.

In a future issue of the "Agricultural Journal," I hope to furnish some of the actual results and other particulars connected with herd testing since the inception of the work in Queensland.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, NOVEMBER, 1913.

Five thousand two hundred and eighty-five eggs were laid during the month. The weather has been very warm, several days ranging from 100 deg. to 106.2 deg. Fahr. This has had a tendency to affect the laying, but, owing to the free use of water on the floors of the houses, we had no deaths from heat apoplexy. Green feed is very scarce, and, if rain does not come soon, matters will be serious. Broodies have been very numerous this month, as many as three out of one pen at the same time. Moritz Bros. win the monthly prize with 158 eggs. The following are the individual records:—

Competitors.	Breed.	Nov.	Total.
J. R. Wilson	White Leghorns ...	127	1,073
A. H. Padman, S.A.	Do.	142	1,062
Loloma Poultry Farm, N.S.W.	Do.	146	1,031
Moritz Bros., S.A.	Do.	158	1,028
T. Fanning	Do. (No. 2)	137	1,026
O.K. Poultry Farm	Do.	129	1,025
Range Poultry Farm	Do.	138	997
T. D. England	Do.	128	970
E. A. Smith	Do. (No. 2)	136	966
R. Burns	Black Orpingtons (No. 2)	131	949
J. F. Coates	White Leghorns ..	132	945
F. McCauley	Do.	110	944
S. E. Sharpe	Do.	116	943
H. Tappenden	Do.	136	937
R. Burns	Black Orpingtons (No. 1)	137	934
J. Zahl	White Leghorns ...	128	927
Jas. McKay	Do.	127	920
A. T. Coomber	Do.	141	918
Cowan Bros., N.S.W.	Do.	128	917
Doyle Bros., N.S.W.	Do.	136	909
Mrs. Munro	Do.	137	900
W. D. Bradburne, N.S.W.	Do.	142	896
E. A. Smith	Do. (No. 1)	142	893
Mrs. Sprengel, N.S.W.	Do.	123	885
Yangarella Poultry Farm	Do.	136	877
H. Hammill, N.S.W.	Do.	128	873
A. F. Camkin, N.S.W.	Do.	146	868
R. Jobling, N.S.W.	Do.	123	859
D. Grant	Do.	123	854
J. Archibald, N.S.W.	Do.	141	835
J. Gosley	Do.	110	826
T. Fanning	Do. (No. 1)	131	820
C. Leach, N.S.W....	Do.	134	818
J. Murchie	Brown Leghorns ...	140	815
Mrs. Craig	White Leghorns ...	141	808
A. Schbrowski	Brown Leghorns ...	114	807
T. Stephens	White Leghorns ...	113	789
Mrs. Bieber	Brown Leghorns ...	137	758
J. Anderson	Red Sussex	114	757
A. C. Collis, N.S.W.	White Leghorns ...	144	754
Totals	...	5,285	36,113

State Farms.

As might be expected from the climatic conditions of the past month—abnormal heat and absence of rain combined with serious bush fires—the reports from the farming districts have not been encouraging; and the State Farms have naturally shared in the general depletion of crops and unfavourable conditions for preparation and seeding of the land.

Usually, the Northern districts are more favoured than the Central or Southern coast lands during dry seasons, but towards the latter end of last year the North has had its undue share of trouble. From the

KAMERUNGA STATE NURSERY.

the manager reports that the last six months—from 1st June to 30th November—show a record drought so far as the Kamerunga district is concerned, the total rainfall for that period being only 2·75 in., made up of only a few points at a time, which, in the Northern coastal district, is looked upon as a very severe drought. Consequently, the July and August rains having failed, no spring planting of sorghums, buckwheat, cowpeas, &c., for seed could be done. Arrowroot, yams, and ginger were planted after a slight shower in October; but the gingers were not able to hold their own against the weather conditions. Many legume crops were practically annihilated, despite all efforts for their preservation. The bean fly appears to have been very destructive. The coffee-trees flowered and the young fruit set; but the manager feared that, owing to the dry season, the beans would be small, as he always found this to be the case when there was no rain to swell the young fruit.

KAIRI.

In common with all rural districts, the Kairi State Farm has suffered for want of rain. Amongst the grasses none have withstood the dry conditions so well as the Rhodes Grass. Clovers, both in the field and observation patches, completely disappeared; but the manager has every reason to expect that they will put forth a fresh and vigorous growth when the wet weather sets in again. So short has the farm been of grass that it became necessary to feed only a few special beasts, and instead of 150 head it has only been possible to keep up a herd of 100. Mangolds and sugar beets appear to have done well, notwithstanding the dry conditions; the former weighing up to 13 lb., and the latter to 7 lb. each. These are not at all specially large samples; but when one realises that approximately 9,000 of them can be grown on an acre, it gives some idea of the tonnage it is possible to harvest from a given area. The manager also states that they stand excessive wet and any frost they are likely to get in Queensland. If sown in January or February, they provide just the feed wanted during the constantly recurring dry spring months. Cow cane has also proved a valuable roughage. Carrots also have come through the dry weather so well that it is considered they would be a valuable addition to our fodder crops, suitable for growing for feeding during the dry spring or severe winter months.

WARREN STATE FARM.

Reporting on the position of affairs at Warren, the manager states that the farm has suffered somewhat as has been the case with the rural industries of the State generally, drought conditions having prevailed during the past few months, withering up all the native grasses. Here, the Rhodes Grass again shows its value in a dry season, having kept its colour and growing fairly in spite of the weather, the severity of which may be gauged by the fact that since last June, and up to the middle of December, the total rainfall only amounted to 1·18 in. Fortunately, there are 722 acres in Rhodes Grass on the farm, growing well on poor box country. Although the land has been ready for some time for other crops, it has been impossible to plant any summer crops. Some idea of the state of the land may be formed when we are told that the wheels of the plough had to be weighted down to enable the land to be ploughed to a depth of only 6 in. The fruit trees are described as looking well, but bearing very little fruit. The grapes, however, were bearing beyond expectations. Forty acres of lucerne have struggled against the dry season fairly well, and a small crop was taken off on 1st December.

The stock are reported as doing well, although the great heat was very trying to the pigs, who suffered severely.

The manager says, in conclusion, that a large quantity of hay and silage is on hand, and, although a good fall of rain would be welcome, there is enough fodder to keep all the stock in good order for another six months without any rain. Advantage has been taken of the dry weather to destroy prickly pear.

Since this report was written, a fair amount of rain has fallen; and, if the late rains continue, Warren will soon recover from the effects of the drought, especially as the Rhodes Grass has held its own so well; 70 points of rain were recorded on 15th December, but this did more harm than good, as it caked the surface of the land and only germinated some weed seeds.

DESTRUCTION OF DODDER IN LUCERNE.

An Adelaide paper states that careful experiments made on lucerne fields invaded by dodder show that dodder can be destroyed by strong applications of 800 lb. of nitrate of soda to the acre. The fertilising action of the chemical makes sodium nitrate more advantageous than ferrous sulphate and other caustic salts, which are somewhat dangerous to vegetation. Further, that lucerne and other leguminous forage plants subject to dodder are benefited by the fertilising action of the nitrate, notwithstanding the faculty they possess of absorbing atmospheric nitrogen by their root nodules.

The Orchard.

IS THE TOMATO A FRUIT?

The question whether a tomato is a fruit or vegetable is the subject of correspondence in one of the English agricultural papers. One of the professors of the University of Leeds settles it by saying that the tomato is a true fruit, for the reason that it is the product of the ovary, endocarp, and seeds after fertilisation. He also says the apple is not botanically a true fruit, though the tomato certainly is.—"Exchange."

Mr. F. M. Bailey, Colonial Botanist, says that, commercially, the tomato is a vegetable, but botanically it is a fruit.

ONE CAUSE OF THE FAILURE OF TOMATOES TO SET FRUIT.

The attention of the State Commission has been called by various truck gardeners in and around Sacramento to the failure of tomato vines to set fruit after a large number of blossoms had formed. The vines were thrifty and blossomed well. The flowers would hang on the vines for a certain period of time, then fall off, leaving part of the peduncle attached to the stem.

Specimens were sent to Mr. H. S. Fawcett, then plant pathologist of the State Commission, who determined the fungus as a species of *Macrosporium*, possibly that species known to cause the late blight of potatoes and the fruit spot of tomatoes. The writer placed several stems and blossoms of an infested tomato plant in a moist chamber for several weeks, and, on examination, thousands of spores of this fungus were obtained.

A grower used 10 lb. of precipitated sulphur to 100 gallons of water on his tomato vines which had hitherto failed to set fruit, and was rewarded by a fair crop of tomatoes. Mr. H. S. Fawcett advised the use of Bordeaux mixture in an experimental way.—"The Monthly Bulletin" of State Commission of Horticulture, California.

CURING LEMONS.

On this subject, Mr. G. Cushway, Sandgate, writes:—

"I have just read the account by Mr. C. Ross, our Instructor in Fruit Culture, on the curing of lemons, and, seeing he has mentioned the orchard at Helidon that I planted and cultivated so successfully for fourteen years, a few hints as to the management of the above may not be out of place, and, indeed, may be of benefit to many lemon-growers. Regarding the curing of lemons, I always cut them when about 2½ in.

in diameter, even if they were as green as grass. I then placed them in kerosene tins as carefully as if they were eggs, for a bruised lemon is a spoiled lemon; the slightest abrasion of the skin affords an entrance for the spores of blue mould. Handle them carefully, and the loss will be almost *nil.*

"When I had filled the tins, I took them over to the house and gently placed them in trays holding one layer. The trays were made of the ordinary fruit case split in two. I then stacked them on the veranda for a few days to sweat or put them straight away, as was most convenient, in the cellar. My cellar was dug under the house, about 6 ft. deep, and fitted up with saplings as shelves to place the trays upon; and without any further attention they cured a beautiful colour with a skin like a piece of kid and full of juice. Should the market not be good enough at the time, I simply kept them until it improved, and could do so from three to four months. I sent them to market in new cases, stencilled with name, &c., and the prices were always satisfactory. To produce good fruit that is always marketable, the trees need a little care and attention. We cyanided such trees as needed it every year to keep the fruit perfectly clean, for my experience is that a lemon that needs brushing is not a good keeper, and I may say that a dirty tree cannot produce clean, good keeping fruit.

"I fertilised every year, and the best fertiliser was found to be meatworks manure, with sulphate of potash added to make a complete manure. In cutting lemons, I always cut the fruit with a long stalk to the first joint, and found that the new growth invariably produced fruit. The length of stalk was cut off before placing the lemons in the tin. I may say there is practically no loss of fruit either from blue mould or fruit fly, the latter being beaten by cutting before the lemon ripens.

"Mr. Ross says the trees were perfect in shape, very healthy, quite clean, and carrying heavy crops of fruit. They had been pruned to a flat top 8 to 10 ft. high, with a spread of branches 25 to 30 ft. in diameter, and well furnished with fruiting wood from the top to within 1 ft. of the ground."

[We are very pleased to publish Mr. Cushway's letter, corroborating as it does all that Mr. Ross stated in his paper on lemon-curing in the December issue of the Journal.—Ed. "Q.A.J."]

THE RUTHERGLEN FLY.

(RHYPSROCHROMUS SP.)

This pest has again made its appearance in the Stanthorpe orchards, and the following notes by Chas. Ross, F.R.H.S., Instructor in Fruit Culture to the Department of Agriculture, will be found acceptable.

The fly is very destructive to potatoes and other ground crops, and preventive treatment should be applied upon such crops before the tree fruits are ripening. Concerted action should be taken on its first appearance. It attacks cherries, peaches, plums, apricots, and grapes, which become literally covered with the tiny bugs, introducing their beaks into the fruit, thereby sucking out the juices, causing the latter to shrivel and dry up. Peaches especially become quite leathery in texture.

Many preventives have been tried, with more or less good effect; but the best of all, so far as at present is known, is a mixture of half benzole and soft water. The wash must be continually stirred whilst it is being applied through the finest of nozzles, so as to cause a mist spray. Although expensive, it seems to be the only thing to instantly kill the insect without injuring the fruit.

Quibell's mixture has been used with good effect, but it leaves a tar flavour on the fruit; and it should be applied to ground crops and wherever the insect is found in the egg or larval stage.

The insect is apparently immune to all other strong solutions that have been tried in Victoria.

The following recommendations, however, should be persistently put into active operation, viz.:—

(1) Suppress all weed growth, and cart away or bury all rubbish during the first four months of vegetative activity in the trees. The most important thing is to destroy the eggs and larvæ.

(2) Whilst in the larval stage a large proportion can be destroyed by the application to the soil of 1 oz. of sulphate of iron diluted in 1 gallon of water.

(3) Gas lime and acetylene gas refuse have also been found useful when dug into the ground.

(4) When first observed on weeds or ground crops, either destroy the host plants or spray with some sticky or slimy solution that will impede their movements if it does not kill them.

A POSSIBLE MARKET FOR ROSELLAS.

From almost the earliest days of farm settlement in Queensland, the Rosella has been grown for sale, and has ever since found a market for limited quantities for the purpose of jam-making. As the bark contains a quantity of excellent fibre, it was expected that this portion of the plant would also be largely utilised, but, as in the case of all bast fibres demanding large quantities of water for retting, nothing was ever attempted in the way of producing Rosella fibre. Lately, a communication was received by the Department of Agriculture from a Southern gentleman, who has come to Queensland to point out to farmers the great value of the Rosella if grown on a large scale, and to advocate an extension of the cultivation of the plant, "now that," as he says, "a certain and profitable price is to be obtained."

He proposes to establish depôts in Brisbane and other coastal towns in the North, when a reasonable quantity of this fruit may be obtained, and permanent centres for handling and treatment of the crop. He says that he is prepared to offer 2d. per lb. for fresh fruit delivered at the factory in Brisbane, which price will be the basis of contracts in other places where receiving depôts will be established. He trusts that farmers will realise that in the Rosella, at the price set down, they have a crop which will give a profit "eclipsing many which growers now handle."

It is estimated, on the basis of returns possible to get in other countries (and there is no reason to think that our yield would be any less), that from 4,000 to 7,000 lb. per acre of fresh Rosella can be gathered. Even supposing this estimate to be much exaggerated, he holds that there is still a sound margin of profit in it.

It is claimed that in some of the American States this fruit will give the grower from £25 per acre upwards, and prospective growers are assured by this gentleman that, if the article is forthcoming in sufficient quantity, there need be no fear of a glut, as the demand is practically such as to allay any fear on the score of over-production.

Buying centres, in the event of the scheme being carried out, will probably be established at Bowen and Cairns, or any places where inducement offers of a supply of fruit, in addition to Brisbane.

We have no information on the subject beyond what is here given, but we may point out that the Rosella plant will yield in the season from 2½ to 4 lb. of fruit. The seed is set in rows from 5 to 6 ft. apart, and 4 ft. apart in the rows. If planted 4 x 5, there will be 2,178 plants to the acre, which, at an estimate of 2 lb. of fruit per plant, would yield 4,356 lb. The value of this at 2d. per lb. would be £36 6s. If the maximum of 7,000 lb. of fruit per acre, as mentioned by the proposer, were reached, the value per acre would be £58 6s. 8d. It must, however, be remembered that each fruit must be cut off separately, and sent to the depôt fresh and free from stalk. Whether the labour conditions in this State would admit of the cultivation, harvesting, and marketing the crop, to ensure so large a profit, is a matter which would only be settled by experience. If the result of experiments should show that it can be done, then farmers will have another and a very profitable string to their bow, even if it should take 50 per cent. of the value of the crop to harvest and market it. Meanwhile, we can neither advocate nor deprecate the scheme until further definite information reaches us.

SWEET POTATOES IN AN ORCHARD.

A North Coast orchardist, who is going in largely for citrus fruit-growing, having planted a considerable area on which sweet potatoes had been growing, but had not been dug, is anxious to get rid of them; but, although he has mowed down the vines and ploughed and harrowed the ground several times, still the vines persist in growing, and naturally so. Only continuous work will get rid of them. The matter having been referred to Mr. C. Ross, Instructor in Fruit Culture, that gentleman says:—

"Some orchardists would be glad to have a dense mass of sweet potato vines all ready to plough under for providing humus—the very substance that most fruit lands are short of. Why is it desired to grow cowpea when a fine green crop is now available? If nitrogen is required, then use a nitrogenous fertiliser in conjunction.

"Do not adopt such an ill-advised method of getting rid of the crop by applying an arsenical mixture in any form.

"Your object should be to bring every portion of latent plant food into a soluble condition, to be readily utilised by the trees, and not to poison what food is already there. The arsenical particles may never leach out of the subsoil, and there are already too many deleterious substances in some subsoils needing correction without adding to the trouble. To mention a few only, acidity is caused by bad drainage, copper, antimony, chlorinated magnesia, salts of iron, and other minerals, common salt, &c.

"To succeed with either a small or large orchard, continuous and thorough surface cultivation is absolutely necessary from the start. A perfect soil mulch, 3 in. deep, should be kept up all the year round, and, if this operation is performed in a proper, workmanlike manner, as it ought to be, neither a weed or sweet potato can exist."

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

Date.	January.		February.		March.		April.	
	Rises.	Sets.	Rises.	Sets	Rises.	Sets.	Rises.	Sets.
1	4·56	6·46	5·21	6·42	5·41	6·20	5·57	5·47
2	4·57	6·46	5·21	6·42	5·41	6·19	5·58	5·46
3	4·58	6·46	5·22	6·41	5·42	6·18	5·58	5·45
4	4·59	6·46	5·23	6·41	5·42	6·17	5·59	5·43
5	4·59	6·46	5·24	6·40	5·43	6·16	5·59	5·42
6	5·0	6·47	5·24	6·39	5·44	6·15	6·0	5·41
7	5·1	6·47	5·25	6·39	5·44	6·14	6 0	5·40
8	5·1	6·47	5·26	6·38	5·45	6·13	6·1	5·39
9	5·2	6·47	5·27	6·37	5·45	6·12	6·1	5·38
10	5·3	6·47	5 28	6·37	5·46	6·11	6·2	5·37
11	5·4	6·47	5·28	6·36	5·46	6·10	6·2	5·36
12	5 4	6·47	5·29	6·35	5·47	6·9	6·3	5·35
13	5·5	6·47	5·30	6·35	5·47	6·8	6·4	5·34
14	5·6	6·47	5·31	6·34	5·48	6·7	6·4	5·33
15	5·7	6·47	5·31	6·33	5·49	6·6	6·5	5·31
16	5 8	6·47	5·32	6·32	5·49	6·4	6 5	5·30
17	5·9	6·47	5·33	6·31	5·50	6·3	6·6	5·29
18	5·9	6·47	5·33	6·30	5·50	6·2	6·6	5·29
19	5·10	6 47	5·34	6·30	5·51	6·1	6·7	5·28
20	5·11	6.47	5·35	6·29	5·51	6·0	6·7	5·27
21	5·12	6·46	5·35	6·28	5·52	5·59	6·8	5·26
22	5·13	6·46	5·36	6·27	5·52	5·58	6·8	5 25
23	5·13	6·46	5·37	6·26	5·53	5·57	6·9	5·24
24	5·14	6·45	5 37	6·25	5·53	5·56	6·9	5·23
25	5·15	6 45	5·38	6·24	5·54	5·54	6·10	5·22
26	5·16	6·45	5·39	6·23	5 54	5 53	6·10	5·21
27	5·16	6 44	5·39	6·22	5·55	5·52	6·11	5·20
28	5·17	6·44	5·40	6·21	5·55	5·51	6·11	5·19
29	5·18	6·43	...	...	5·56	5·50	6·12	5·18
30	5·19	6·43	...	...	5·56	5·49	6·12	5·18
31	5·20	6·43	...	...	5·57	5·48	...	...

PHASES OF THE MOON.

			H.	M.	
4 Jan.	☾	First Quarter	11	9	p.m.
12 ,,	○	Full Moon	3	9	,,
19 ,,	☽	Last Quarter	10	30	a.m.
26 ,,	●	New Moon	4	34	p.m.
3 Feb.	☾	First Quarter	8	33	p.m.
11 ,,	○	Full Moon	3	35	a.m.
17 ,,	☽	Last Quarter	7	23	p.m.
25 ,,	●	New Moon	10	2	a.m.
5 Mar.	☾	First Quarter	3	3	p.m.
12 ,,	○	Full Moon	2	18	,,
19 ,,	☽	Last Quarter	5	39	a.m.
27 ,,	●	New Moon	4	9	a.m.
4 Apr.	☾	First Quarter	5	41	a.m.
10 ,,	○	Full Moon	11	28	p.m.
17 ,,	☽	Last Quarter	5	52	,,
25 ,,	●	New Moon	9	22	,,

Horticulture.

FRIENDS OF THE GARDENER.

Very few practical gardeners are fully acquainted with the injurious and beneficent insects and larger animals which abound in all cultivated plots, and particularly in the flower and vegetable garden. For how often do we hear, "Oh! there's a spider; kill it!" or it may be a toad or a centipede or a bi-spotted coccinella or adalia (ladybird) or a lace-wing fly or a lizard. None of these should ever be killed by the gardener, as they are absolutely harmless to all plants, but deadly enemies of caterpillars, slugs, beetles, aphides, wire-worms, &c. One of the most valuable insects for the destruction of caterpillars, and particularly of the cabbage moth, is the ichneumon fly, which, if magnified, bears a remarkable resemblance to a wasp or bee. Some varieties of this fly deposit their eggs in the caterpillars or the pupæ. The resulting maggots feed on the soft parts of them until the caterpillar or chrysalis is about to undergo a change; but the chrysalides cannot effect this owing to the injuries received from the maggots, and they consequently die. The larvæ of the lace-wing fly are most voracious. They devour vast numbers of aphides, including American Blight, in a very short time, and will even attack large caterpillars. As to spiders, although their webs and nests give an untidy appearance to bushhouses, greenhouses, &c., they should never be destroyed, as they live on all kinds of moths, flies, wasps, and mosquitoes. The tarantula is equally valuable. Our Australian tarantula is a kind of leaping spider which pounces on its prey, as does also the "trapdoor spider." Our centipedes are—some of them—very large, and a nip from their powerful forceps is not only very painful but often more dangerous than the bite of a black snake. Such creatures, although feeding on insects, caterpillars, worms, slugs, &c., are not desirable tenants of the garden. A case occurred in the Executive Gardens, Brisbane, of a gardener being bitten on the little finger by one of these about 5 in. long, and the wound did not heal for twelve months. But there are centipedes and centipedes. The slim red centipede, whose body is not much thicker than a thread, is harmless, and does great execution amongst the insects.

The lizards, which frequent gardens in numbers, are very active assistants in destroying beetles and many insects injurious to garden plants, and they are especially fond of white ants when they can find a broken tunnel exposing these pests to their attacks.

As for toads, no bushhouse should be without a few toads. They are ugly, certainly, but perfectly harmless, and will touch nothing but living food. So quick are they in seizing their prey, such as cockroaches, that the eye can scarcely follow the motion of the tongue as it darts out. The toad neither bites, stings, nor ejects venom, and thus is even more harmless than the house fly. It is nocturnal in its habits, although it will sometimes in wet weather venture out to forage. As stated, the toad will only touch living food. If its favourite dish—a cockroach—

were to stand perfectly motionless before a toad, it would be safe from attack; but the instant it moved even a feeler it would be absorbed as if by magic. Toads dispose of enormous quantities of food. In twenty-four hours the amount they consume equals four times the stomach capacity—that is to say, that in the time mentioned the stomach is filled and emptied four times.

We have, in Queensland, two more good insect hunters—one, the brilliant-eyed, flat-tailed gecko, which often frequents rooms in a dwelling-house. It is a very pretty little reptile of the lizard order, and is perfectly harmless and even friendly. All night long the gecko hunts for moths and other insects. The other is the "mantis"—the so-called "praying mantis"—which is especially fond of blow flies. When it catches one, it holds it in its front feet and first eats out the fly's eyes. But the mantis itself is much esteemed as an article of food by the gecko. We once saw a praying mantis catching flies on the table. Unluckily, a gecko happened to be on the prowl just under the edge of the table, and as the mantis approached the edge the gecko caught sight of it, suddenly seized it by the middle, and that was the end of the poor mantis' hunting expedition.

Unfortunately, the gardener unwittingly destroys thousands of his insect friends as well as enemies by the use of poisonous sprays for the destruction of pests, and also by his ignorance of the beneficent ones, which he is not able to distinguish from those that are injurious.

As for our bird friends, ignorance of their value is really culpable, because their work, either for the benefit or the reverse to cultivators of the soil, is carried on to a large extent by daylight, and an intelligent observer would soon learn to distinguish between his friends and foes.

A knowledge of these things should be instilled into the pupils of the State Schools. They are taught the elements of agriculture. Why not then explain to them what birds and insects are aids to the farmer?

TANNING SKINS.

The Sydney "Town and Country" gives the following as a "lightning tanning process":—

The lightning or sulphuric acid process is the quickest method of tanning wallaby, rabbit, and other skins, and is a very simple one. Pour five or six quarts of boiling water over two quarts of bran, and then strain the infusion. Make an equal quantity of salt water, by adding to blood-warm water as much salt as will dissolve. Mix the bran and salt water, and to each gallon of the mixture (when no more than lukewarm) add an ounce of sulphuric acid (H_2SO_4). Immerse the skins in the liquor, stirring them occasionally till tanned, which will be in about twenty minutes. When tanned, rinse in clean water, and hang out in shady place to dry. Pull and stretch them well while drying. By sufficient pulling they can be made quite white. Dry skins should be soaked in warm water before tanning till they are quite soft, and all flesh and grease should be well cleansed from them.

Tropical Industries.

KAPOK.

Some interest appears again to be taken in the subject of the cultivation of kapok in Queensland. One or two inquirers have asked—

WHAT IS KAPOK?

Kapok is a floss produced in pods on a tall tree which may be seen in some gardens in North Queensland. The floss is extensively used

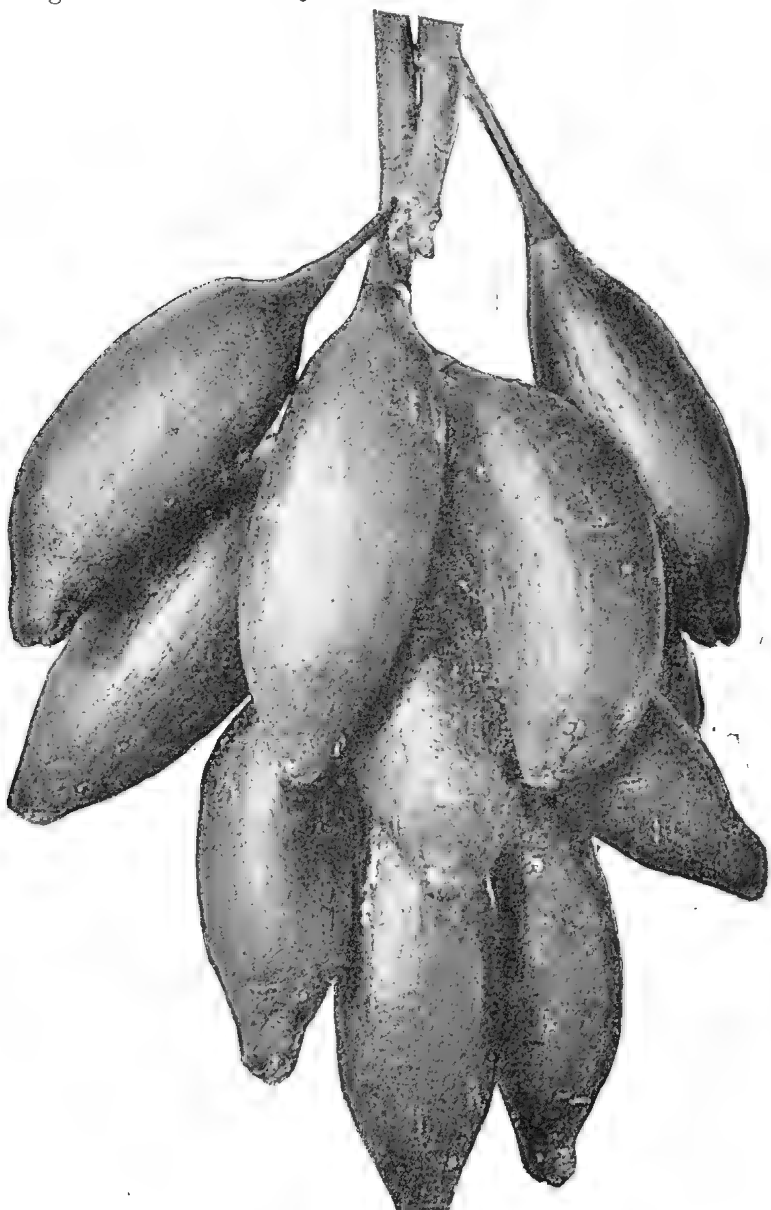

PLATE 3.—CLUSTER OF GREEN KAPOK PODS.

for filling pillows, cushions, mattresses, duvêts, and similar articles. In Java there are over 50 plantations where kapok is produced as an auxiliary crop. On some, however, it is the principal crop, and about 40,000 bales of the floss are exported annually to Holland, Australia, China, and America, Australia taking something like 8,000 bales of 80 lb. each. Of this quantity Queensland manufacturers take (according to the Government Statistician) over 5,000 bales, or 445,167 lb.; so that it will be seen that there is a local market for a considerable quantity of the product.

Another question is—

WILL IT PAY TO GROW KAPOK?

Mr. M. Saleeby, Chief of the Fibre Division, United States Department of Agriculture, Manila, in a bulletin (No. 26) on kapok, points out that the annual yield of clean kapok from a tree of normal growth and under 7 years of age may be placed at 350 or 400 pods. Trees between 7 and 10 years should average 600 pods or more. Reckoning that 230 pods produce 1 kilo (about ($2\frac{1}{5}$ lb.) of clean fibre, a hectare (about $2\frac{1}{4}$ acres) containing 280 trees ought to yield 95,000 to 110,000 pods, which, at the rate of 230 pods to 1 kilo ($2\frac{1}{4}$ lb.), will yield 410 to 480 kilos (922 lb. to 1,080 lb.) of clean kapok per year. From the 7th to the 10th year, a hectare ($2\frac{1}{2}$ acres) should produce about 640 kilos (about 1,440 lb.). The clean kapok averages from 55 to 65 per cent. of the weight of the seed. A tree which yields 3 kilos of clean kapok during the year yields also about 6 kilos of seeds. The value of kapok for the highest grades has gradually risen from 27 centavos ($13\frac{1}{2}$d.) in 1900 to about 80 centavos (3s. 4d.) in 1907; and in 1912 the value continued to advance, reaching its maximum of 90 centavos (3s. 9d.) per kilo of $2\frac{1}{5}$ lb. towards the latter part of the year.* This gradual rise in the value of kapok is accounted for by the continual increases in the uses made of it, which was in turn caused by a more general knowledge of its superior qualities and its suitability for several purposes heretofore unknown. The chief market is Amsterdam, Holland, which is a distributing centre for most of the European countries using the product, such as Great Britain, Germany, France, Belgium, and others. These countries are said to use, for the most part, the higher grades of kapok. Australasia and the United States come next to Holland as buyers of kapok, and these consume chiefly the medium and lower grades. Kapok, like other fibres, is usually sold under four grades, the difference in price between each two successive grades ranging from 9 to 13 centavos per kilo. The price of kapok imported into Queensland is from 8d. to 9d. per lb.

The fine, silky fibre is used for filling cushions, pillows, mattresses, &c., and, owing to its great elasticity, all these articles filled with it will, after pressure is taken away, resume their previous dimensions. In other words, kapok does not get matted with use, as is the case with all other filling materials.

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* These prices indicate a duty on exported kapok, of which we have no information. Kapok comes duty free into Australasia.

BY-PRODUCTS.

The most valuable product of the kapok tree is, of course, its floss. Next to this in value and importance is the seed, which has also become an article of trade; 20 per cent. of its total weight consists of the oil

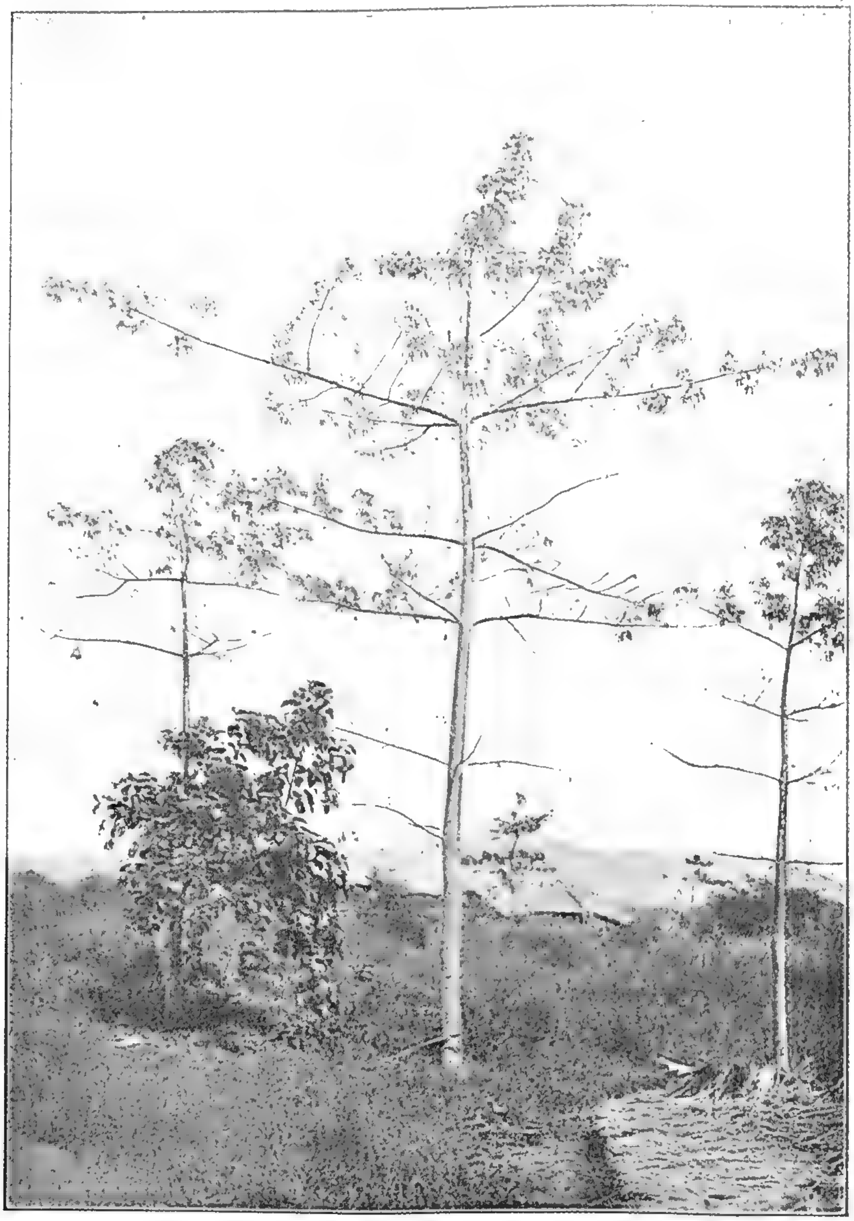


PLATE 4.—FIVE-YEAR-OLD KAPOK TREE AT LA CARLOTA EXPERIMENT STATION, OCCIDENTAL NEGROS.

content, and the value of the seed in Manila market is about 3½ centavos per kilo. On this basis a hectare of land planted to kapok under 7 years of age will yield 800 to 900 kilos of seed per year, valued at 28 to 31·50 pesos. From this it would appear that an acre of kapok carrying about 150 trees should yield a cash return, at the quoted Queensland wholesale price of 9d. per lb., of floss £19 16s., and of seed £3 3s. 1d., or £23 per acre.

At one time an obstacle in the way of production of kapok by white labour was the want of machinery to separate the seed from the floss;

PLATE 5.—ROW OF SIX-YEAR-OLD KAPOK TREES AT BATAAM.

but Mr. Saleeby, in his pamphlet, shows that this drawback has been eliminated, as suitable machines of large and medium capacities are now available.

The principal steps (he says) in the kapok industry which claim the attention of the prospective producer and upon which depends his ultimate success are:—First, the judicious selection of a location having a suitable soil and climatic conditions; second, the necessity of raising kapok on a large scale or in localities of sufficient propinquity; third, the adoption of the proper cultural methods by which kapok can be most conveniently and economically raised; and, fourth, the use of modern machinery for cleaning and baling the product, as well as the exercise of judicious methods in the handling of it prior to and after cleaning.

In conclusion, Mr. Saleeby says that "several communications have recently been received by the Bureau of Agriculture, Manila, from a number of manufacturers in the United States, who are desirous of handling the Philippine product, and who have quoted prices ranging from 65 to 90 centavos per kilo, laid down in New York or San Francisco. These facts, together with the facility of raising kapok in the Philippines and its freedom from any dangerous enemies or disease, should recommend to the attention of Philippine planters as well as Philippine buyers and exporters the advisability of building up this industry, and endeavouring to supply the larger part, at least, of the American and Australasian markets."

As far as Australia and New Guinea are concerned, the climate of North Queensland is eminently adapted to the cultivation of the tree, especially in the neighbourhood of Cooktown, where a few trees are found growing laden with pods and the ground is strewn with quantities of this valuable fibre, all going to waste. The same may be said of the country around Townsville, Rockhampton, and Gladstone. As for New Guinea, there are avenues of these quaint-looking trees at Rigo and other places, all over 7 years of age, and all in full bearing; yet nothing is done with the product in spite of cheap and abundant labour.

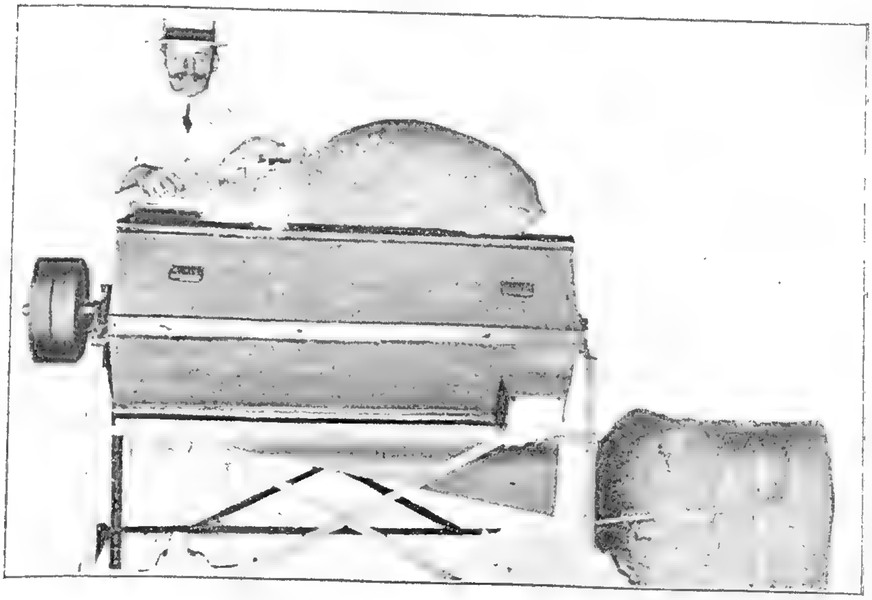
CLEANING MACHINES.

Mr. Saleeby gives the following information in his interesting pamphlet on machines regarding which he has any information of importance:—

1. *The Bley Machine,* invented by Mr. G. Bley, a prominent kapok planter of Java. This machine is supposed to be one of the best machines so far invented. It requires ½ to 1 horse power for its operation, and is claimed to clean about 217 kilos (over 500 lb.) of floss per hour. The machine obtained first prize at the Surabaya Fibre Congress and Exhibition, held in July, 1910.
2. *The Becker Machine,* invented by Messrs. Becker and Co., Surabaya, Java. This machine works on the general principle of the Bley machine, differing from the latter principally in having the cleaning chamber set perpendicularly instead of horizontally as in the Bley Machine. It is claimed that this machine cleans about 120 kilos (288 lb.) per hour.
3. *The Lienau Machine,* invented and manufactured by some English firm whose name could not be learned. This machine was imported into the Philippines by Mr. Felix Lienau, of Manila; hence the name given it here. It is built very much

on the same general plan as the Bley Machine, but is much smaller in size than the latter, and is not provided with a fan. It requires from ½ to 1 horse power for its operation, and will clean between 120 and 130 kilos per day of ten hours. Its simplicity of construction, the inexpensiveness of its operation, and its low cost (probably not exceeding 150 pesos (£30) without motor) would indicate that it can be operated to advantage on smaller plantations.

The illustrations are also taken from Mr. Saleeby's pamphlet on the Kapok Industry, No. 26, issued by the Bureau of Agriculture, Manila.



LIENAU KAPOK-CLEANING MACHINE. EXTERIOR

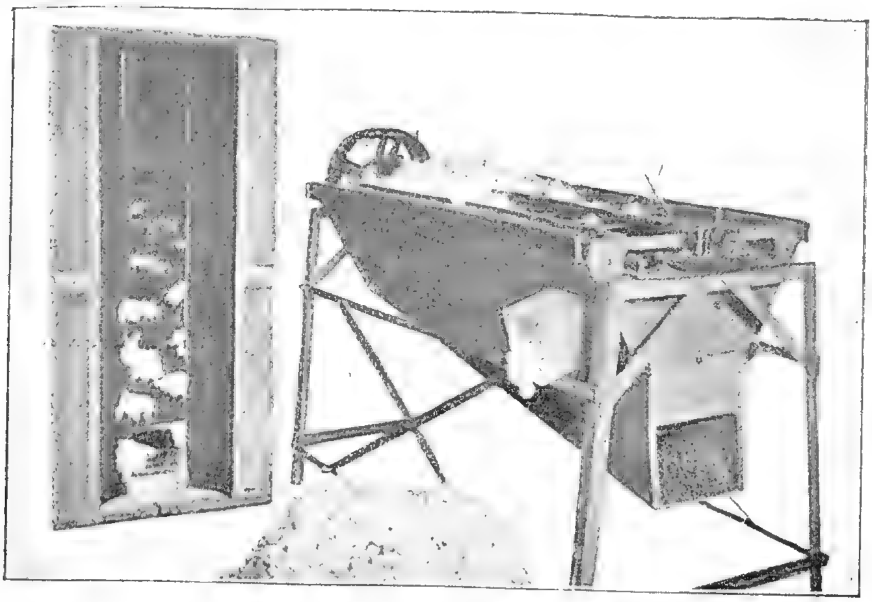


PLATE 6.—THE LIENAU KAPOK-CLEANING MACHINE. INTERIOR

IS ANOTHER RUBBER BOOM AHEAD?

A special correspondent of "Grenier's Rubber News" writes optimistically on the "Interesting Possibilities of the Near Future."

"It may sound," he says, "like the most ludicrous of paradoxes at a time when rubber depression almost defies description to say that we seem to be going full steam ahead for another boom. Paradox or not, it is a view which is held in certain quarters, and is a prospect which the born gambler would welcome. The fact is that just as, in April, 1910, when rubber was 12s. 6d. per lb. and people behind the scenes were talking of its going to 25s., the turn came and the slump has continued with a few breaks ever since, so now, when the wiseacres of Mincing Lane are prepared to talk of eighteen-penny rubber and general ruin, the upward movement may begin and have as long a run as the slump. Not being a prophet, I hesitate to say what I think may happen. But history has a knack of repeating itself, and if the boom of 1910 succeeded the slump of 1908 there is no reason why a boom in 1915 should not be the reaction from the depression of 1913. Of course it will be said the conditions are very different. To some extent the difference makes in favour of a new boom a year or eighteen months hence. The statistical position in 1908, due to American troubles, showed declining consumption, temporary though the decline was. The statistical position in 1913 shows an increasing consumption and declining visible stocks, notwithstanding vastly increased outputs. We have the extraordinary condition of things that rubber prices are falling or have fallen with the fall in the surplus amount available for consumption. Nothing could more forcibly illustrate the artificial character of the present situation than the fact that the world's stocks have gone down without prices going up. The idea of over-production meanwhile is the sheerest moonshine: every ounce of rubber brought forward has been taken up by the dealers, and it is worth repeating that no one pays even 1d. per lb. for an article he does not want. Of course the large quantities of plantation rubber coming forward rob the dealer and the manufacturer of any fear that supplies will fail. But supplies may yet fall short if prices continue so low that the bulk of the wild stuff from Africa and elsewhere is driven out of the market. Brazil and the plantations cannot meet the demand yet awhile unassisted, and if the shortage at present prices came suddenly there would be a panic and a boom before those who had been crushed out were able to resume operations. Hence the paradox may prove to be not a paradox at all, but a simple economic development.

"We are certainly passing through a remarkable time, and if they were not so pitiable we might almost be inclined to smile at the difficulties in which some of the leaders of the industry find themselves. There are as many views of what should be done to meet the crisis as there are people called upon to decide. When the boom was on, the great ones in the rubber industry thought themselves mighty fine fellows, and the world was inclined to regard them as heaven-sent leaders. But they did nothing to promote the huge profits which came to themselves and their companies, and, now that the wheel of Fortune has gone full round, they are convicted of having done nothing to stop its movement. . . .

Suggestions are floating about that, when the worst has been reached and many companies cannot go on as the result, the advocates of *laissez faire* will step in and acquire many excellent properties cheap. That would be Machiavellian finance with a vengeance! It would mean risking the solvency of some fine companies of the first class, in order to get possession of promising companies of the second class—which, after all, might not prove practicable. Of course there is much to be said for the maintenance of a free market, but it is reasonably contended that we have not got a free market now: the market is in the hands of half a dozen men as cute as any in the city of London. One of the humours of the situation is that certain well-known freetraders, who will not even listen to arguments in support of Imperial preference—to say nothing of protection—are among the most strenuous advocates of protective measures for the rubber industry in which they have big interests!"

WHAT IS REALLY WRONG WITH RUBBER?

We have frequent inquiries from subscribers, who have invested money in rubber shares in Malaya and Papua, as to the future prospects of the industry, a drop in price from 12s. 6d. per lb. in 1910 to 3s. 4d. and 3s. in 1913 giving some people cause to think that they have little hope of realising even Savings Bank interest on their venture. We have just received the latest "Grenier's Rubber News," which contains an article under the above caption. It reads as follows:—

"We gather from our own London correspondent and the home newspapers generally that all and sundry, from the smallest plantation shareholder to the rubber barons themselves, are busily engaged endeavouring to discover what is wrong with rubber. The influential Rubber Growers' Association, the membership of which includes a representative of practically every rubber company of any importance and almost, without exception, all the lights in the rubber world at home, has met and appointed a representative committee, which for weeks has met in secret conclave and apparently has not succeeded yet in locating any vital disease. The Growers' Association committee, moreover, will probably go on sitting for some months to come and finally issue a lengthy report which will get us little or no further than we already are. The fact of the matter is they have quite made up their minds at home that, having regard to the fallen price, there must be something radically wrong with rubber, and there is hardly a single individual to be found who has the really very obvious position as we find it to-day fairly diagnosed. This is due to the fact that most people bought rubber interests on the strength of a high value for the commodity, failing entirely to adequately allow for the inevitable ultimate fall to a proper commercial level.

"There has been no falling off in the demand for rubber, but as the supplies grow the consumers naturally are unwilling to pay for it at many hundreds per cent. beyond the production cost price. It is not a fall in consumption that has caused the value to decline, but actually the increased production and hence the competition amongst the producers themselves in the selling of their goods in the market. To-day the demand for and the supply of rubber is more evenly balanced than it has been for many years, and instead of the demand stimulating the supply it is now the supply that is encouraging the demand. In other words, the price for rubber that has ruled during recent years has made the use of it impossible in a thousand-and-and-one directions, which with the progress of time and the lower cost of rubber are now becoming consumptive mediums. Every farthing or cent. per lb. that rubber falls in cost to manufacturers makes its use practicable for some new and probably some very extensive purpose. Thus the only thing that is really wrong with rubber, from the point of view of the industry as distinct from the particular concern of the company shareholder, is that the cost price of rubber to the manufacturer has been too high. In time it must come down to a proper basis.

"Whoever heard of a commercial article, in which there was no limit to productive possibilities, permanently being marketed at 100 per cent. profit? and that is still roughly the profit per lb. on plantation rubber allowing for the obliteration of extravagances which are obviously included in 'all in' production costs. We have no hesitation in saying that, if rubber during the past three or four years had been just a normal commercial article producing the normal rate of profit, its 'all in' production costs would at this date be no more than 1s. sterling per lb. and probably less. The simple fact of the temporarily profitable state of the industry has naturally encouraged risky and costly experiments and very many extravagancies which the high profits on production allowed and permitted to be ignored. These costs may or may not have a permanent good effect on the industry. We are not here disposed to discuss whether or no they have or otherwise been justified. Our immediate contention is that rubber could have been produced much cheaper than it has during the past few years, and that the time will come when it will really be produced cheaper and on a more economic and business-like basis.

"Having, in passing, commented upon the costs in the East, it is fair to say they only form part of a generally extravagant policy which has been a more or less common association with the plantation rubber industry since the boom of 1910, and through the free supplies of cash which that boom provided. The scale of costs at home is quite as bad; probably worse! The financing of the plantation industry ever since the boom has been a highly profitable game—first on promotions, and since then the many pickings which were cleverly arranged for at the time when estates were at a premium and those who wanted them were prepared to agree to almost any terms. Those pickings provide annuities and unearned increment to fortunate individuals at the cost of production, and while there is still a substantial profit on rubber they will remain, or be modified only gradually as modification becomes more and more necessary with the narrowing of the margin between the cost of production and the market value of the commodity. It will likely take years to weed out these internal diseases, for company shareholders are still receiving very high dividends, and they will only begin to agitate about administrative costs when dividends become much diminished—that is, if they do so become. With rubber costing 1s.—it should cost no more—and selling at, say, 1s. 6d., possibly rather more, there should be no question about adequate dividend payments in the future. We use the word adequate advisedly, for the day of abnormal dividend payments has passed.

"We must look ahead to a reasonable return as given and expected on every normal commercial enterprise or industry. For the most part rubber is destined to provide substantial returns on the initial capital involved. The premiums paid for shares are no concern of the industry, nor have those premiums formed any part of the capital which has been sunk in the creation of the industry. Those who bought rubber interests at high costs simply paid cash profits to those who previously bought them low, and the rubber industry cannot be blamed for that. Those who are trying so hard to find out that there is something wrong with rubber had better carefully digest these several really elementary facts. They will discover that there is little else wrong with rubber or the matter with the plantation industry."

RUBBER PAVEMENTS.

For some time past there has been much talk of rubber being used for road paving, and the matter appears to be attracting attention of late in view of the low price ruling for the raw material, added to the contemplation of a great increase in the supply of rubber within the next few years.

At present there are in London three places where rubber flooring or pavements are to be found—viz., the courtyards of the Savoy and Claridge's Hotels, and the approach and exit of the Euston Railway Station. There can be no doubt that these pavements have admirably well served the purpose for which they were intended. Those at the two hotels, with the constant ebb and flow of vehicles of all descriptions, have stood the test of time. Originally of 2½ in. in thickness, the pavements, after a decade or more, have worn off in some places to half their original thickness. The paving at the Euston Station proves in a greater degree the wearing power of rubber. Over thirty years ago some of the rubber was laid under the arch of the station through which vehicles depart from the station, and, though worn out to 1½ in. in some places, the pavement is still serviceable and does not require immediate relaying.

We learn from papers to hand by last mail that a patented rubber preparation is now being laid on certain thoroughfares in London with a view to testing its suitability for the requirements of heavy traffic. We quite believe that a large quantity of rubber will be worked up in connection with this matter during the next few years, but the "Stock Exchange Gazette" remarks as follows:—"It is scarcely surprising, perhaps, that an attempt should have been made to suggest that this new use of rubber will exercise a far-reaching effect upon the planting industry, but while there are some germs of common sense in this contention there is a tendency to carry the argument much too far. In the first place, the class of rubber employable for road-making purposes is of the roughest kind; such, in fact, as is hardly saleable for other purposes, and is consequently obtainable at a very low figure—approximately, we believe, about 1s. 9d. per lb. if ordered in sufficiently large quantities; and in these circumstances it is not to be supposed that the Road Board will send their agents to the Mincing Lane auctions to bid for, say, fine plantation crêpe to be used in providing a surface for the thoroughfares of London. The real significance of the development now in progress is that, if it gains as much popularity as is expected, it will provide a market for rough grades of rubber, thereby producing a considerable revenue which at present does not exist in any shape or form. Every planting company has a good deal of rough stuff which is quite unsuited to Mincing Lane purposes, though it possesses a good many of the qualities of the finer material, and is, in addition, exceptionally durable. On this basis we attach a good deal of importance to the new road-making process, but we are far from believing that it will revitalise the rubber-growing industry, or that it will stimulate the price of the more expensive grades of latex."—"Grenier's Rubber News."

NEW CANE PLANTER.

The "Mackay Standard" describes a new cane planter, invented by Mr. W. Punzell. It consists of a box, made high in front, to hold the plants, and carried on two wheels, smaller but wider than the ordinary buggy wheel. The axle is made so that the box is fairly high from the ground, and attached to the axle is another V-shaped axle, on the apex of which is hung an ordinary swing plough, without the handles. The horses are attached to this plough. The plants are dropped through a leather conduit, and fall immediately behind the plough, through a space formed by placing another plate parallel to the plough's original side plate. Two horses are attached to the machine, which is fitted with a pole and cross bar. The assistant sits on a seat behind the box, and feeds the plants, whilst another man drives. At the demonstration given, each plant was laid perfectly in line, and as the machine passed on the earth fell in and covered them. Planting was only carried out one way. On the return, by the manipulation of a lever, the depth of the furrow was lessened to 7 in., and the next row was marked out. Following the same line then, the depth was altered to 10 in., and the planting proceeded as before. With three horses, however, enabling the 10 in. furrow to be opened out in the one operation, planting could be carried out on both journeys, without the necessity for the marking out. For March planting, a shallower depth would suffice, and two horses could do the work.

The machine weighs about 2 cwt., without the plough, and it is claimed for it that even planting as Mr. Punzell was doing, on one journey only, it will plant two acres a day.

ANOTHER CANE PLANTER.

An improved cane planter, patented by Mr. G. Hing, of Pioneer Farm, Stockton, is thus described by the "Johnstone River Advocate," of 18th September:—

The cane planter is a plough, which is drawn under the dray, and so constructed that the two sides dig out a trench in the furrow at any depth, and a little distance behind the share there is a slot in the plates which allows the plant to lie on a ridge of loose soil, which is preferable to a hard bottom. The loose plants in the dray are handled by a boy, and thrown down a funnel, which is set in the bed of the dray. The plants pass below between the parallel sides of the plough. At the same time the plants are laid perfectly in line. The coverers attached behind completely cover the pieces. These coverers may be regulated to cover deep or shallow, and if they pick up any rubbish it is rapidly freed by lifting the plough handles without stopping the team. In the case under notice the plants were covered to a good depth to hold the moisture, but, by the raising or lowering of two chains which suspend the plough, the depth may be regulated to any degree. Besides, it may be done from the "pull" at the head of the plough. These cane planters may be attached to any dray, and, in the case when the dray has to go any distance for a fresh supply of plants, the plough may be secured by the chains and raised out of harm's way without disconnecting it from the dray, thus saving time. When the plants are obtained, it is a simple matter to put the plough into action. In the exhibition the drills were struck for the planter.

With this ingenious contrivance, it is possible to plant over 4 acres per day, with the aid of a boy sitting on a movable seat to feed the plants, and one man as driver.

In connection with the planter, we saw a manuring machine attached to the dray, and tried with success. The feed may be regulated, and the fertiliser passes into the furrow as fine as flour itself, caused by stirrers in the receptacle, which break any lumps, and keep the stuff moving to the feed pipe. The whole of this mechanism is worked from the axle of the dray by means of a sprocket wheel and chain.

Mr. Hing is to be complimented on the success of the cane planter, and several of our cane farmers have placed orders for this appliance. It is probable that other sugar districts will adopt them.—"Australian Sugar Journal."

Vegetable Pathology.

REPORT ON SOME OF THE DISEASES OF CITRUS FRUITS.

By C. ROSS, F.R.H.S., Instructor in Fruit Culture.

In continuation of a further investigation of the diseases and pests affecting citrus fruits, I left Brisbane on the 13th of October and toured part of the Blackall Range, including Nambour, Kureelpa, Mapleton, and Montville. I also visited Gympie for the purpose of giving advice on the sites, aspects, and methods of laying out and planting new areas to bananas, pineapples, and citrus fruits.

In the Blackall Range district are to be seen some of the best-kept and remunerative orchards in the State, but at the same time the successful grower is made to work all the harder by reason of his neighbours' heedlessness regarding pests.

With the exception of White Louse and Pink-wax Scales, Borers, Bugs, and Fruit Fly, other diseases and pests are not so general as imagined; and with the attentive man these pests were either non-existent or well under control.

The dangers of the propagation of all pests is a result of carelessness or unthriftiness of the man who has bit off more than he can chew on the one hand, and the gross neglect of the "one-tree" or backyard orchardist on the other. The mistake amateurs and even those who attempt to grow for profit often make is to plant a tree of every known subject instead of specialising in two or three directions only. The result of such a medley of subjects is that a feeding and breeding ground for the fruit fly is ever present. Those who persist in growing a few deciduous and other fruits, so attractive to the fly, in or adjacent to their commercial citrus grove may always expect fly attack. A few well-kept citrus trees in this district will return cash enough and leave a profit, after purchasing sufficient jam fruit for house supplies, than whole acres of peaches, plums, guavas, &c. Although the practice is to be condemned, if a few soft fruits are desired, the trees should be grown on a "dwarf-bush" system, and be close-netted in before the crop begins to colour. The following are some of the diseases and pests investigated, viz.:—

"COLLAR ROT" OR MAL DE GOMMA.

This disease originated in the Azores, and was first mentioned in 1832. Although widespread over the whole of Australia, Europe, and America, it is not very prevalent on that part of the Range I recently visited. I only noticed its presence in two orchards at Mapleton, but probably it exists in other places. The disease is of such a destructive nature that in Florida the annual damage is set down at £20,000; and in Italy, taking an average of sixteen years, the loss amounts to £25,000.

Wherever it gets a foothold, it is spread from tree to tree until entire orchards are devastated. The mysterious working of this disease in its initiatory stages is not always noticed, as it occurs at the collar, close to or beneath the ground. The surest indication is the appearance of drops of gum at the collar or elsewhere; the bark becomes discoloured and emits a disagreeable odour. Where no gumming occurs, some other disease is at work.

Since the discovery of the fungus parasite (*Fusarium limonis*, Briosi), this disease has become amenable to rational treatment. The exudation of gum, decay of the bark, unhealthy appearance of the foliage, and death of small shoots are all symptoms. The mycelium of the fungus permeates and destroys the living tissue, and McAlpine has found the reproductive bodies (conidia) in the gum drops; therefore, if this gum or any portion of diseased tissue is carried, by means of tools or implements, and deposited on a suitable medium or conveyed by any other means to a citrus tree, under favourable conditions for the growth of the fungus, there we may expect the disease to appear.

In addition to the contributory cause and conditions favouring disease, given in my report relative to the orange groves in the Maryborough district, I may add that any condition or treatment that tends to weaken the constitution of the tree will predispose it to the attack of the parasitic fungus. Therefore, it is necessary to maintain a vigorous growth by thorough cultivation and the judicious application of suitable manures. The need of good drainage cannot be too often reiterated; close and deep planting producing excessive shade must also be avoided.

The relative value of stocks upon which to work the different varieties of citrus fruits cannot be entered upon here, but at a future date I will discuss this matter more fully. I may, however, mention, *en passant*, that the seville stock (*Citrus bigaradia*) has been proved to be resistant so far as collar rot is concerned, but it has not been satisfactory as a stock in other directions on the Blackall Range. The sweet orange stock from seedling trees has been found to do best on high basaltic country. What is called the "common rough lemon" should not be ignored. This is the variety that has escaped cultivation, and is seen all over the country in a wild state. It is seldom or ever diseased under the worst of circumstances, and is now being sought after in the Southern States and West Australia for a stock. In Florida it is called the "citroned orange" (*Citrus aurantium indicum*). I have found that oranges budded to this stock do better on rolling, grey, sandy loams overlying clay and with yellow sand subsoils. I have come across oranges that have been worked upon the smooth-skinned lemon, but, as it is so subject to collar rot, it is the most unsatisfactory of all stocks.

TREATMENT.

There is a general remedy for bark and root diseases caused by fungi; and that is, to cut away every portion of the diseased wood as well as some of the apparently healthy tissue surrounding it, and all such portions should be immediately burnt. To prevent any further spread or infection, the wounds should be dressed by washing or painting with one of the following antiseptic solutions, viz.:—

(1) Fifteen parts of sulphurous acid to 85 parts of water. Exposed roots may also be sprayed at the same strength.

(2) Paint with equal quantities of carbolic and olive oils.

(3) One part of crude carbolic acid to 1 part of water. If used as a spray for roots, it should be diluted in the proportion of 1 to 5.

(4) Coal tar has also been used with good effect upon the amputated part.

(5) The following is a good stock solution to use for many purposes:—Place 30 lb. of flowers of sulphur in a cask, and add sufficient water to form a stiff paste. Add 20 lb. of powdered caustic soda, and stir vigorously. The whole mass boils and liquefies. After violent boiling has ceased, add water to bring it up to 20 gallons. Strain it into a barrel that can be kept tightly corked.

One part of this stock solution is added to 1 part of water for covering wounds, and 1 part to 10 of water for spraying the roots.

(6) Proper drainage is essential; and by exposing the roots and dressing with slaked lime, the development of injurious fungi will be arrested.

(7) Deep ploughing close to the trees should be avoided, as injury to the roots is favourable to the growth of fungi.

(8) Deep and close planting producing excessive shade is favourable to fungus growth, and otherwise produces an injurious effect upon the trees.

"ROOT ROT" (*PHOMA OMNIVORA*, n. sp.).

Two sickly trees in an otherwise healthy orchard were pointed out to me at Mapleton, which were apparently affected with Armillaria fungus at the root, resulting probably from being planted near old forest tree stumps. But the root rot seen in an adjoining orchard, also at Montville, is of a more deadly character than "collar rot," and it begins in the subsoil and spreads into the tree, which ultimately dies. When trees are badly affected, there seems to be no cure. Bad drainage and stagnant water, poisoning the roots, are very common causes; but it may also be the result of some deleterious substance in the subsoil, such as chlorinated magnesia, copper salts, antimony, or other poisonous minerals. This disease has often been confounded with Mal de Gomma, as it presents similar symptoms; but the distinction in this disease is that there is no gumming, and it is caused by a totally different fungus, called *Phoma omnivera*, n. sp.

A form of this fungus causes "Wither-tip," or what has for many years been called "Die-back" in Queensland, but has nothing to do with that disease, "Exanthenia," and is not known outside America. The very dark-green colour of the foliage so much desired by some growers is a sure indication that the grove is on the verge of showing disease at the root.

The following treatment will be beneficial:—

(1) Good cultivation and manuring to encourage root action.

(2) Cut hard back and burn all prunings.

(3) Two pounds each of powdered sulphate of iron and fresh slaked lime chipped in the soil around the trunk and beneath the tree.

(4) Small holes made with a stick 10 in. apart and 6 in. to 30 in. round the tree, and Bordeaux mixture poured in at the rate of ½-gallon per tree and 3 lb. of slack lime hoed in a fortnight later.

LEMON BARK BLOTCH (*ASCOCHYTA CORTICOLA*, n. sp.).

Only one example of this disease was observed. The symptoms and effect of this fungus disease are so nearly similar to "Collar Rot" that, except for scientific purposes, a minute description is not looked for by the practical grower, and the same treatment as for Collar Rot will apply.

SCABBING OF FRUIT AND LEAVES.

I found the lemon, of all citrus fruits, to be the worst affected with what is called "Scab." Most of the fruit examined was so badly scabbed that it was quite unfit for market. Glen Retreat mandarins, to a more or less extent, were rendered unsightly from the same cause.

The primary cause of this disease is not easy to determine. Frequently bruises, insect punctures, or other mechanical agencies may so irritate the skin of the fruit as to induce a flow of essential oil, which, becoming oxidised, is converted into a resinous deposit, thus providing a congenial situation for the propagation of fungi. Mr. Tryon, in his researches, found a scarlet mite which he believed was the primary cause of scabbing. Most forms of scab appear to be associated with fungi, although animal and vegetable parasites stimulate the formation of corky tissue, giving the fruit a scabby appearance.

On both oranges and mandarins scab was very conspicuous on the leaves even when the fruit was not badly affected. No less than six different fungi have been discovered associated with scab on a single leaf. In the apple and pear there is a definite fungus known to produce it; but in the lemon various fungi may be associated with the disease, but may not actually cause it.

When the disease is of fungus origin or associated therewith, Bordeaux mixture is the best of all sprays to use, but should be applied and repeated before the disease has developed. Plant lemons on dry soil and in a locality where the rainfall is light during the blossoming and setting period.

"BLACK SPOT" OR ANTHRACNOSE (*PHOMA CITRICARPA*).

This disease was not found to be very prevalent, but sufficiently so to excite the utmost vigilance for keeping it under control. The fungus causing the dark-brown sunken spots on the fruit, although slightingly spoken of as only a skin disease, is very rapidly spread, not only disfiguring the fruit, but inducing rottenness and decay, and the fruit falls a ready prey to blue mould. The fungus which produces the "Black Spot" has been named *Phoma citricarpa,* and is sometimes found associated with "Melanose," although on the Range I found it by itself. Any treatment having the effect of destroying the reproductive spores will be suitable:—

(1) Disinfect all cases or other receptacles.

(2) Destroy skins of diseased fruits.

(3) Attend to drainage.

(4) Spray with Bordeaux mixture as soon as fruit sets; repeat spraying at monthly intervals before fruit changes colour; also, spray the trees after crop has been gathered.

(5) Sprinkle ½-lb. of sulphate of iron about the feeding roots of each tree, or water this quantity in at the rate of 1 oz. dissolved in 3 gallons of water.

MELANOSE.

One of the most interesting facts in connection with this disease is that the sweet orange type is alone affected. There was only one instance of this trouble noticed, and that to a very serious degree, in an orchard at Montville. Melanose, or, to properly designate the disease, "False Melanose," may be described as follows:—Previous to the attack of the fruit it is to be seen on the young shoots and leaves in discoloured elevated spots, yellowish at first, becoming brown or even black as the blotches begin to swell, and, if looked at through an ordinary good lens, the skin will be seen to have broken up into a reticulated system like that of dried mud. The disease known as "Maori" may also occur on the same fruit; but the discoloration is not broken up in this fashion, but is uniform and continuous. Melanose, as known here, has been proved to be quite a different disease to that known in Florida. Therefore, Mr. McAlpine designates it as "False Melanose," and the fungus producing it is called *Cladosporium Brunneo-atrum,* n. sp.

The Bordeaux mixture and ammoniacal solution of copper carbonate are perfect remedies when properly applied. The summer strength of the former should be applied at intervals of three or four weeks after the fruit has attained the size of a pea.

As there is no injury to the trees to be feared by the use of the ammoniacal copper carbonate solution, it may be preferred. Use at the rate of 5 oz. to 50 gallons of water. A dressing should also be applied about a fortnight after the fruit has been gathered.

There is also another fungus which, for want of a better name, I have called "Running Bark" or "Web Fungus," which I have not seen scientifically described, but is well known amongst orange-growers in the North Coast district—happily not very prevalent. It is one of the most destructive froms of fungi, but, if taken in time, it is easily eradicated by a fairly strong solution of bluestone painted on the spot.

The disease appears in dull greyish streaks, which run together and form a network, the threads running up along the bark of the limbs, throwing out other threads on each side as it proceeds up the tree. Whatever part of the tree the mycelium of this fungus reaches, the living tissues are destroyed, and, if not checked, the death of the tree is certain.

MAORI.

This disease is very common in many parts of the country; but I only found it to a very serious extent in one orchard on the Range, and in this instance the crop, which was a very fine one, had been ruined from an export point of view. Maori is sometimes found on the same fruit with Melanose, and, the two being similar in appearance, are often confounded by the casual observer. On close examination the former presents the colour of a Maori's face, and is smooth to the feel, the discoloration is uniform and continuous, and is caused by a small mite which punctures the oil cases, from whence the oil exudes and spreads and dries on the surface; whereas Melanose is produced by a fungus, and appears as round, brown spots which run together in irregular curved lines, giving a streaky appearance to the skin, which is roughened and reticulated.

Flowers of sulphur dusted at intervals over the tree, beginning when the fruit is small, is a useful remedy for Maori; but the most effective preventive is 1 lb. of whale oil soap to 50 gallons of water sprayed on at intervals. If the two diseases appear together, a weak solution of the lime-sulphur wash is recommended whilst the fruit is small. This latter wash being both an insecticide and fungicide, is also very effective against several other diseases besides Maori and Melanose.

Amongst scale insects the most troublesome, if not the most destructive, to be found in this region are the White Louse (*Chionaspis citri*) and Pink Wax (*Ceroplastes ruber*), which are very widespread. Red oil and cyanide sprays at various strengths have been applied with more or less good effect, but in my opinion there are none so satisfactory, next to cyaniding, as either of the old-fashioned solutions such as the "Kero," "Resin-soda," or "Lime-sulphur" washes if properly made and applied. The Red Circular Scale (*Aspidotius coccinea*)—the most deadly of all scales—I was very pleased to note was almost non-existent. Borers in some instances are a serious trouble. The only way to cope with these is to follow them up, and, where a suspicion of sawdust is to be seen, either probe the cavity from whence it came, insert kerosene, block the orifice with hard soap, or catch the insert on the wing. This may be done by hanging a light over a dish of soapy or oily water just after sundown. A very good deterrent is tar water—1 lb. of oil of tar to 100 gallons of water. The moth and beetles avoid laying their eggs where the odour of tar is present.

A considerable loss has been occasioned by the depredations of the Orange Bug—Holy Bug (*Mictis profano*). As a description of this well-known pest may not be required, I simply give what I consider the best means of minimising the evil. The old recommendation for shaking the branches, inducing the bugs to climb down the stem, is a method that does not appeal to the commercial grower. A simple and effective method is as follows. viz.:—Before sunrise or after sunset, or in cool weather when the bugs are not active, throw a gas-tight sheet (calico) over the tree and fumigate with hydrocyanic acid gas or strong tobacco fumes.

"Banana Scab" was noticed to a slight extent at Kureelpa and in some of the plantations on the eastern slopes. "Black Point" or Anthracnose was prevalent in several instances. This disease is most in evidence in the spring, and has been put down as the result of cold or wet. As certain fungi are always in connection with the two above diseases, a fungicide, such as Bordeaux mixture, applied when first seen, is the best remedy.

The season, in spite of certain drawbacks, has been a good one; and growers speak with satisfaction as to the quality, quantity, and the prices that have ruled for Citrus, Pineapples, and Bananas.

Considering the very large scope there is for inquiry and investigation, I have not been able to give a very detailed and exhaustive description of all the subjects that came under my observation during this tour, as any one of those touched upon would occupy a good-sized pamphlet; but from what has been written, and the advice offered thereon, it will be concluded how important it is for the grower to be on the alert and exercise his best judgment and energy for observing and suppressing all such troubles as may exist.

Before closing this report, I would like to draw attention to the subject of cincturing or girdling. This is an operation which has led to considerable success, not only on grapes, deciduous standard fruits, mangoes, citrus, but more particularly with relation to the navel orange. Many growers complain that this variety is not a good bearer or that it is erratic in its cropping. The navel orange, with its large foliage and large fruit, is a more ravenous feeder than most other varieties, and requires a stronger, richer soil with abundance of moisture and generous manurial treatment, together with the best of cultivation. Grown under such conditions, but yet proving an erratic bearer, the operation of girdling should be tried. The operation is performed as follows:—Choose alternately one-half of the branches in the secondary system of growth—*i.e.*, the branches not less than 1 in. in diameter on the first, second, or third forks—and remove a circle of bark about one-eighth of an inch wide, completely ringing the branch. The operation should be performed just as the flower buds begin to swell or when the sap is rapidly ascending to the head of the tree. The return flow of sap coming down by the outer bark is thus checked at the ring, and is absorbed by the opening blossoms, causing more profusion and helping them to set better. If adverse conditions cause the fruit to drop off whilst they are small, a second girdling will enable the fruit to hang better and bring it to maturity from seven to ten days earlier. Instruments for this purpose may be purchased at small cost.

The following references have been consulaed:—H. Tryon, D. McAlpine, N. A. Cobb, J. F. Moody, R. E. Smith, and O. Butler; Bulletin No. 4, U.S. Department of Agriculture; W. J. Allen, and J. French.

Entomology.

FRUIT CATERPILLAR OF THE BANANA.

BY E. JARVIS, Assistant Government Entomologist.

Whilst investigating a disease of Cavendish bananas at Cairns, last September, I had an opportunity of securing specimens of the caterpillars and pupæ of a small moth which during the past season has proved very destructive to green bananas.

This pest has remained unidentified up to the present, although the fact of its being injurious has been previously recorded by Mr. Tryon ("Natural Enemies of the Banana occurring in Queensland"); but, having lately bred the prefect insect from material collected whilst at Maria Creek, a brief account of its life-history and economy will no doubt interest banana growers.

NATURE OF INJURY.

The moth deposits its eggs at the base of a "hand" as soon as it is uncovered by the flower bract, the larvæ when hatched hiding between the tiny "fingers" and gnawing their surfaces, producing at first a slight discoloration, which at this early stage is practically hidden from view.

When the hand becomes half grown, however, the caterpillars, which are then of a size to permanently damage the fruit, gnaw irregular patches in the tender skin near the stem end of the "fingers."

A watery matter exudes from these wounds, which are soon repaired by corky tissue, at first pinkish in hue, but ultimately darkening to yellowish brown, and assuming the appearance of unsightly scabs that sometimes cover two or more sides of a "finger," and are raised slightly above the surrounding green undamaged surface.

In addition to this injury, the fully grown caterpillar sometimes eats through the skin close to the fruit stalk, making a large deep irregular cavity, and in such cases it is not unusual to find the affected "hand" worthless for marketable purposes, the majority of fingers being badly scabbed, and the spaces between them partially filled with webbing mixed with excreta of the caterpillars. Growers generally remove such "fingers" before marketing bunches, and Chinamen make use of them in some instances for pig feed.

DESCRIPTION OF LARVA.

General colour shining light yellow, more or less pinkish, especially on thoracic and hinder abdominal segments. Body marked with numerous pale greenish-brown tuberculate blotches, each enclosing a black dot, from which, in the majority of cases, arises a single brown hair. These blotches are larger close to centro-dorsal area than on sub-dorsal and ventral surfaces, and arranged in the following order:—Dorsal surface of 1st thoracic segment shining black with a narrow yellow centro-dorsal line; a blotch on each side in line with spiracles, and a larger one just below it, both bearing two hairs; and a blotch on centro-ventral area immediately behind coxæ. 2nd and 3rd thoracic segments with a row of six blotches near frontal edge, the two dorsal supporting two hairs; two blotches on each side behind frontal row, the one nearest coxæ being lunate; and two behind coxæ. 1st, 2nd, 7th, and 8th abdominal segments with a frontal row of twelve blotches encircling body, and two behind dorsal blotches. 3rd to 6th segments with a frontal row of eight; one on each side of prolegs, and two behind dorsal blotches. 9th segment with a large centro-dorsal blotch, and eight encircling body. Anal segment with a very large triangular dorsal blotch supporting a number of hairs, and a large blotch on each side of prolegs. Head and first and second pairs of legs black; third pair of legs, prolegs, and ventral surface yellow. Greatest length, about 28 mm.

HABITS OF LARVA.

The larvæ appear to reside principally between the fruit stalks close to the "handle"—a situation of comparative obscurity and seclusion—and, as additional precaution against attacks of insectivorous birds, make use of their excreta by webbing the particles together to form loose masses amongst which they retire when not feeding.

DESCRIPTION OF PUPA.

This stage is passed on the side of the fruit, usually between the "fingers" near the "handle," the pupa being covered by a frail silken bag which is hidden from view under a mass of excrement.

The pupal shell is light reddish yellow, darker on eyes and on edges of segments, with a brown tubercle at the base of each wing on dorsal surface partly overlapped by the posterior edge of metathorax.

Spiracles brown and prominent. End of anal segment nearly black, the extremity abruptly pointed dorsally and furnished with hooks. Length, about 13 mm. (See sketch on plate.)

DESCRIPTION OF MOTH.

The perfect insect, which belongs to the family Pyralidæ, is new to Messrs. Lyell and Turner, two leading Australian lepidopterists; the latter authority, however, has placed it in sub-family Pyraustinæ. Its general coloration is pale yellowish brown, and the following description of the characteristic blackish markings on the upper surface will enable those interested to identify this moth:—

Fore wings with a conspicuous blotch on costa near apex, an inconspicuous acutely triangular transverse streak on costa near base, a large irregular blotch at centre of sub-costal area, and a row of seven minute spots on edge of outer margin (visible under pocket lens).

Hind wings with a conspicuous spot (nearer base and upper margin than centre) and seven minute spots on edge of outer margin.

In addition to the above-mentioned blotches, both wings are barred transversely in places with more or less indistinct detached blackish lines running from upper and hind margins towards centre of wings.

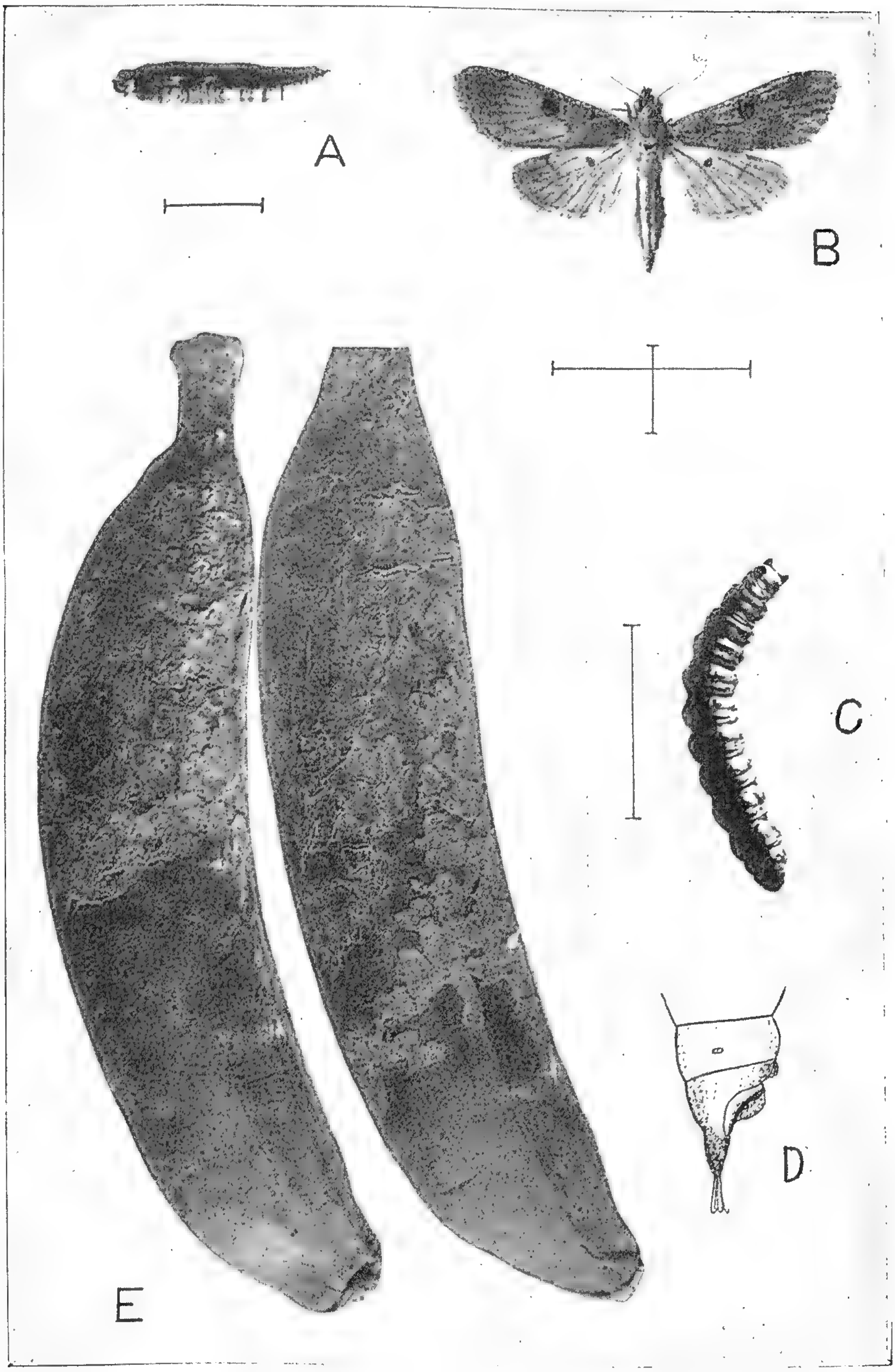


PLATE 7.—*A*, Pupa (magnified twice); *B*, Moth (magnified twice); *C*, Caterpillar (magnified about twice); *D*, Extremity of pupa showing projection; *E*, Injury to green fruit.

Dorsal surface of abdomen covered with silver scales, and anal segment tufted with dark brown. Expanse of wings—about 27 mm. in female, and 22 mm. in male.

CONTROL.

Natural Enemies.

Several of the larvæ collected were destroyed by a hymenopterous parasite, which Mr. A. A. Girault has named *Tumidicoxa regina-dentata*, Girault, new var.

Artificial control.

With regard to a means of preventing these caterpillars from damaging bananas, I think that spraying with arsenate of lead (1 lb. to 30 gallons of water) would be a cheap and effective remedy.

A knapsack spray pump and cyclone spray nozzle (costing in all about £2 10s.) would meet requirements, and it would certainly pay growers better to expend a few seconds in treating a bunch than to risk losing perhaps 50 per cent. or more of the fruit.

Two applications should be sufficient—one administered as soon as the "hands" are exposed, and another when the fruit is half grown. Inspector Selby has noticed that in the Cairns district this pest appears mostly just after moist weather in May and June, the grubs being very bad at the end of the latter month; so it would be well to commence spraying operations early in May, or as soon as the first signs of scabbing are noticed.

An attempt should be made also to discover the native food plants of this destructive moth, as the rooting out of such plants in the vicinity of banana plantations would be an additional means of control.

THE PRICE-CAMPBELL COTTON-PICKING MACHINE.

When the Government Bacteriologist (Mr. C. J. Pound) was in the United States, he saw a cotton-picking machine at work which appeared to have solved the question of rapid picking by machinery. Unfortunately, being engaged on other work connected with his mission, he did not obtain any particulars concerning it. It may possibly have been the machine which is mentioned as follows in "The Wealth of India":—

There has been a lot of talk from time to time about an efficient machine to pick cotton, but they seem to have evolved one at last, of course, in America. A couple of such machines have been recently tried in Texas on black soil—of something of the sort we have in the great cotton belt in India—and picked nearly 5 lb. of cotton per minute each. When compared, the cotton thus picked made a better showing than that picked by hand. Only one man is required to operate a machine, which can pick an acre an hour or at least 8 acres a day; and the rows so picked are said to compare very favourably with rows picked by hand.

Ornithology.

THE ECONOMIC VALUE OF OUR BIRDS.

We have frequently drawn attention to the indiscriminate slaughter of birds, amongst which a large majority are insectivorous, and hence of great economic value to the farmer and market gardener, by so-called sportsmen, who sally forth every week and on every holiday armed with pea-rifles, and ignorantly kill birds which should be protected from such vandals.

The Bird Protection Court, Melbourne, has just issued the following bulletin on the "Economic Value of our Birds," by Professor F. Erasmus Wilson, R.A.O.U.:—

It is a well-known fact that Australia loses hundreds of thousands of pounds annually owing to the ravages of insect pests. These creatures attack our orchards, our cornfields, our forest reserves, and our pastoral areas, and for twenty-four hours out of every day are waging a deadly warfare against us. A competent judge calculated that the yearly loss to the United States, owing to damage caused by insects, amounted to £160,000,000 sterling.

In our papers we read of enormous plagues of locusts, of hordes of "take all" grubs devastating our grazing lands, of apple crops being ruined by the codlin moth, of valuable stock being killed by bot flies, and of the many other misfortunes that assail our primary producers, and are caused by insect pests.

Every year thousands of pounds are expended throughout the Commonwealth in buying costly machinery for spraying, &c., and vast quantities of poison are spread in an often futile attempt to keep in check this growing menace. Deadly maladies are carried about by the myriads of mosquitoes and flies that abound everywhere, while in some localities life is made almost unbearable owing to their presence.

Now Australia is extremely fortunate in that the majority of its birds live almost entirely upon an insect diet.

An insectivorous bird is by far the best weapon in creation with which to assail the insect world, both on account of the enormous quantity that it can despatch and also from the fact that it requires no payment for services rendered. All it asks for is the right of existence, and yet we in a thoughtless and foolhardy manner kill our birds which in reality are worth their weight in gold.

Mr. D. Le Souef, the well-known Director of the Melbourne Zoological Gardens, some years ago visited an enormous rookery of the straw-necked ibis in the Riverina, and in an article published in the "Victorian Naturalist" he tells us that the birds in this rookery would, at a conservative estimate, number at least 240,000.

He procured a few specimens, and found that the stomach of each contained about 2,000 immature grasshoppers. A simple calculation will show that this vast flock would account for 480,000,000 grasshoppers per diem. Yet, in face of this, people visit the breeding haunts of the birds and collect their eggs by the cart load. One party last year, having gathered more than it required, drove away and left about 4,800 eggs to rot on the banks of the swamp. In Egypt in olden days the ibis was held to be sacred and was not molested in any way, and it is regrettable that it should not be so at the present time, as surely no bird is more worthy of veneration.

The little tomtits and wrens that are so busy in your garden, searching almost everywhere amongst the plants, consume at least their own weight of insects every day, yet we permit our children to destroy them with their shanghais, and our would-be sportsmen fire charges from a 12-bore shotgun at them.

The black and white fantail or willie wagtail, as it is perhaps more commonly known, is an exceptionally useful bird, and, being of a confiding nature, performs good deeds even at your very doorstep, capturing hosts of flies and mosquitoes, and from time to time enlivening you with dulcet notes, "Sweet pretty creature." A near relation, the white-shafted fantail, is another bird adept in the art of catching flying insects, and, although so small of stature, is a mountain of usefulness.

Then, again, take our cuckoos, of which there are six kinds in Victoria, and consider the items of their menu. They are practically the only birds known to take and devour the familiar hairy caterpillars, and are, therefore, our only means of natural defence against these pests; also, they are very fond of the vine moth caterpillars; and a naturalist once removed from the stomach of a pallid cuckoo eighteen of these, each of which was about 2¼ in. in length.

One of the best known and perhaps most beneficial of our birds is the harmonious shrike thrush, that silvery-throated songster that we all love to hear. Apart from its ordinary insect-eating proclivities, it should commend itself especially to campers, as it includes in its bill of fare the dreaded bull-dog ant. Campers please note; and when next you "draw a bead" upon a harmonious shrike thrush, stay your hand and remember the sting of the bull-dog ant.

Another well-known friend is that dainty little sprite, the welcome swallow, who so trustfully constructs its plastered nest beneath verandas. What a potent engine of destruction is this mite. From morning till night it may be seen busily skimming hither and thither, gathering in the harvest of noxious flying insects, especially mosquitoes.

Out in the fields, ground larks, chats, robins, plovers, magpies, and others too numerous to mention, are working hard in our interests, yet every day many are ruthlessly destroyed.

In the more thickly-wooded country we find tree-creepers and sitellas eagerly searching the bark of trees for insect foes that are lurking there. Lower down at the foot of the trees are scrub wrens, shrike robins and others also performing their quota of the work. Higher up, amongst the tree tops, are pardalotes, shrike tits, whistlers, cuckoos, &c., all eagerly bent on devastating the ranks of the enemy.

Near the edge of the wood our old friend the laughing jackass is busy devouring a fat juicy grub which later would have developed into a destructive beetle. Occasionally, when luck favours him, a meal is made of some dreaded reptile, and campers may have the pleasure of seeing a black snake being demolished by our jolly companion.

Near the pond gracefully walks the mudlark, which, besides destroying numerous insects, has a "sweet tooth" for the water snail which is known to be the intermediate host of the liver fluke, always a menace to our sheep industry.

In an orchard near by a flock of babblers is hard at work in search of the codlin moth, which the birds consider to be a toothsome morsel. A little brown flycatcher sits upon the wire fence, from time to time darting into the air to capture some passing fly or moth, and lucky indeed is the insect that escapes it.

Suddenly a kestrel swoops into the field, and a farmer friend seeing that it is a hawk immediately shoots it. An examination of its stomach, however, reveals the fact that it is a valuable insectivorous bird.

A big nest placed high up in a large gum tree next attracts attention, and proves to be the home of a pair of wedge-tailed eagles (eaglehawks). A visit to this is well repaid, for underneath it is found a great heap of bones and pelts of rabbits. The noble old wedge-tailed eagle, the largest of its kind in the world, repays twenty-fold for any small amount of damage that it may occasionally do in partaking of a stray lamb at times—in fact, there are very few authenticated instances indeed of this bird killing lambs. Some western district squatters will not allow eagles to be killed upon their estates under any consideration, as they deem them to be their best natural protection against the rabbit.

Even at night time the birds are still working, as it is then that the owls, frogmouths, and nightjars sally forth. Till the break of day these birds will be busily employed in capturing those insects that are nocturnal in their habits. From the stomach of an owl have been taken four large caterpillars, two spiders, three cockchafer beetles, three large moths, and a quantity of other insect remains too much digested to be recognised.

The numerous honey-eating birds destroy quantities of insects at different seasons of the year, and feed the young entirely upon them, yet at present we afford them protection only during the breeding season.

It will thus be seen that all over the Commonwealth there is a vast army of birds working in our best interests, and demanding as payment only the right of existence. It behoves every Australian who has the welfare of his country at heart to do all in his power to afford protection to our native birds.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

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

Order Myrtaceaæ.

EUCALYPTUS Lhér.

E. rariflora, *Bail. sp. nov.* (Plates 8, 9, 10, 11) "Bastard Box" (Eidsvold). A tall tree not recorded as very abundant; branchlets slender of a pleasing red colour. Leaves very variable in shape, those of the flowering branchlets varying from lanceolate to oblong or even ovate, from 2—4½ in. long and ½—1 in. broad, or the ovate ones still broader on slender petioles of about 1 in. On young trees the leaves are almost orbicular, or sometimes obversely reniform, and mostly broader than long, but always slightly decurrent on the petiole from ½—3 in. long and ½—3½ in. broad, apex sometimes emarginate, texture thin, in the young leaves, almost membranous. (The petioles in these large leaves are often over 2 in. long.) Parallel nerves numerous, slender, branching at the top, where they join the intramarginal one, which is sometimes very close, at other times rather distant from the edge, the smaller veins forming a very delicate irregular reticulation. Oil dots numerous. Inflorescence composed of slender erectopatent panicles of usually few scattered pedicellate flowers; at times in umbels of 3 or 4 flowers. Operculum very short, scarcely exceeding 1 line, blunt or very slightly umbonate. Stamens inflected in the bud, the outer ones 1½ lines long. Anthers globular, opening in broad slits. Fruit (including the short pedicel) 4 lines long, about 2 lines diameter; rim rather broad. Capsule sunk, 4-celled, the valves not exserted. Seeds small, somewhat pear-shaped, dark brown and slightly rugose.

Hab.: Eidsvold and Mundubbera, *Dr. Thos. L. Bancroft.*

The present species is one of the most puzzling so far met with in Queensland; and it has only been through the indefatigable zeal of my friend, Dr. T. L. Bancroft, who collected so much information and such a complete suite of specimens, that mistakes have been prevented. The bark and foliage, as well as the flowers and fruit gathered at one stage of the tree's growth, would certainly lead one to believe it to be a species of Ironbark. Indeed, had the whole of the specimens been received from a less accurate collector, one might have doubted the specimens belonging to one species.

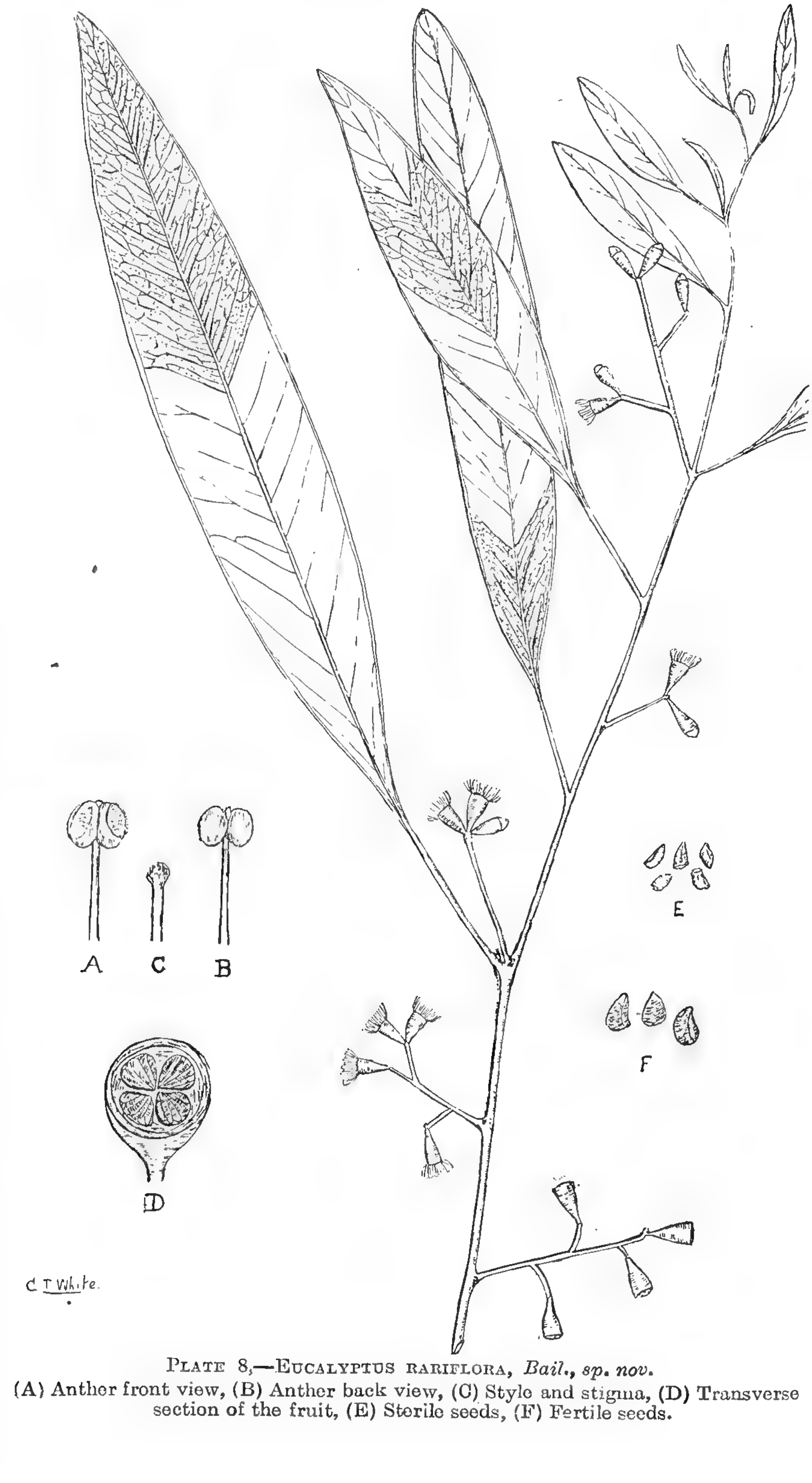


PLATE 8.—EUCALYPTUS RARIFLORA, *Bail., sp. nov.*
(A) Anther front view, (B) Anther back view, (C) Style and stigma, (D) Transverse section of the fruit, (E) Sterile seeds, (F) Fertile seeds.

PLATE 9.—EUCALYPTUS RARIFLORA, *Bail. sp. nov.*

Plate 10.—Eucalyptus rariflora, *Bail.*, *sp. nov.* Leaves from a young tree.

Photo. *Dr. T. L. Bancroft.*

PLATE 11.—EUCALYPTUS RARIFLORA, *Bail.* BUTT OF TREE.

Plate 12.—Sorghum halepense, *Bail.* Johnson Grass.

Order Gramineæ.

SORGHUM, Pers.

S. halepense, *Pers.* (Plate 12.) Johnson Grass, Means Grass, or Cuba Grass. The plant now brought under notice is a very peculiar form of a widely-spread grass, which may be at once known by its numerous fleshy root-stocks or stolens which are almost, if not quite, peculiar to the present variety. All species of the genus, or especially those of robust growth form strong clusters of roots which hold to the ground with a tenacity seldom equalled by other grasses; thus, when reading of this grass causing trouble to eradicate from a field where it was no longer wanted, it is thought that this feature is the one referred to. Such, however, is not the case, but rather the fleshy stoloniferous shoots, which in the work of eradicating break up into short joints, every one of which sprouts into a fresh plant, thus showing a more closely sown crop of the grass than the one it was attempted to clear off the field. Undoubtedly the grass now under notice has very high feeding properties, and even the very rootstocks, which in one sense we deplore, as a fodder are most certainly not to be despised.

Specimens of this grass (without roots or rootstocks) were received some years ago from the Johnstone River from Mr. W. C. Harding; from the specimens a few seedlings were raised and handed over to Mr. J. Liverseed, Manager of the State Farm, Hermitage; and the present plate is from specimens grown there. Further specimens have recently been received from Messrs. McIntyre Bros., Christmas Creek, Beaudesert, where it is said to be growing prolifically and is a good dry-weather grass. I believe it is indigenous to Northern Queensland and introduced into the latter district by Mr. Harding, who at one time resided not far from there.

Previously, no doubt, this grass has been confused with other forms of the species, as it cannot well be distinguished except by the thick fleshy stolons or rootstocks.

The two forms of the root of this grass here brought under notice, and as shown in the illustration, are rare among grasses, and gives me the opportunity of pointing out the absolute necessity, when exhibiting grasses, of showing complete specimens, including root and inflorescence, especially to those persons who still persist in cutting off the root and throwing it away, exhibiting only the inflorescence even when good specimens have been given them; and also of pointing out to collectors the need of sending full specimens when they require the name of plant sent for that purpose. In this case the matter would have been settled six years ago had full and complete specimens been available.

Specimens were handed over to Mr. F. Smith, B.Sc., who reports:—"Both the leaves and stoloniferous roots contain a hydrocyanic acid yielding a glucoside."

General Notes.

MENDING AUGER AND OTHER TOOLS.

By COLORADO COLLEGE OF AGRICULTURE.

It often happens that good augers with the screws broken off are thrown away as useless. This should not be, for with a little work and small cost they can be made almost as good as new.

Take a file of suitable width, and cut a groove the width of the old screw about 3/16 in. deep, a little wider at the bottom than at the top (dovetail form). Then from a piece of steel cut a piece the shape of the screw, with a base that will fit neatly and tightly in the groove, then coat the edges with a tincture as follows:—

Equal parts of sulphur and any white lead with about a sixth of borax; mix the three thoroughly. When about to apply the preparation, wet it with strong sulphuric acid. After treating the blank screw with the preparation, press it tightly in the groove, lay away for four or five days, and then you will find it as solid as if welded. The job will not take a half-hour or cost more than 5 cents for material. The same process may be used for mending almost any broken tool without drawing the temper.—"Nor'-West Farmer," Canada.

THE DUST PROBLEM AS SOLVED IN ENGLAND.

The advent of motor-cars has effected a revolution in provincial and rural England which can scarcely yet be estimated fully. The dust nuisance, though seemingly a small matter, was rapidly creating a deep-rooted hostility that was seriously menacing development and even calling for reactionary legislation.

The problem has been solved in two ways. Firstly, where the traffic is extremely heavy, the roads have been relaid with tarred macadam, but this method is too expensive for general extension both in first cost and upkeep. The other method is watering or spraying. Watering is prohibitive in cost because of the rapid evaporation. Spraying with tar is effective, but very objectionable in hot weather.

But a method is in use to a rapidly-growing extent which combines the advantages of watering with that of tar-spraying at a reasonable cost, and eliminates the disadvantages of tar. It has long been known that calcium chloride attracts the moisture which is present in the driest atmosphere and retains that moisture tenaciously. A few years ago it was discovered that if a road was watered with a solution of calcium chloride the dust became impregnated with the calcium chloride, and the whole, instead of drying up, remained damp for from two to three weeks.

A modification of the process is to sprinkle the road with calcium chloride as a powder, the result being the same as the most perfect watering, without the expense of watering, except once in three or four weeks. Calcium chloride is a well-known article of commerce used largely in cold stores, and sells for about £5 per ton. The mixture for watering is about 1 to 5 of water, while the powder entails no expense except the cost of sprinkling every few weeks. Calcium chloride is odourless, and harmless to both man and beast.—"Pastoralists' Review."

A NEW REMEDY FOR CONTAGIOUS ABORTION.

In U.S.A., at the Vermont State Experiment Station, during the past year, the Science Department, after exhaustive experiment, have demonstrated that methylene blue is a remedy for contagious abortion. In their Bulletin No. 174, they give an account of 92 cows that were fed on it. They had all aborted before being tried with this remedy, but only one aborted subsequently. This remedy can be administered either in food or by capsule, and is said to exert a very great antiseptic effect on the blood, thus destroying the abortive germ, and without doing any apparent injury to the cow. Dose: One-third to one-half ounce given night and morning early in the period of pregnancy for seven days. Allow a week to elapse, then dose again for a week; then dose, one week in every month, till the birth of the calf. Cost of dosing a cow is about 3s. per week. The methylene blue should be obtained from wholesale druggists, pure, for about 15s. per lb.—"Exchange."

Answers to Correspondents.

WHITE PAINT FOR OUTSIDE FENCES, ETC.

W. WESTON, Townsville—

The following is a good substitute for white lead for the above purposes:—1 quart of skimmed milk, 3 oz. of fresh lime, 3 oz. of raw linseed oil, 1½ lb. of whiting. Put the lime into a clean bucket, add sufficient of the milk to slake the lime, add the oil a few drops at a time, stirring the mixture with a flat stick until the whole of the oil is incorporated with the mass, then add the remainder of the milk and afterwards the whiting, which must be finely powdered, and sifted over the mixture gradually, or it will go lumpy. One coat of this will do for some purposes, but two coats are required for good work. It should be strained through a hair sieve or coarse calico. The above quantity will be sufficient for 100 square feet, or 11 square yards.

DESTROYING TREES WITH SALTPETRE.

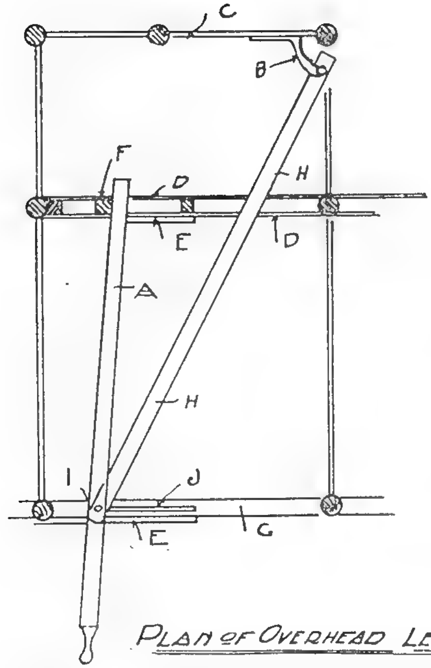
"SETTLER," Beerburrum—

If our correspondent will look up the November (1908) number of this Journal, he will find that heavy timber has been completely destroyed in Queensland by the use of saltpetre, applied as here described by a South African correspondent of the "Pastoralists' Review," and who writes:—

"I have seen many hundreds of acres of bush—large and scrub—completely destroyed with ordinary commercial saltpetre, but the trees were not cut down, as this entails much labour. A hole is bored in the tree in a downward direction to the centre. For large trees, a 1-in. auger is used; for smaller ones, ½-in. size is large enough. For large trees, 1 oz. to 2 oz. is the quantity used, and for smaller ones ½ oz. to 1 oz. A plug is put in the hole to keep rain from washing it out. The nitrate of potash is carried by the sap to the tips of the branches and to the rootlets. If the trees is a large one, say 2 ft. or more in diameter, very little difference will be noticed in the foliage for two or three months, then the leaves begin to fall, and it assumes a bare, wintry appearance. At the end of about six or eight months you pile a little brushwood round the tree and light it, and there is no further trouble. It will smoulder away to the remote ends of the roots, sometimes 30 ft. from the butt of the tree, leaving masses of valuable ash in all directions; while, if your bungalow is near to the clearing, you will hear a crash, which will sometimes startle you at night time, when the big trees fall, and when fallen they will continue to smoulder until every particle is converted into ash."

[We have had the same experience with big trees in the Logan district, but we added kerosene to the saltpetre. At Mapleton, near Nambour, North Coast Line, we saw a large tree, which had been treated with saltpetre, completely burnt out.—Ed. "Q.A.J."]

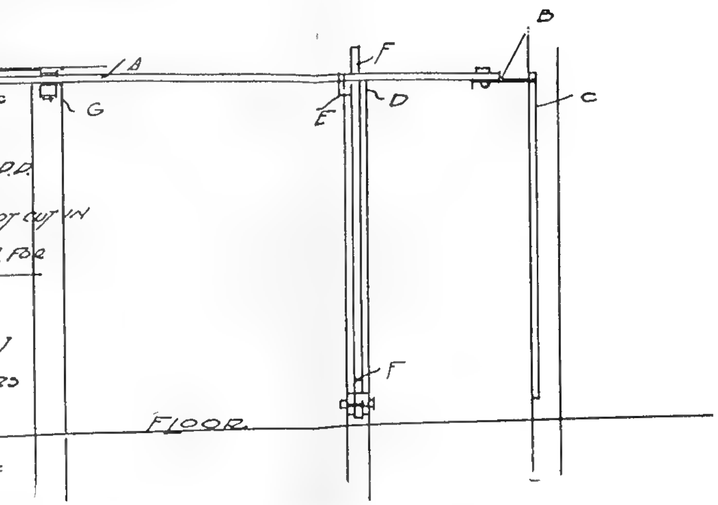
PLANS OF VARIOUS COWBAILS



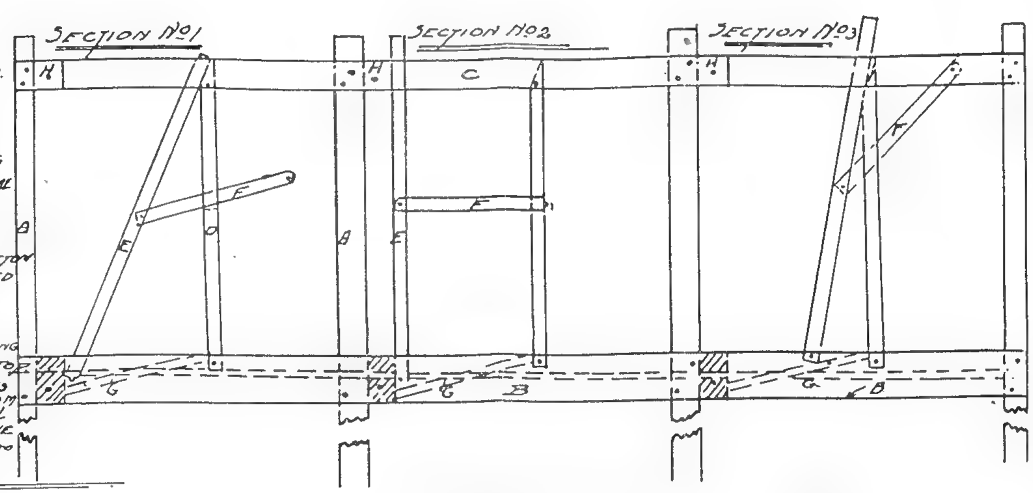
PLAN OF OVERHEAD LEVERS FOR OPERATING BAIL AND GATE

REFERENCES

A LEVER 3×1 PINE RESTING ON D AND G
B WROT IRON QUADRANT BOLTED TO GATE AND LEVER H
C GATE HUNG TO POST
D 4×1½ PINE ON EACH SIDE OF POST
E 6×1 NAILED ON TO D AND G FORMING STOP FOR LEVERS
F 3"×2" BAIL SWORD SLIDING BETWEEN D.D.
G 4×2" PINE ON TOP OF POSTS WITH A SLOT CUT IN
H 3×1 LEVER BOLTED TO QUADRANT B. FOR OPENING GATE
I BOLT THRO A AND H RUNNING IN SLOT J
J SLOT CUT IN G FOR KEEPING LEVERS IN POSITION.



SECTION THRO BAIL



IMPROVED COWBAIL.

REFERENCES CONTINUED FROM RIGHT HAND SIDE

G IS A PIECE OF 2¼×2" HD WD FIXED BETWEEN THE BOTTOM PLANKS EXTENDING FROM THE BLOCK MARKED H TO THE SAME BOTTOM OF THE POST MARKED D WITH A FALL FROM RIGHT TO LEFT OF 6 THIS PIECE WILL FORM AN INCLINED BOTTOM TO THE 2¼ INCH SPACE ABOVE MENTIONED BETWEEN THE PLANKS AND BOLTED THRO AS SHEWN.

H REPRESENTS BLOCKS OF 2¼×6" HD WD & 10" LONG FOR THE BOTTOM AND 6 LONG FOR THE TOP PUT IN POSITION BETWEEN THE PLANKS AND BOLTED, THE BLOCK AT THE BOTTOM IS MEANT FOR THE BOTTOM END OF BAIL STICK TO BUMP ON, AND THE UPPER ONE TO PREVENT THE BAIL STICK CLOSING TOO TIGHTLY ON THE COWS NECK.

REFERENCES

A 3"×3" HARD WOOD POST
B 10×1 HARD WOOD PLANKS LET INTO POSTS A LEAVING A SPACE OF 2¼ BETWEEN AND SECURELY BOLTED LEVEL WITH GROUND AS SHEWN
C 6×1 HD WD PLANKS LET INTO BOTH SIDES OF POSTS LEAVING SPACE OF 2¼ AS IN THE CASE OF THE BOTTOM PLANKS AND BOLTED
D IS FIXED 3FT FROM THE BAIL POST BETWEEN THE TOP BOTTOM PLANKS AS SHEN AND BOLTED
E THE BAIL STICK IS OF 3×2 HD WD 6×3 LONG HAVING A LONG SHAPED MORTICE NEAR THE CENTRE ABOUT 2" DEEP TO RECEIVE THE END OF BAIL CATCH THE BOTTOM END SHOULD BE CUT ON AN ANGLE AND FITTED WITH A SMALL WHEEL
F A HD WD BATTEN 3×3¼" IS FIXED TO BAIL STICK WITH A BOLT LEAVING SUFFICIENT ROOM TO WORK EASILY THE OTHER END TO HAVE A NOTCH NEAR THE END TO CATCH IN POST. THE MORTICE.
G HOLDING THE BAIL STICK SECURELY IN PLACE.

PLATE 13.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR DECEMBER, 1913.

Article.		DECEMBER. Prices.
Bacon	lb.	9d. to 11½d.
Bran	ton	£5
Butter	cwt.	104s.
Chaff, Mixed	ton	£3 10s. to £5 15s.
Chaff, Oaten (Victorian)	„	£6 to £7
Chaff, Lucerne	„	£6 10s. to £7
Chaff, Wheaten	„	£3 5s. to £5
Cheese	lb.	6½d.
Flour	ton	£9
Hams	lb.	1s. 3½d.
Hay, Oaten (Victorian)	ton	£5 10s.
Hay, Lucerne (Prime)	„	£4 5s. to £6
Honey	lb.	2d. to 3d.
Maize	bush.	4s. 3d. to 4s. 6d.
Oats	„	...
Onions	ton	£6 10s. to £9
Pollard	„	£5
Potatoes	„	£5 10s. to £10
Potatoes (Sweet)	cwt.	...
Pumpkins	ton	£5 5s.
Wheat, Milling	bush.	3s. 3d. to 3s. 7d.
Eggs	doz.	7d. to 1s. 2d.
Fowls	pair	3s. to 5s. 9d.
Geese	„	5s. 6d. to 6s. 6d.
Ducks, English	„	3s. 6d. to 4s.
Ducks, Muscovy	„	4s. to 5s. 3d.
Turkeys (Hens)	„	8s. to 12s.
Turkeys (Gobblers)	„	22s. to 25s.

SOUTHERN FRUIT MARKETS.

Article.	DECEMBER. Prices.
Bananas (Fiji), per case	15s. to 19s.
Bananas (Fiji), per bunch	5s. to 14s.
Bananas (Queensland) per case	8s. to 13s.
Mandarins (Local), Emperors, per case	8s. to 9s.
Oranges (Local), Navel, per case	14s. to 16s.
Oranges (Other), per case	9s. to 10s.
Papaw Apples (Queensland), per quarter-case	3s. to 4s.
Passion Fruit (Queensland), per quarter-case	7s. to 11s.
Pineapples (Queensland), (common), per case	6s. to 10s.
Pineapples (Queensland), (Ripleys), per case	10s. to 12s.
Pineapples (Queensland), (Queens), per case	11s. to 13s.
Strawberries (Local) per dozen punnets (quarts)	18s. to 20s.
Tomatoes, per quarter-case	3s. to 5s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	DECEMBER. Prices.
Apples, Eating (American), per case	14s. 6d. to 15s.
Apples, Cooking (American), per case	12s.
Apricots, per case	3s. to 4s. 6d.
Bananas (Cavendish), per dozen	1½d. to 2½d.
Bananas (Sugar), per dozen	1d. to 3¼d.
Cape Gooseberries, per quarter-case	5s. to 8s.
Cherries, per quarter-case	4s. 6d. to 7s. 6d.
Citrons, per cwt.	...
Cocoanuts, per sack	13s. to 14s.
Custard Apples, per case	...
Lemons (Local), per case	10s. to 14s.
Lemons (Italian), per case	17s. 6d.
Limes, per case	...
Mandarins, per case	...
Mangoes, per case	4s. to 7s.
Oranges (Navel), per case	...
Oranges (other), per case	...
Papaw Apples, per quarter-case	1s. 9d. to 4s.
Passion Fruit, per quarter-case	2s. to 4s. 6d.
Peaches, per quarter-case	1s. to 4s. 6d.
Peanuts, per lb.	3d. to 3½d.
Pineapples (Ripley), per dozen	2s. to 5s. 6d.
Pineapples (Rough), per dozen	3s. 6d. to 7s. 6d.
Pineapples (Smooth), per dozen	6s. to 7s.
Plums, per quarter-case	3s. to 5s.
Rockmelons, per dozen	2s. to 9s. 6d.
Strawberries, per dozen pints	...
Tomatoes, per quarter-case	1s. to 2s.
Watermelons, per dozen	3s. 6d. to 12s. 6d.

TOP PRICES, ENOGGERA YARDS, NOVEMBER, 1913.

Animal.	NOVEMBER. Prices.
Bullocks	£10 2s. 6d. to £12 10s.
Cows	£7 12s. 6d. to £8 10s.
Merino Wethers	24s. 3d.
Crossbred Wethers	19s.
Merino Ewes	18s.
Crossbred Ewes	20s. 3d.
Lambs	18s. 3d.
Pigs (Porkers)	...

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF NOVEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING NOVEMBER, 1912 AND 1913, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Nov.	No. of Years' Records.	Nov. 1913.	Nov. 1912.
North Coast.	In.		In.	In.
Atherton	2·16	11	1·21	1·11
Cairns	4·32	25	Nil	1 54
Cardwell	4·84	25	Nil	4·66
Cooktown	3·32	25	Nil	1·60
Herberton	2·63	25	2·04	1·87
Ingham	4 44	20	Nil	1·07
Innisfail	7·44	25	Nil	2·40
Mossman	6·12	5	0·25	6·88
Townsville	1·94	23	0·01	2·69
Charters Towers ...	...	...	0·02	
Central Coast.				
Ayr	1·34	25	Nil	1.51
Bowen	1·36	25	0·01	1·60
Mackay	2·52	25	0·07	3 03
Proserpine	3·82	10	0·06	1 19
St. Lawrence ...	2·04	25	2·25	4·20
South Coast.				
Crohamhurst ...	4·47	20	0·31	4·21
Biggenden	2·45	14	1·06	
Bundaberg	2·38	25	1·83	3·14
Brisbane	3·62	62	1 64	3·69
Childers	2·75	17	3·75	1·77
Esk	3·01	25	1 28	3·80
Gayndah	2·62	25	0·93	2·03
Glasshouse M'tains	...	...	...	4·38
Gympie	3·00	25	0·71	2·28
Kilkivan	2 62	25	0·68	1·22
Maryborough ...	2·75	25	2 82	4·07
South Coast—continued:	In.		In.	In.
Nanango	2·49	25	0·48	0·83
Rockhampton ...	2·20	25	0·70	1 45
Woodford	3 08	25	1;03	2·52
Yandina	3·70	19	0 17	*
Darling Downs.				
Dalby	2·60	22	0·47	1·98
Emu Vale	2·72	17	0·81	1·59
Jimbour	2·47	24	Nil	0·74
Miles	2·33	25	Nil	5·19
Stanthorpe ...	3·00	22	0·61	1·41
Toowoomba ...	3·11	22	0·90	2·05
Warwick	2·73	22	0·65	2·65
Maranoa.				
Roma	2 13	21	0·54	2·81
State Farms, &c.				
Gatton College ...	2·71	14	0·42	2·59
Gindie	2·06	13	1·10	2·17
Kamerunga Nurs'y	3·22	23	0·01	..
Kairi	...	.	...	1·55
Sugar Experiment Station, Mackay	2·50	16	0·06	3·03
Bungeworgorai ...	..	...	0·03	2·20
Warren	...	...	0·70	...
Hermitage ...	2·81	7	0·64	2·65

* Incomplete.

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for November this year and for the same period of 1912, having been compiled from telegraphic reports, are subject to revision.

Orchard Notes for February.

In order that the series of monthly notes that have appeared for some years past in the "Agricultural Journal" might be rendered of more value to our fruitgrowers, advantage is taken of the commencement of the new year to revise them and bring them up to date. At the same time the notes have been somewhat altered, as, instead of making them of a general nature, applicable to the whole of the State, they are, to a certain extent, localised, as, although the general principles of cultivation, manuring, pruning, treatment of fruit pests, as well as of the handling and marketing of the fruit are applicable to the State as a whole, there are many matters that are of interest to individual parts of the State rather than to the whole State; and, further, notes that are applicable to the Southern part of the State for one month are not always applicable to the North for the same month.

In order to carry out this idea, the State has been divided as follows:—

1. The Southern Coast Districts, south of the Tropic of Capricorn;
2. The Tropical Coast Districts;
3. The Southern and Central Tablelands.

This plan has met with such general approval during the past year that the notes will henceforth be published in accordance therewith.

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 in consequence kept very busy sending them to both 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 is thoroughly prepared—viz., well and deeply worked—they can be planted with safety, and will become well established before winter. The month is usually a wet one, and both tree and weed growth is 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 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 March is to be preferred. 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 as this time of year.

THE 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 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 those 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 when 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.

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 hardwood 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.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. I. FEBRUARY, 1914. PART 2.

Agriculture.

ONION-GROWING IN THE SOUTH BURNETT DISTRICT.

By G. B. BROOKS, Instructor in Agriculture.

The largest area met with (30 acres) was that on Mr. A. B. Postle's farm, Memerambi, this, I believe, constituting a record for Queensland.

Last season this gentleman raised 1½ acre, which I inspected during the early steps of growth. This patch was somewhat thin owing to the dry conditions prevailing subsequent to planting. Notwithstanding this, I was informed that the return from the 1½ acre was over £70 in cash.

It may be mentioned that while at the Toowoomba Show, Mr. Walsh, seedsman, donated a bag of large, well-grown onions from this crop for exhibition purposes. These were exhibited at the various shows for a period of some 5 months, proving that their keeping qualities were excellent.

The present crop at the time of my visit (20th October) was looking very healthy, a good germination having been secured. The varieties grown are the long-keeping Brown Spanish (24 acres) and Early Globe (6 acres). Planting was carried out during the latter end of May, in rows 20 in. apart, the seeding being at the rate of 2 lb. per acre.

At the time of my visit the plants had developed to the thickness of a lead pencil, and were just beginning to bulb. Mr. Postle anticipates to harvest about March.

A portion in the centre of the field, where cowpeas had been grown the previous season, showed a much more advanced growth. It will be interesting to note what effect this will have on the yield.

Several other farmers in the district are experimenting with this crop in a small way, viz.:—J. Todd, 1½ acre; R. Gatacre, 2 acres; L. Coe, 2 acres; R. Laycock, ½ acre; G. Glen, 1½ acres. Unfortunately time did not permit my visiting these growers.

The soil in this district is a deep, friable chocolate loam of volcanic origin, and is undoubtedly suitable for the production of heavy crops of good quality onions.

The only obstacle that is likely to keep this industry from developing into large proportions is the want of knowledge in regard to the working of the soil so as to keep the crop clean, thereby reducing the cost of weeding, which is at present a heavy item. For instance, Mr. Postle was paying £1 per acre for a single weeding, and this was in addition to the cost of scuffling.

The common practice of ploughing and putting the land in order just previous to planting cannot be too strongly condemned in onion culture.

It will be found necessary—more especially in land that has been cropped for some years—to put the land into tilth some months ahead of planting. If this is carried into effect, and frequent stirring made, most of the weed seed will be induced to germinate, when complete destruction will be easy. Owing to the difficulty in securing reliable labour, up-to-date implements will also have to be used for the after cultivation of the crop as well as for harvesting purposes.

In addition to the areas around Memerambi, Messrs. Springthorpe Bros., Goomeri, have also 5 acres. The varieties grown are E. Barbete, Tripoli, Early Globe, Flat Red, and Giant Rocker. These were planted about the middle of March, on forest land, the soil being a rather heavy brown loam.

Of the varieties experimented with, the Giant Rocket gives promise of giving the best results, the Flat Red coming next. All sorts developed thick necks, possibly due to a combination of circumstances, such as heavy soil, early planting, and the varieties grown. Harvesting will commence about the end of November.

Were proper cultural methods observed, there is no reason why this industry should not expand into very large proportions.

THE HISTORY OF COTTON-GROWING IN QUEENSLAND—No. 2.

BY THE EDITOR.

SECOND PHASE, 1890-1897.

The first period of the Cotton Industry in Queensland had been, as has been shown in my first article on the subject, productive of results which gave rise to the hope, indeed almost to the certainty, that cotton-growing in the State had been established on a solid basis; but, as I also explained, this hope was shattered by the resumption of cotton exports from the United States, shortly after the close of the war of secession in the United States of America. Referring for a moment to the first phase of the industry, it will be noted that in 1871 our heaviest export of ginned cotton amounted, in round numbers, to 2,500,000 lb., equal to 6,505 bales.

From that date the production of cotton declined year by year, until, about the year 1887, the industry practically died out.

Three years later, however, an impetus was again given to the cultivation of the plant. This was owing to the offer by the Queensland Government of a bonus of £5,000 for the first 5,000 yards of cotton fabrics manufactured by any enterprising Queensland company who might be thus induced to establish a cotton mill in the State. Such a company was soon formed; a mill, with all necessary appliances for spinning and weaving the fibre, was erected on the banks of the Bremer River, at Ipswich. An apparently permanent market being thus assured, the farmers once more planted cotton, and received remunerative prices for their crops. As it had long since been proved that cotton cultivation in this State could not be successfully carried on on the old American "plantation" system, the Ipswich mill depended on the aggregate of small supplies from farmers who planted from 5 to 30 acres each, and it is probable that serious delays occurred owing to supplies being intermittent. However that might have been, the company managed to produce the necessary 5,000 yards of cotton fabric, and duly received the Government bonus of £5,000. Eventually it was found that, for various reasons, the company could not carry on, and had to succumb to adverse circumstances and go into liquidation.

On the closure of the mill cotton-growing in Queensland ceased, and was not revived until five years later, when the industry entered on its

THIRD PHASE, 1902-1912.

About this time, an Italian gentleman, Dr. David Thomatis, established a cotton plantation near Cairns, and, undeterred by the collapse of the industry in the South, devoted himself to the evolution of a totally new variety of long-stapled cotton by crossing, I believe, Sea Island with a variety which he procured in 1901 from the Savery River (a tributary of the Amazon), on the borders of Peru and Brazil. In these experiments he was so successful that the new variety, which he named "Caravonica," not only obtained the highest price for long-staple tree-cottons, but was awarded a gold medal at the Tourcoing (France) International Exhibition. So valuable was this cotton considered that the seed readily sold at 10s. per lb. Eventually Dr. Thomatis sold his plantation, which he had successfully worked during all the years of depression, for a very large sum, and travelled all over the cotton-growing world in the interests of foreign Governments. His plantation is to-day being carried on under the name of "Gossypium Park" by a company, and considerable quantities of Caravonica cotton are annually exported. In 1902, the Queensland Government, fully alive to the great value of the industry to the State, if it could be revived, decided to come to the farmers' assistance.

The State had just passed through a very long and serious drought, which came to an end in 1902. It was noticed that whilst the usual farm crops had failed all over the country, yet, wherever cotton was still growing, it was found to have resisted the drought. Consequently, the Department of Agriculture, having its attention drawn to this circumstance, took steps in, I think, 1904, to induce farmers to once again engage in cotton-growing.

To this end, a quantity of seed was imported from America and Egypt, which was distributed free to all who would undertake to give cotton-growing another trial. The Department offered to make them an advance on their crops, and to gin, bale, and market their crops for them, paying them, less expenses, the full value of the lint which would be sold either in the British or Australian market.

Many farmers took advantage of the liberal offer, and planted small areas as a commencement. Judging by the results of the crops of 1907, it was abundantly proved that cotton-growing in Queensland would pay handsomely without any recourse to cheap labour of any kind. Those results were as follow:—

—	Acres.	Yield, Seed Cotton.	Value.	Value per Acre.
	Lb.	Lb.	£ s. d.	£ s. d.
W. G. Giles, Wallumbilla	1	2,240	14 0 0	10 0 0
W. Goos, Tallegalla	2¼	4,250	26 11 3	11 13 0
C. Pointing, Tallegalla	2	3,527	22 0 3	11 0 1
C. Litzow, Vernor	2	3,006	18 15 9	9 7 10
F. Baumann, Vernor	1¼	1,300	8 2 6	6 10 0
O. Adermann, Vernor	1	1,473	9 4 2	9 4 2

A Mackay farmer reported his yield from a small area as being equal to 1,368 lb. to the acre; value, £8 11s.

When the cotton was sold it realised 6d. per lb.

Thenceforth, encouraged by this satisfactory result, the farmers planted larger areas, until, in 1911, there were 605 acres devoted to this crop. I believe that this recrudescence of the industry was largely due to the enterprise of Messrs. Joyce Bros., who had purchased the Ipswich cotton mill, where they manufactured large quantities of cotton goods, especially a cottonette, which was utilised on banana plantations to protect the fruit against the attacks of the fruit-fly.

Unfortunately, the firm were unable to compete against imported goods of the same class, and repeated applications to the Commonwealth Government to give them some protection in the way of import duty on foreign cotton goods, elicited no response, with the result that the firm closed their manufacturing works in 1912.

This market being no longer available, the farmers in the Southern and Central districts again reduced their cotton areas to 441 acres in 1912, and in 1913 there was very little cotton produced in those parts of the State.

To show how profitable the industry might be, if determinedly followed up: In 1912 the Queensland Department of Agriculture bought a parcel of cotton seed from a person arriving from Egypt, who intended to start cotton-growing in Queensland, but who was prevented from doing so owing to his having to leave for England. I obtained some of this seed, and the product was sent to England to the Imperial Institute in London by the Department, for a commercial valuation, and although it was from the first crop, and, consequently, had not been acclimatised, the comparative value is interesting.

The Institute found that the first grade was worth 12½d. per lb., with "Choice Georgia Sea Island" cotton at 13d. per lb., and "Fancy Florida" at 14d. The inferior or second-grade sample was valued at 9·25d. per lb., as against "Good Fair Egyptian" at 9·80d., and "Good Fair Noubari" at 10·20d. per lb. These prices were highly satisfactory, and it is probable that, had the industry not received the set-back by the closure of the Ipswich factory, further cultivation would have increased the commercial value of these cottons in the English market.

In the Cairns district, in North Queensland, the Gossypium Park Company, above mentioned, still carries on the cultivation of the valuable Caravonica cotton, but I have no knowledge of what the crops yield per acre, or at what price the ginned cotton is sold. That they are carrying on is at least satisfactory evidence that the plantation must be paying. Aboriginals are employed on this plantation, who receive good wages and are under the supervision of the Chief Protector of Aboriginals.

We now come to the year 1913, when the Minister for Agriculture, the Hon. J. White, determined to make another effort to resuscitate cotton-growing in the State.

Cotton seed was purchased and was distributed gratis to such farmers as were willing to make another trial of the industry. The Department offered to take all raw cotton from the growers, make them an advance of 1½d. per lb., gin, bale, and market the cotton, and sell it in the best market, either in England or Australia. Whatever balance to credit is shown when account sales are received in 1914, will be distributed amongst the growers according to the quantity of cotton supplied by them, deducting only the bare expenses of preparing the shipments, freights, &c. The seed, which has always been a negligible quantity in the palmy days of cotton-growing in the State, now has a good market value and will probably be a factor in increasing the profits of the growers.

The Colonial Office, London, on 27th November, 1913, announced an agreement in principle between the Commonwealth, the Queensland Government, the Dominions Royal Commission, and the British Cotton Growers' Association in regard to cotton-growing in Australia.

The sum of £1,500 has been promised, including a grant of £100 per annum for three years, by the association to secure skilled advice, and to carry out practical experiments with various cotton seeds.

The British Cotton Growers' Association also guarantees for three years from July next to pay a minimum net price of 6½d. per lb. in Liverpool for cotton according to specified description.

With reference to this cablegram, the Premier of Queensland, Mr. Denham, said that, so far as he was aware, the matter was in a somewhat indefinite state, the latest advice from the Agent-General being that no action should be taken by the Government until mail advices came to hand in Brisbane. The question arose at the beginning of October, when the Agent-General cabled that the Colonial Office had informed him that as a result of the visit of the Dominions Royal Commission to Australia a conference between the Commission and the British Cotton Growers' Association had been arranged to be held at the Colonial Office on 22nd October. The Agent-General said he had been invited to be present. The attendance of Sir Thomas Robinson was approved, and in order that he might be familiar with the present position in Queensland, Mr. Denham cabled particulars of the steps taken by the Department of Agriculture to gin and market cotton. It was suggested that if 6½d. per lb. was paid for a fixed term it would be sufficient to ensure cultivation in Queensland. The British Cotton Growers' Association made proposals and offers of assistance, and asked the Queensland Government if the amount would be supplemented. Numerous cablegrams have passed since, and as a result it was agreed that the Commonwealth should give the sum of £500, the British Cotton Growers' Association £300, and the Queensland Government £700. The Queensland Government was willing to do this provided that the services of an expert, whom it was proposed to send out, should be exclusively employed in Queensland. If he was to be engaged in other States, Mr. Denham considered that the amount to be paid should be divided proportionately between the States participating.

Such is the position of the cotton industry in Queensland at the end of the year 1913.

It must be remembered that no black labour is employed in the Southern or Central Districts in the cotton-fields, and that there is only one plantation in the State which is worked on the "plantation system"—in the North, as I have already explained.

In all other districts, cotton is merely a subsidiary crop, and in the best of times few farmers exceeded an area of from 5 to 20 or 30 acres under that crop.

To conclude: It has been conclusively proved that there are tens of thousands of acres ideal for cotton-growing, in all parts of the State, both on the coast and inland, and nowhere has the crop been found to fail. As to pests, the cotton plant in Queensland is exempt from that scourge of the cotton States of America—the Boll Weevil, and also from the American Cotton Stainer. The Boll worm (really, the maize cob worm) we have, but it is a simple matter to prevent its ravages by planting "trap crops" of maize—five rows of maize to each twenty-five rows of cotton. Cotton-leaf wilt and root rot are scarcely known here.

It is expected that the British Cotton Growers' Association will shortly co-operate with the Queensland Government in forwarding the industry, and negotiations to that effect are proceeding at the time of writing.

WHEAT VARIETY TESTS.

In July of last year, the Director of Agriculture in South Australia forwarded several samples of wheat to Mr. F. Grayson, M.L.A., Warwick, representing a selection of the varieties most in favour in the State mentioned. These wheats were distributed to the State Farm at Roma, and the Hermitage State Farm, Warwick—unfortunately arriving too late in the season to obtain the best results. Appended is the report on the results by the manager of the Roma State Farm.

DESCRIPTION OF WHEATS.

Thew.—Is very early, medium tall, and a fair stooling variety. The young growth is vigorous, spreading, and of good colour. It has a medium amount of foliage, which is green to the base of the plant. The leaves are rather stiff and narrow. When ripe, the straw is white, not very stout, and inclined to be weak under good conditions. The spikelets are fairly open, chaff white, small, and not very close.

Correl's No. 7 (Western Australian variety).—A late wheat, with broad leaves, susceptible to rust. Has a nice large grain.

Gluyas.—An early variety. It is a fair stooler and vigorous grower with weak straw. The heads are beardless, bronzed, and pendant, and hold the grain well.

Firbank.—A very early, good hay wheat, with soft straw of excellent colour and quality. It is a tall grower, stools moderately. The ears are long and open and have a tapering tip. The chaff is small and white.

Federation.—A midseason wheat, and essentially a grain yielder. The head is square, with a peculiar and characteristic bronze cast; upright, beardless, and, while easy to strip, the grain does not readily shake out. The foliage of the young plant has a characteristic bright green colour, and possesses broad, stiff, pointed leaves.

Huguenot.—A late variety, a very tall grower, but a sparse stooler. It has an upstanding, practically solid straw, very sweet in character. It belongs to the Macaroni type of wheat, possessing a high gluten content, considerable strength, but the colour of the flour is very inferior, and it is therefore objectionable to the miller and baker. It is a hardy grower and needs to be sown rather thickly to secure a good sample of hay.

Comeback.—A vigorous grower, medium early, a good stooler, with tall clean straw, and makes a very fair sample of hay. The head is of medium length, beardless, smooth, and white, but the tip of the head is defective. It is a most excellent milling variety.

Crossbred No. 28.—Is very early, medium tall; the young growth is vigorous, rather spreading, and of good colour. Straw is white, not very stout, and inclined to be weak under good conditions.

RESULTS OF TESTS.

The seeds of these varieties, which it is understood represent those most in favour in South Australia, were received too late in the season to obtain the best results, as they did not reach here until the 12th

July. The grain was put into the ground on the same day as received; conditions being favourable for germination, the plants appeared in ten days. During the ten weeks subsequent to germination only 35 points of rain were experienced.

These conditions, in conjunction with the already mentioned lateness of sowing, prevented the plants from making anything like normal growth, so that anything more than the actual results obtained cannot be given. These in themselves afford very little information as to the suitability or otherwise of the varieties, when a comparison is made with data obtained in other sections where similar kinds are grown under seasonable conditions.

Of the wheats received some had already been tested here, viz.:—Federation, Huguenot, Gluyas, and Comeback since 1907, and Firbank and Thew in the previous season, and this has afforded an opportunity of arriving at the individual characteristics of each; Correll's No. 7 and Crossbred No. 28 being the only varieties we were unacquainted with.

When the sowings were made a drill of a crossbred raised here, B x B lb., was put in for control purposes.

NOTES ON WHEATS.

Variety.	Length of Straw.	Stooling.	Rust.	Season.	Yield.	Remarks.
	Ft. in.				Oz.	
Comeback ...	2 7	Good	Rusty	Mid ...	3	Hot winds and rust reduced yield, the ears curing off instead of maturing naturally
Correll's ...	2 3	Fairly good	,,	Late ...	6	Ditto ditto
Federation ...	2 0	Good	,,	Medium	10	Ditto ditto
Firbank ...	3 0	Fair ...	Free ...	Medium early	10	Not so much affected by hot winds, and rust absent
Gluyas ...	2 3	Poor ..	Rusty	Medium early	6	Very weak straw
Huguenot ...	3 4	Very poor	,,	Late ...	9	Coarse, straw semi-solid
Thew ...	2 6	Fair ...	Clean	Medium early	14	Fine straw, drill nice and even, by far the most promising under existing conditions
Crossbred, 28	2 3	,,	,,	Early ...	6	Rather disappointing, evidently more subject to dry conditions than others
Bunyip x Bunge 1B	2 0	Poor...	,,	,, ...	15	Yielded a good deal better than it looked; straw inclined to be coarse and spongy

DESTROYING STUMPS WITH ACIDS.

We have had numerous inquiries as to the efficacy of certain acids in the destruction of stumps, but in the absence of any reliable experiments, all we have been able to say on the subject has been unfavourable to the method, and Mr. J. C. Brünnich, Agricultural Chemist, has maintained that the process is not only useless but dangerous. We now publish the results of careful experiments made by the Department of

Agriculture of New South Wales, under Mr. H. C. Coggins, Assistant Inspector, which appeared in the "Agricultural Gazette" of that State for 3rd November last. From the following results, it may be conclusively affirmed that neither dry nor green stumps can be destroyed by the strongest acids.—[Ed. "Q. A. J."]

[In November last the Matcham Progress Association, of Matcham, *viâ* Gosford, suggested that the department should carry out a series of experiments in the use of acids for rotting out stumps, as a good deal of interest was being aroused on the subject, and various landholders were trying the process with not very satisfactory results. In consequence of this Mr. F. B. Guthrie, at the request of the Experiments Supervision Committee, designed the following series of experiments.—Ed. "Agricultural Gazette of New South Wales."]

There seems to have been some diversity of opinion as to whether dry and green stumps could be destroyed with acids, and with a view to determining the efficacy of this treatment, the department decided to experiment in this direction.

These experiments were carried out according to the following design, and included both dry and green stumps:—

1. Dry—1 pint sulphuric acid.
2. Dry—1 pint nitric acid.
3. Green—½ pint nitric acid, ½ pint sulphuric acid.
4. Dry—¼ pint nitric acid, ¾ pint sulphuric acid.
5. Green—¾ pint nitric acid, ¼ pint sulphuric acid.
6. Dry—¼ pint sulphuric acid, ¼ pint nitric acid.
7. Dry—1 pint nitric acid, 1 pint sulphuric acid.

The stumps treated were of the spotted gum, box, and ironbark variety, and were from 18 in. to 2 ft. 6 in. in diameter.

Holes were bored with a 2-in. auger in the stumps about 18 in. from the earth-line at an angle of 45 deg. to a depth of 18 in. Each stump was then dosed according to the design; the holes were then immediately plugged with green plugs.

Periodical notes were taken as to the action of the acids, and as six months have now elapsed, a sufficient time has been given to prove the experiment a success or otherwise.

It must be understood that the whole of these stumps were perfectly sound and solid, also that two out of the three varieties—viz., box and ironbark—are extremely hard wood, and if the acid would eat through these stumps then the majority of other timbers would be easy victims.

The final examination showed that, in the case of the dry stumps, in every instance the action of the acids had no appreciable effect, and beyond a very slight crumbling of the wood—in extent about 1 in.—in the immediate vicinity of the hole no other effect was noticeable.

As regards the green stumps, in both instances the effect seemed to be slightly better. The wood in the immediate vicinity of the holes had rotted to a depth of about 2½ in., but beyond that sound wood was found; in addition both stumps had thrown out vigorous suckers.

The above result clearly proves that sound stumps cannot be destroyed with either sulphuric or nitric acid or both, and these two acids are of the strongest known.

The experiment has an additional value, inasmuch as it has provided the actual cost per stump as against other methods.

The average cost per stump worked out at 1s. 9d., which includes cost of acids and labour paid at the rate of 7s. per day; and it is an open question whether men could be found to work with two such dangerous acids at that figure.

In the event of the success of the acids, the great drawback to clearing land by this method would be the vast amount of valuable time wasted in waiting for the stumps to rot away, irrespective of the danger of handling the acids, and when time is taken into consideration—and in every instance time is money—cheaper and quicker methods may be adopted.

Mr. C. W. Brown (Jilliby) in the "Gosford Times," recounts his experience in connection with the use of sulphuric and nitric acids for destroying stumps:—

"I thought I would have a try myself, as I have some heart-breaking stumps here, and as I take out everything in front of me, regardless of size, I thought that the acids would prove a great labour-saver. Having purchased 4 gallons of sulphuric and nitric acids (2 gallons each), I started operations on a green grey-gum stump 4 ft. high, and diameter 4 ft. 6 in. In that stump I bored three holes with a 2-in. auger, going the full depth of the auger, and in those holes I poured equal quantities of the acids, then plugged up with a green spotted gum plug, having previously put same in paraffin, which I had melted, and then also poured some of the paraffin over the plug to make certain that it was air-tight. I next tried a dead blackbutt stump, 10 ft. high and 4 ft. 9 in. across it on the top, the giant at the butt being 24 ft. 2 in. I bored four holes with the 2-in. auger, going its full depth, and repeated the same process as I did with the grey-gum stump. After waiting patiently for six weeks, I knocked out the plugs and refilled both stumps. From the time of refilling to the present day is five and a-half weeks, or in all eleven and a-half weeks, using in all 2¾ gallons of acids on the two stumps, and the only difference in them is what I pulled out with the auger. Having given the acids a first-class trial, I have to turn round again and use what I have been using for the last five and a-half years, gelignite, and it will be a hard job to find its superior."

I find throughout the State that farmers in several districts have started clearing by this method, and in every instance it has been discarded in favour of more reliable and quicker methods.

A NEW METHOD OF FERTILISING THE SOIL.

"The Implement and Machinery Review" (London) for 1st December, 1913, states that "an extraordinary discovery is said to have been made by the eminent Professor of Botany at King's College, London, Dr. W. B. Bottomley. As the result of seven years' experiment, it is said that the professor has found that by inoculating ordinary peat with nitrogen-fixing bacteria and using it as manure, he is able to increase the growth of plants and vegetables, in some cases as much as 150 per cent. When further experiments on a large scale are conducted next spring, particular attention is to be paid to the cultivation of wheat. Meanwhile, remarkable results have been obtained with other produce. The professor's further experiments will, we are sure, be awaited by the agricultural world with the greatest possible interest." This discovery recalls to our recollection the invention by Colonel Halford Thompson, F.R.H.S., of

JADOO FIBRE,

and its introduction into Victoria in 1897 by Mr. W. R. Virgoe, proprietor of the Old Chatsworth Nursery at Brighton, near Melbourne. This Jadoo fibre was a peaty moss, saturated with the fertilising liquid called Jadoo, from the Indian word meaning "magic," and when applied to plants either in the field or in pots, induces a wonderful growth of fibrous roots which enable the plant to absorb so much more nourishment that it grows quicker and stronger and healthier in every way than it can possibly do in soil alone. The same Jadoo may be used many times over; in fact, it has not yet been ascertained when it becomes exhausted.

Mr. Virgoe in 1899 published details of the process of manufacture, omitting, however, the exact proportions, although he was willing to furnish them.

THE FOUNDATION OF JADOO FIBRE

is absorbent peat moss.

In a large boiler, partly filled with water, the following ingredients are put in various proportions:—

Soot, Pink Gypsum, bonemeal, phosphoric acid, potash, nitrate of soda, sugar.

The boiler is then filled up with the peat moss in a dry state, and the whole is kept at boiling point for thirty minutes. The moss is then taken out and stacked. To it is added yeast, and the moss is fermented, and kept in that state, and at a certain temperature for a month or five weeks, when it is fit for use. The Jadoo liquid is made in the same way, but without the use of the peat moss.

In December, 1899, Mr. J. C. Brünnich, Agricultural Chemist, analysed the product, and wrote as follows on the result:—

The Department of Agriculture supplied a quantity of Jadoo fibre to the Agricultural College for experimental purposes, and the results of these experiments will be looked for with interest, although in our rich College soils the effects might not be so marked as on poorer soil.

In order to see if what the inventor claims is really true, I made a complete analysis of the product, with the following results: —

I found Jadoo fibre to be a fine fibrous product, of brownish colour, which, almost like a sponge, has the power of absorbing an enormous quantity of water up to six to eight times its own weight. This fact alone will explain part of its practical value, when used for pot plants, in the orchard or vineyard. This fibrous raw material is saturated with plant foods, which, according to analysis, are to a large extent soluble in water, any plant having thus a fair amount of plant foods at once available for its growth; another portion of the plant foods are like some in the soil not soluble in water, but soluble in hydrochloric acid, and these will become available gradually, by the chemical dissolving action possessed by the roots of growing plants. As a matter of fact, Jadoo fibre must be considered a highly fertile artificial peaty soil.

Analysis.

		Per cent.
Organic matters		71·40
Containing ·812 per cent. of Nitrogen = ·986 per cent. Ammonia.		
Mineral matters—		
Soluble in water (total, 4·36 per cent.)	Per cent.	
Phosphoric acid, P_2O_5	·445	
Sulphuric acid, SO_3	1·286	
Nitric acid, N_2O_5	·520	
Alumina and iron, Al_2O_3, Fe_2O_3	·271	
Lime, CaO	·303	
Magnesia, MgO	·107	
Potash, K_2O	·357	
Soda, Na_2O	·750	
Ammonia, NH_3	·020	
Soluble in hydrochloric acid, 1·1 sp. gr.	Per cent.	
Silica, SiO_2	·031	
Sulphuric acid, SO_3	·926	
Phosphoric acid, P_2O_5	·715	
Alumina, Al_2O_3	·765	
Iron, Fe_2O_3	·170	
Lime, CaO	1·875	
Magnesia, MgO	·163	
Potash, K_2O	·402	
Soda, Na_2O	·791	
	5·838	
Insoluble in HCl	4·012	
Total ash		9·85
Moisture		18·75

The inventor does not claim the product to be a manure, and in accordance with the analysis the actual value of the plant foods.

phosphoric acid, potash, and nitrogen amounts to 15s. per ton of Jadoo fibre. The secret of the preparation lies in the foundation material, which has the power of absorbing and retaining the fertilising ingredients, which are thoroughly incorporated with the fibre by a slow process of fermentation.

I believe the manufacture of this product could be successfully started in this State, and I do not think that a better foundation material could be found than finely crushed megass from a sugar-mill. Megass by itself has only a very slight manurial value (about 6s. per ton), but megass possesses great absorptive power, and retains water just as well as Jadoo fibre, and, again, does not rot quickly in the ground. Perhaps finely chopped trash, or, again, dried filter press cake, might be added with advantage to the megass.

A FEW OBSERVATIONS ON THE RAISING OF WINTER FODDER CROPS.

By G. B. BROOKS, Instructor in Agriculture.

In the winter months it is interesting to note the great variation in the growth of winter fodder crops, more especially should the season have been at all a dry one.

On one farm one might see nice healthy-looking crops, while on those adjacent to it they are poor and stunted, even although grown on similar soil and under identical climatic conditions.

To the settler who has made no provision in the way of ensilage or dry fodder, a field of green material to draw upon in a dry time is, needless to state, of very great value, and the methods of the farmer who can raise a crop of such under adverse climatic conditions are worth looking into.

The reason, perhaps, why so little care is taken to ensure a full crop is, that given a dropping winter, one can, on an average Queensland soil, grow fair crops of fodder, even although practising the most careless methods of preparation. For instance, it is not at all an uncommon thing to see areas ploughed one day and seeded down the next. Should the winter be at all a dry one, however, the results are altogether different—good crops are then the exception rather than the rule.

Now, when we come to investigate the methods of the successful man, we find that it is not so much the kind of soil, or the manner in which he cultivates it, that ensures a crop, but the time or season when it is prepared.

Of course, one cannot get away from the fact that poor soil and careless cultivation are closely connected with light yields, but it is the farmer who puts his land into good tilth early in the season who invariably reaps a heavy crop.

Numerous examples bearing this out are to be met with in practically every district, examples which should be valuable object lessons to those whose efforts have resulted in failure.

Much has been written on the subject of dry farming and the wonderful results obtained thereby. To sum it up in a few words, the whole secret of dry farming lies in early preparation. No sooner is one crop taken off than the land is broken up either with the plough or disc cultivator for the next.

I firmly believe that by going over the land immediately after harvesting either a wheat, corn, or any other crop, it would be the means of going pretty near to doubling the yield.

Early cultivation, it may be mentioned, has a two-fold effect, viz., the conservation of moisture and the making available of the necessary plant food, two essentials in successful crop production.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF DECEMBER, 1913.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Madame Melba	Holstein	10 Nov., 1913	1,194	3·4	48·32	
Lady Loch...	Ayrshire	31 Aug. ,,	1,030	4·2	48·26	
Glen ...	Shorthorn... ...	27 Oct. ,,	1,041	4·0	46·52	
Bluebelle ...	Jersey	13 July ,,	677	4·4	33·43	
Butter ...	Shorthorn... ...	27 Sept. ,,	761	3·8	32·22	
Pauline ...	,, ...	8 Oct. ,,	868	3·4	32·66	
Nellie II. ...	,, ...	5 June ,,	714	3·8	32·22	
Miss Bell ...	Jersey	25 Sept. ,,	633	4·4	31·26	
Honeycomb e	Shorthorn... ...	7 June ,,	632	4·4	31·21	
Miss Edition	Jersey	19 July ,,	632	4·2	29·78	
Rosine ...	Ayrshire	27 Nov. ,,	763	3·5	29·60	
Auntie ...	,, ...	15 July ,,	637	3·9	27·71	
Lennie ...	,, ...	1 Sept. ,,	680	3·6	27 20	
Gem... ...	Shorthorn... ...	8 Aug. ,,	621	3·8	26·29	
Bee	Jersey	7 July ,,	504	4·6	26·08	
Burton's Lady	Shorthorn... ...	23 June ,,	631	3·6	25·24	
Daisy ...	Holstein	14 Feb. ,,	687	3·2	24·23	
Silver Nell...	Shorthorn... ...	26 Sept. ,,	498	4·2	23·42	
Lavinia's Pride	Ayrshire	11 Dec. ,,	693	4·2	22·60	
Lonesome ...	,, ...	26 Oct. ,,	599	3·4	22·53	
Sweet Meadows	Jersey	20 Aug. ,,	346	5·6	21·99	
Countess of Brunswick	Shorthorn... ...	22 July ,,	581	3·4	21·36	
Miss Melba	Holstein	22 Jan. ,,	559	3·5	21·69	
Cocoatina ...	Jersey	19 May ,,	420	4·5	21·24	

Fed on natural grasses, with an added ration of 40 lb. of sorghum ensilage per head per day.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, DECEMBER, 1913.

Very hot weather was experienced during the first half of the month, commencing on 3rd December. The highest reading was recorded on the 10th, when the maximum shade temperature was 114 deg. The laying fell off in consequence. By the free use of water, however, the deaths resulting from heat apoplexy were limited to two hens. The ideal weather conditions prevailing during the latter part of the month, resulted in an all-round improvement in laying. Five thousand two hundred and twenty-three eggs were laid. Moritz Bros. win the monthly prize.

The following are the individual records:—

Competitors.	Breed.	Nov.	Total.
J. R. Wilson	White Leghorns	130	1,203
A. H. Padman	Do.	138	1,200
Moritz Bros.	Do.	152	1,180
Loloma Poultry Farm, N.S.W.	Do.	140	1,171
T. Fanning	Do. (No. 2)	140	1,166
O.K. Poultry Yards	Do.	124	1,149
Range Poultry Farm	Do.	140	1,137
T. D. England	Do.	134	1,104
E. A. Smith	Do. (No. 2)	137	1,103
R. Burns	Black Orpingtons (No. 2)	144	1,093
J. F. Coates	White Leghorns	138	1,083
R. Burns	Black Orpingtons (No. 1)	137	1,071
J. Zahl	White Leghorns	140	1,067
S. E. Sharpe	Do.	119	1,062
H. Tappenden	Do.	121	1,058
A. T. Coomber	Do.	139	1,057
F. McCauley	Do.	113	1,057
Cowan Bros., N.S.W.	Do.	123	1,040
Jas. McKay	Do.	119	1,039
W. D. Bradburne	Do.	143	1,039
Doyle Bros., N.S.W.	Do.	130	1,039
Mrs. Munro	Do.	134	1,034
E. A. Smith	Do. (No. 1)	140	1,033
Yangarella Poultry Farm	Do.	130	1,007
H. Hammill, N.S.W.	Do.	132	1,005
Mrs. Sprengel, N.S.W.	Do.	119	1,004
A. F. Camkin, N.S.W.	Do.	135	1,003
D. Grant	Do.	121	975
R. Jobbling, N.S.W.	Do.	115	974
J. Archibald, N.S.W.	Do.	130	965
T. Fanning	Do. (No. 1)	135	955
J. Murchie	Brown Leghorns	138	953
C. Leach	White Leghorns	135	953
J. Gosley	Do.	120	946
Mrs. Craig	Do.	133	941
A. Schbrowski	Brown Leghorns	121	928
T. Stephens, N.S.W.	White Leghorns	119	908
Mrs. Beiber	Brown Leghorns	132	890
A. C. Collis, N.S.W.	White Leghorns	128	882
J. Andersen, Victoria	Red Sussex	105	862
Totals	...	5,223	41,336

MAIZE AND FOWLS.

It has been frequently pointed out to farmers and others who keep fowls in large or small numbers, that persistence in maize-feeding is injurious to fowls. But we still find on the farms, as well as in the suburbs and towns, that whole maize is fed to fowls every morning and evening. Why should we have to go abroad to learn the injury done to fowls by this constant maize-feeding, when a line to the Poultry Expert at the Q.A. College would set poultry breeders on the right track as to feeding? The "Fiji Planters' Journal" has the following article on the subject, and we would advise poultry keepers to read, mark, learn, and inwardly digest it. That journal says:—

Too much maize is not good for fowls, as it brings on liver disease sooner than anything we know. It makes too much internal fat, and also makes blood too fast. Fowls that are fed liberally on it get lined with yellow fat, especially in the abdomen. We have taken it out when it has been ½ in. thick—the egg organs become so weak that the hens lay shell-less eggs. Even this is not the worst part of it, as fowls which have liver disease are susceptible of many other complaints, especially roup.

It is not always the liver that actually kills them—it is very often that other diseases follow through their being in a weak state. When roup has been incurable, we have found on examination that the liver was diseased, being full of tuberculous matter—it is commonly called scrofula—having white spots on it. Sometimes these spots are only as large as the head of a pin. We have found also in a few instances tumors, which maize is very liable to bring on. In cases where only the ordinary scrofula is coming on, tuberculosis substance forms in small yellow spots, about as large as a pin's head; these sometimes develop so quickly that they are ¼ in. through, and the liver more than three times the ordinary size. We have weighed it when it has been from 9 to 11 oz., while the ordinary weight should be from 2½ to 3¼ oz.

Inbreeding also brings on liver disease, from which there are more fowls die than from all other diseases put together. We have known farmers use maize for years together, and it has effected the progeny so that they could scarcely rear a chicken. They die off when from four to seven days, and from three to six weeks old. It is used so largely simply because it is such a cheap food, and fowls seem to prefer it to any other grain. A little for a change does not hurt, especially in the cold weather.

We use more wheat than any other grain, as that is not so fattening as most other grains are. Next to wheat, we use good oats, which are a splendid grain for a change, but they ought not to weigh less than 40 lb. to the bushel. Hemp-seed is also an excellent grain for the breeding season, especially for the male birds. If this is given there will not be many unfertile eggs. It is also very good in the autumn through the moulting season, as it is stimulating. It is used largely for bringing young chickens into good condition for the show pen, but it is well to change the grain, as the birds like variation.

From October to March it is well to give corn softened by boiling from fifteen to twenty minutes, and standing the pot on one side till it soaks up the water used for boiling, giving it to the fowls when hot. Care should be taken not to boil the grain too much, or use too much water, as it causes it to burst and become sticky, in which state it is not at all liked by the fowls.

They ought not to have as much boiled corn as they can eat, but should have a little hard corn to finish up with. When meat is given to the fowls, it should be cut into small pieces just so that the fowls can swallow it easily. If given in too large pieces, one hen gets hold of a piece and runs away with it, and while she is trying to peck it to pieces, the others eat all theirs, and then have a good run to the large piece, in which case the hen which ran away with it usually gets none, and, worse than this, should she swallow the large piece she often gets into trouble, as it is apt to cause stoppage in the passage between the crop and gizzard. Where a large number of birds are kept it is well to pass the meat through a sausage machine.

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

Date.	January.		February.		March.		April.	
	Rises.	Sets.	Rises.	Sets	Rises.	Sets.	Rises.	Sets.
1	4·56	6·46	5·21	6·42	5·41	6·20	5·57	5·47
2	4·57	6·46	5·21	6·42	5·41	6·19	5·58	5·46
3	4·58	6·46	5·22	6·41	5·42	6·18	5·58	5·45
4	4·59	6·46	5·23	6·41	5·42	6·17	5·59	5·43
5	4·59	6·46	5·24	6·40	5·43	6·16	5·59	5·42
6	5·0	6·47	5·24	6·39	5·44	6·15	6·0	5·41
7	5·1	6·47	5·25	6·39	5·44	6·14	6·0	5·40
8	5·1	6·47	5·26	6·38	5·45	6·13	6·1	5·39
9	5·2	6·47	5·27	6·37	5·45	6·12	6·1	5·38
10	5·3	6·47	5·28	6·37	5·46	6·11	6·2	5·37
11	5·4	6·47	5·28	6·36	5·46	6·10	6·2	5·36
12	5·4	6·47	5·29	6·35	5·47	6·9	6·3	5·35
13	5·5	6·47	5·30	6·35	5·47	6·8	6·4	5·34
14	5·6	6·47	5·31	6·34	5·48	6·7	6·4	5·33
15	5·7	6·47	5·31	6·33	5·49	6·6	6·5	5·31
16	5·8	6·47	5·32	6·32	5·49	6·4	6·5	5·30
17	5·9	6·47	5·33	6·31	5·50	6·3	6·6	5·29
18	5·9	6·47	5·33	6·30	5·50	6·2	6·6	5·29
19	5·10	6·47	5·34	6·30	5·51	6·1	6·7	5·28
20	5·11	6.47	5·35	6·29	5·51	6·0	6·7	5·27
21	5·12	6·46	5·35	6·28	5·52	5·59	6·8	5·26
22	5·13	6·46	5·36	6·27	5·52	5·58	6·8	5·25
23	5·13	6·46	5·37	6·26	5·53	5·57	6·9	5·24
24	5·14	6·45	5·37	6·25	5·53	5·56	6·9	5·23
25	5·15	6 45	5·38	6·24	5·54	5·54	6·10	5·22
26	5·16	6·45	5·39	6·23	5·54	5·53	6·10	5·21
27	5·16	6·44	5·39	6·22	5·55	5·52	6·11	5·20
28	5·17	6·44	5·40	6·21	5·55	5·51	6·11	5·19
29	5·18	6·43	...	...	5·56	5·50	6·12	5·18
30	5·19	6·43	...	...	5·56	5·49	6·12	5·18
31	5·20	6·43	...	...	5·57	5·48	...	...

PHASES OF THE MOON.

		H.	M.	
4 Jan.	☾ First Quarter	11	9	p.m.
12 „	○ Full Moon	3	9	„
19 „	☽ Last Quarter	10	30	a.m.
26 „	● New Moon	4	34	p.m.
3 Feb.	☾ First Quarter	8	33	p.m.
11 „	○ Full Moon	3	35	a.m.
17 „	☽ Last Quarter	7	23	p.m.
25 „	● New Moon	10	2	a.m.
5 Mar.	☾ First Quarter	3	3	p.m.
12 „	○ Full Moon	2	18	„
19 „	☽ Last Quarter	5	39	a.m.
27 „	● New Moon	4	9	a.m.
4 Apr.	☾ First Quarter	5	41	a.m.
10 „	○ Full Moon	11	28	p.m.
17 „	☽ Last Quarter	5	52	„
25 „	● New Moon	9	22	„

State Farms.

The manager of Bungeworgorai State Farm, Roma, reports as follows on the operations, &c., for December, 1913:—

Weather Conditions.—The dry conditions mentioned in November report have continued up to time of writing, 14th December. The effects of the excessive temperatures experienced during the heat wave on vegetation has been disastrous, more especially on the sandy soils, where the foliage in many instances bears the appearance of having been in proximity to a fire. During the last few days the weather has broken, storms having been experienced in the surrounding districts, and indications are favourable to more. Rain fell on two occasions, .02 points being recorded.

The following are the meteorological readings for the month ending 14th November, 1913:—

Humidity (lowest), 13 deg.; average, 29 deg.
Maximum, 112·5 deg.; average, 100·5 deg.
Minimum, 55·0 deg.; average, 62·4 deg.

Land Under Crop, Permanent: Vineyard.—The first of the table grapes were marketed on the 9th instant, the returns for which have not yet come to hand. Owing to the shortage of water, the birds have congregated on the ridge in large numbers, in consequence of which a large quantity of fruit is destroyed by the fruit-eating birds amongst them every day.

Orchard: Citrus Fruits.—The lemons mentioned as having been marketed in last month's report realised from 14s. 6d. to 16s. 9d. per case. The greater part of the balance of this crop is past benefiting from rain, and the trees themselves are beginning to show signs of being seriously affected. As a result of the excessive heat, the leaves not only curled but turned colour in the same manner as they would had they been scorched by fire.

Deciduous Fruits.—The returns from the apricots, of which 49 quarter-cases were marketed, have been received, and though not equal to those of last year, were as good as could be expected under existing circumstances. This class of tree (deciduous) is not exhibiting signs of lack of moisture to anything like the extent the citrus fruits are, due to the fact that in the winter less moisture is required by them owing to their being dormant, in consequence of which more moisture was held in reserve in the soil when the prevailing dry conditions began.

Temporary Crops (Summer).—The seed mentioned as having been sown in last month's report is still awaiting rain to promote germination.

In addition to this 2·75 acres of Japanese millet, 3 acres of maize, and 3 of sorghum have been put in for silage. The ploughing of another 7 acres for growing crops, the same purpose, is nearing completion, but the condition of the soil renders it extremely difficult to obtain anything like the desired tilth, and progress is naturally exceedingly slow.

Cowpeas.—A few drills of new crossbreds of this plant sown in the earlier part of the season on the sand are in most instances not only looking well, but still growing, which only serves to further illustrate the value of this crop to farmers in dry districts where extreme heat is likely to be experienced, which burns off most other kinds of vegetation.

Fodder Crops: Lucerne, 1 Acre.—The 6-in. high crop mentioned in previous report has been cut and fed to stock. The effects of continued dry conditions are more apparent on that portion situated on the lighter soil, where the plants are beginning to die out.

Rhodes Grass.—This grass is showing well under existing conditions, being still green. Its superiority over some of our native grasses is demonstrated by the fact that those found growing throughout the crop have died right back and become dormant, whilst odd plants of the Rhodes have gone so far as to produce flowering heads.

General.—The watering and mulching of the young fruit trees has been proceeded with, but a great number have been so injured by the heat owing to lack of foliage that they will not recover.

Posts have been secured for the fencing in of assistants' quarters and placed in position.

Both horses and cattle look exceptionally well. Artificial feeding will have to be resorted to in the course of a fortnight if rain is not experienced in the meantime.

The pigs have had a most trying time, but no losses have occurred to date.

Mr. D. Macpherson, manager of Kairi State Farm, reports:—

After a rather prolonged spell of dry weather, the rain set in in earnest on the 12th December, and between then and the end of the month we had twelve wet days, the total rainfall for that time being 779 points.

Forty-five acres of last season's falling has been planted with maize. This came up splendidly, but, unfortunately, wallabies and bandicoots have played havoc with it. In previous years these vermin have been satisfied to take a toll round the edge of each falling, but this year they have worked right out to the centre of the piece.

Small plots of cowpeas, six varieties, and various strong-growing beans have been planted, also white panicum.

Since the rain, lucerne has made and is making a most wonderful growth. I cut one lot for hay to-day that had practically nothing on it when the rains came, a little over three weeks ago, while another plot that is used for soiling makes marvellous growth behind the scythe.

From the State Nursery, Kamerunga, Cairns, the manager, Mr. C. E. Wood, writes:—

The long dry spell was broken on 12th December, when 40 points of rain fell. Between this date and end of the month, 13.59 in. were recorded. After the first showers, all ground lying in the rough was harrowed down, ploughed, again harrowed, and made ready for planting small plots of various seed.

Two or three rows (about 2 chains each) of the following legumes were planted for comparing growth as cover crops:—Mammoth cowpea, White's perennial cowpea, Iron cowpea, Groit cowpea, Chinese mottled cowpea, Mauritius beans, small Madagascar bean. There are all runners, while non-running legumes are: Poona cowpea (generally, I believe, considered an upright grower), Black and Yellow Pigeon pea (*Phaseolus Max* and *P. Mungo*).

In our climate, where weeds spring up so quickly, and rain is apt to be continuous, cover crops are an important item. The use of legumes as soil renovators cannot be over estimated, as by ploughing in, large quantities of humus are added to the soil, and the nitrogen "drawn from the atmosphere by means of bacteria for which the roots of the legumes act as hosts" must also be added.

Other seeds sown comprise Japan Upland rice, Raggee, white panicum, sorghum and sesamum. Although only three weeks have elapsed since the first rain, grasses such as Guinea and Red Natal are from 15 in. to 2 ft. high on patches of cultivated ground, and the surrounding country, which looked brown and bare, is now green with grass, burrs, and sida retusa.

Mr. A. E. Soutter, manager of the Roma State Farm, Bungeworgorai, appears from his report (12th January) to have had many difficulties to contend with owing to the dry weather of the latter part of last year, but the rains which have lately fallen will doubtless soon produce beneficial effects. It is noted that, despite the shortage of fodder crops, there has been no necessity for hand-feeding to stock, and the cattle have done remarkably well, as is evidenced by the sale of two fat cows to the local butcher early in January. Mr. Soutter's report is as follows:—

Weather Conditions.—Notwithstanding that the dry spell mentioned as being experienced at time of submitting last report was partially dispelled on the 19th, 20th, 21st, 22nd, and 25th December—1.67 in. being recorded—at the present moment vegetation is again evincing signs of distress. This is not to be wondered at considering how dry the subsoil must be and the excessive temperatures, accompanied by hot, strong winds, which have been experienced during the past week.

The following are the meteorological readings for the period under review:—

The maximum temperature recorded was 109°; average, 98·2°.

Minimum temperature recorded was 51°; average, 61·5°.

Humidity (minimum) 21°; average 49°.

Permanent Crops: Vineyard.—The excessive heat completely destroyed the crops of grapes on some of those varieties having sparse foliage—viz., Centennial, Golden Champion. The rain experienced rotted the "Chavuch." This is always the case with this variety, and it is to be regretted, as it is a most wonderful grower and cropper with berries of extra large size, of good flavour. The Ferdinand de Lesseps also seemed to be affected by the conditions, as, though they were larger than in previous seasons, when ripening off seemed to wilt and turn sour.

The following have turned out well so far:—Chas. Violet, Chas. Negropont, Mad. Royal, Muscat, Hamburg, Royal Ascot, Muscat Beaume, Raisin de Dame.

Some of the late varieties are looking well. As previously mentioned, great numbers of birds migrated here during the excessive hot weather, and having remained, have wrought great havoc in the vineyard.

The lack of natural food and absence of water, due to droughty conditions, accounts for the increase of their numbers over those of other seasons.

Orchard.—The rain was not of sufficient quantity to be of much benefit to the citrus fruits, though it freshened up the trees wonderfully. It is sincerely hoped that more will be experienced within the course of a few days, as the oranges and mandarins have not yet gone too far, though it is feared the greater part of the lemon crop is beyond saving.

Figs.—The sun has completely destroyed the crop of this fruit, which on one tree was a particularly heavy one.

Summer Crops.—Those sown before the rain look as well as can be expected. They consist of 6 acres maize, 4 sorghum, 2.75 panicum.

Six acres of sorghum sown since the rain has been scorched off and will have to be resown.

An area of 25 acres has been worked up for cow-peas. The seeding of this should be completed by 14th instant.

Four acres of sandy soil were worked up and sown with Rhodes grass previous to the rain, and a good strike resulted, but it is feared the uncongenial weather, in conjunction with weeds, will put its extreme hardiness to too severe a test.

Seed was scattered over 6 acres of a grazing paddock, consisting of a very sandy soil, and the rain brought about a fair germination here also.

Last week a test was carried out in order to ascertain whether drilling in seed with manure would prove beneficial, and what seed should be put on to the acre. Three acres were devoted to this, the results of which will not be forthcoming until after rain is experienced. Small sowings of the following crops have been made, the resulting plants in most instances looking well at present, viz.:—China nut, Teff grass, soya beans (two varieties), cotton, pumpkins, etc.

Transplantings were made of some grasses from seed boxes out in to the open during the cloudy weather. The plants were those resulting from crossing Rhodes grass with one of our indigenous grasses (Chloris).

Some died as a result of the removal, the others were sheltered from the direct rays of the sun to preserve them, and it is pleasing to be able to record that of those which have eared one at least proves to be a combination or conjugate plant.

The plants resulting from the tobacco cross scorched off similarly to those in 1907.

Stock.—The spring in the pastures has been sufficient to delay the necessity for resorting to hand-feeding so far.

On the whole horses and cattle look exceptionally well; in fact, two fat cows were disposed of to the butcher last week.

Owing to the severity of the weather it has been found necessary to spell the horses for four hours during the heat of the day.

GINDIE.

The experience in respect of dry weather and its effects on crops during the last few months of 1913 was much the same at the Gindie State Farm as at others, and in the farming districts generally. The Manager, Mr. R. Jarrott, writing on 15th January, says:—

In common with other parts of our State, we have been experiencing a dry time, and the outlook was not very cheering. From June to well on in November our rainfall was 38 points; just enough to give some extra work while getting in the hay crop.

But notwithstanding the dry weather all the stock were in good condition, especially the horses and sheep; the latter were very fat. I am pleased to say that we had some rain this month, in December, which will enable us to plant maize and other seasonable crops, including Rhodes grass. Up to the present, we have not been successful in growing this. When the ground has been cracked the seed has been scattered about on the low parts of the paddock, in hopes that when rain came some of the seed would be covered and come up, but it failed to do so, and we have had no better results where it was sown on cultivated land. I am afraid it will not take to our heavy black soils very well. Weather permitting, we will try different methods of planting it. If it can be grown on the flats where the Daisy Burr has killed the native grasses, and also on some of the low brigalow country, it would be of vast benefit to the district.

CALENDAR FOR 1914.

We have received from Messrs. Traill Bros., process engravers, Brisbane, a very neat, artistic calendar for 1914, for which we tender our best thanks and good wishes for the New Year. The calendar, we are informed, is entirely a Brisbane production.

The Orchard.

CINCTURING FRUIT TREES.

RENMARK EXPERIMENTS.

Cincturing fruit trees to induce the setting of the fruit, as described and performed by Mr. C. Ross, Instructor in Fruit Culture in this State, is a modified form of ringbarking, and is effected by means of a special instrument. In the "Murray Pioneer" for 12th December we find the following interesting account of the process as adopted at Renmark, South Australia. The writer says:—

Oranges are said to be falling very badly this year in Renmark plantations, and that this is true of at least some orchards I have seen for myself. How true it may be of the settlement as a whole I have had no chance to judge. That it is not universally true is evidenced by the fact—vouched for by the manager, Mr. C. H. Katekar—that the Fairview Orangery, which last year produced a record crop of fruit, is carrying an even larger crop this year.

In the case of this orchard of Mr. Rose's there are special influences at work which may, perhaps, be responsible for the fact that the trees are promising so large a crop at a time when in other orange groves so many trees have shed nearly all their fruit.

The special factor which is very probably influencing the Fairview trees—as it very probably influenced them last year—is the use of a wire girdle, twitched tightly round the tree trunks to assist the setting of the fruit. Mr. Katekar experimented with the girdling last year, and was not desirous of making the experiment known until its value had been clearly demonstrated. But the matter got about, as such things will, and Mr. Katekar, realising that a knowledge of at least the broad lines of his experiment had become pretty generally spread, has been good enough to supply me with a little more detailed information than was contained in the general report.

The practice followed has been to tie a piece of soft, No. 10, wire round the tree trunk in the spring—using heat, if necessary, to make the wire sufficiently soft and pliable—tapping it to make it follow closely the irregularities of the surface, and then twitching it tight. The wire girdle is left on until the setting of the fruit is assured—until after midsummer, in fact—and is then removed.

The effect, apparently, of this treatment at Fairview last year was the heaviest crop of navel oranges ever harvested in Renmark. And, so far as can be seen, the trees have taken no harm from the girdling. The marks left in the bark by the wire have practically disappeared, the trees to-day appear to be in perfect health, and they are carrying an even heavier crop than that of last year.

The idea of girdling fruit trees with wire is not a new one, but I do not remember hearing of its application to orange-trees before. Ten years or so ago I learned that a wire girdle was frequently used by pear-growers of the Doncaster district, in Victoria, and with good results. But there is so great a difference between the respective natures of the bark of the pear and orange tree that one might well be apprehensive lest a constrictive treatment suitable for the pear should prove injurious to the orange. One is inclined to suppose that any constriction, if tight enough to serve its intended purpose, would be likely to damage the tree by bruising the wood. As noted, the trees at Fairview are at present showing no signs of injury from the treatment to which they have been subjected.

Two things I should suppose to be essential to secure successful results from the wire girdle. The girdle must be tight enough to press into the bark, and it must be left on until the long period during which orange-trees are liable to cast their fruit is past.

Last Friday I visited an orange grove—a very nice little plantation of some 4 acres of nine-year-old trees—in which wire girdles have been tried this year in imitation of Mr. Katekar's experiment. Every tree in the grove, I believe, had been girdled, but with no apparent result at all on the setting of the fruit, which has fallen very badly. On some of the trees, indeed, it is difficult to find a single orange left. The wires have already been removed, through fear of damage to the trees as the bark swells, but a cursory examination of the trunks showed that in many cases (and this was probably true of most trees) the wires had failed to make a complete girdle. In places the mark of the wire could be seen in the bark, but wherever there was a depression the wire had missed it, and the circuit was broken. One does not need to think very hard to realise that if a girdle is to be of any use it must be complete, just as the cincture on the currant must be made right round the stem to be effective.

CINCTURING EXPERIMENTS.

Though the practice of girdling the orange-tree is new in Renmark, the cincture was experimented with a good many years ago. And it was tried then in Mr. Rose's orangery. Mr. Rose's experiment took the form of removing a strip of bark from the circle of the trunk, leaving "bridges" of bark, so as not to make the experiment too drastic. Even with the "bridges," however, it was a long time before the strip healed, and the effect on the trees was judged to be too severe for the experiment to be repeated. In Mildura, however, at about the same time (some ten years back) a number of experiments were tried with the single cut, complete cincture on orange-trees. In some cases the trunk of the tree was operated on, and in other cases branches were selected for the experiment. In every case of the complete cincture which came under my notice good results were recorded. Heavier crops were obtained by this means, and the trees appeared to take no harm from the operation. But the practice has not, apparently, been continued.

Since writing the above, I have been reading some of my old notes and am reminded thereby that Mildura growers did not confine these experiments of tree cincturing to the orange. The results obtained varied considerably with the variety of tree. On the Adriatic fig-tree the cincture was most successful; and Jordan Almond trees operated on responded well, so far as crop was concerned. But on the prune d'Agen the cincture produced no effect whatever, probably owing to failure to make provision for the cross fertilisation of the blossoms. In the case of the almond and prune, a certain amount of gumming was induced by the cincture, but the fig bark healed over the wound without any appreciable injury to the tree.

It is worth stating here that most of the Mildura cincturing experiments had their origin in a series of articles on "The Philosophy of Cincturing," which Mr. W. H. Harrison, M.A., of Renmark, contributed to the "Cultivator" in 1903. But the earliest recorded experiment of this class in Mildura was made some years before this date by Mr. Thomas Wilkinson (since deceased) on an Adriatic fig-tree. Following in Mr. Wilkinson's wake, Mr. Henshilwood (who had seven acres of these trees) employed the cincture to force young, but well-grown, Adriatic fig-trees into early bearing. To the subsequent history of these trees of Mr. Henshilwood's an element of romance—or tragedy—is attached. But we have carried the subject far enough for the present.

To this, Mr. C. Ross adds:—

"Referring to my remarks on cincturing fruit trees in my notes on citrus-growing in the last issue of the 'Q.A. Journal,' I may add that I have read the article with much interest. As a general rule, I prefer that the cincture should be performed in the head of the tree, for the reason that it is not so drastic as when the main stem is operated upon. The cincture is more successful than the wire girdle, as the latter cannot be complete on any limb that is not perfectly cylindrical. However diverse the method is performed I should like some of our growers to try it and to state with what result. The principle is to check the return or descending flow of sap without unduly retarding the upward stream."

DISEASES IN CITRUS FRUITS.

On this subject, Mr. C. Ross, Instructor in Fruit Culture, writes:—Since my article on "Diseases in Citrus Fruits" appeared in the "Agricultural Journal" of January, 1914, I have received a letter from Mr. Charles C. Brittlebank, of the Pathologists' Branch of the Agricultural Department of Victoria, in which he states that he has received true samples of "Exanthenia" from Queensland and New South Wales. An excellent description is given in the "Agricultural Journal" of Victoria, vol. x., p. 401.

It would be of great assistance to this department in the interests of fruitgrowers, if samples of diseases and pests generally were sent in to our own Pathological and Entomological Branch for investigation and record.

Where *n. sp.* occurs in the same article, after the words *Phoma omnivora* or *Ascochyta corticola*, it should be explained that Mr. McAlpine, Vegetable Pathologist of Victoria, named these fungi. (See "Fungus Diseases," by D. McAlpine, pp. 43, 53.)

Horticulture.

DAFFODILS.

In Southern Queensland, the Narcissus or Daffodil flourishes as well as it does in cooler climates, yet these beautiful flowers are rarely seen in suburban or country flower gardens. Their cultivation presents no greater difficulty than growing a patch of cabbages or onions. Of course they require a certain amount of care. The chief cause of failure is late planting, although last year we planted the bulbs over a month too late and yet had a fine show of blooms. Some may be planted as late as May or June without any appreciable falling off in quality or quantity of blossom, while there are others—the Poeticus section, for instance—that can hardly be planted too early. The best results are obtained from these by planting in March, or even in February. The depth at which the bulb should be planted is important. It will vary with the size of the bulb. A good old English rule is that all narcissi bulbs should be covered with soil once and a-half their own depth, measuring from the collar of the neck to the actual base.

The best soil for these bulbs is a nice soft, sandy loam, but they are not at all particular as to soil, and may be left alone for several years after planting. Some, indeed, like a rather deep and somewhat stiff soil, and if the position is one partially shaded from hot sunshine in spring, the flowers of some of the species retain their beauty for a much longer period than they would if exposed to all the light and sunshine possible. Narcissi are well adapted for planting by the sides of creeks and waterholes. They delight in root moisture, and in the early stages of growth there should be no lack of it. They are also suitable for naturalising in grassy plots, when they may remain for a long period, for it is neither necessary nor desirable to transplant the bulbs annually.

The bulbs must on no account be allowed to come in contact with crude manure or they will assuredly be injured. Should manure be necessary at the time of planting, owing to poorness of soil, it should be well rotted and placed at such a depth that the bulbs do not touch it, say, at least 6 in. below the bulb-planting level. As stated, plenty of water is required during the growing season, and the flowers will always be more beautiful in a moist season than in a dry one. When the soil is at last so exhausted that the plants show decided deterioration, the whole batch should be lifted, and it is an excellent plan to move the bulbs to an entirely different location, as a change of quarters makes a wonderful change for the better in their recuperative power. The lifting must be done with care, and the best time for the operation is when the foliage has attained the yellow stage preparatory to decay. Some place the bulbs in a cool, airy shed to dry, after which any offsets large enough may be separated from the parent plants, either by pulling them apart or cutting. Drying the bulbs indiscriminately is a very bad practice. As a general rule, lift, divide, and plant out at once. When planting bulbs in grass plots, they may be dibbled in with a crowbar, or the grass may be taken up and the soil underneath prepared. The species and varieties are divided into sections, and these again into groups. The sections are: Hoop Petticoat daffodils, Trumpet daffodils, Chalice Crowned, and Poet's daffodils.

The groups are: 1. *Magni-coronati.* This group contains the largest Trumpet daffodils. 2. *Medii-coronati,* or Chalice-cupped daffodils (*Narcissus incomparabilis*). 3. *Parvi-coronati* (Dolly Cup or Small-crowned daffodils.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF DECEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING DECEMBER, 1912 AND 1913, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Dec.	No. of Years' Records.	Dec., 1913.	Dec., 1912.
North Coast.	In.		In.	In.
Atherton	7·55	11	8·59	1·72
Cairns	7·71	25	10·76	1·71
Cardwell	9·18	25	7·41	0·09
Cooktown	5·81	25	16·56	1·68
Herberton	5·38	25	5·49	3·00
Ingham	6·40	20	7·51	1·50
Innisfail	13·02	25	7·46	1·53
Mossman	11·55	5	19·92	1·90
Townsville	5·68	23	6·72	1·38
Central Coast.				
Ayr	3·57	25	9·18	0·14
Bowen	3·78	25	5·71	0·86
Mackay	6·50	25	15·59	1·66
Proserpine	7·32	10	12·30	2·95
St. Lawrence ...	3·84	25	8·09	1·28
South Coast.				
Crohamhurst ...	6·86	20	4·45	8·24
Biggenden	5·11	14	4·81	1·09
Bundaberg	4·57	25	5·22	1·01
Brisbane	5·08	62	2·37	5·20
Childers	5·69	17	3·77	2·72
Esk	4·51	25	3·77	3·88
Gayndah	3·95	25	5·78	5·06
Glasshouse M'tains	...	...	2·82	...
Gympie	6·77	25	3·23	2·49
Kilkivan	4·31	25	4·55	3·04
Maryborough ...	4·37	25	6·24	3·36
South Coast—continued:	In.		In.	In.
Nanango	3·69	25	3·01	1·29
Rockhampton ...	4·09	25	13·40	2·83
Woodford	5·54	25	3·67	4·83
Yandina	6·97	19	5·22	...
Darling Downs.				
Dalby	3·36	22	1·35	1·18
Emu Vale	3·19	17	3·92	1·08
Jimbour	3·45	24	1·73	1·08
Miles	2·80	25	2·73	0·18
Stanthorpe ...	3·51	22	1·57	3·41
Toowoomba ...	4·24	22	1·93	3·91
Warwick	3·47	22	3·70	2·37
Maranoa.				
Roma	2·42	21	2·28	0·54
State Farms, &c.				
Gatton College ...	3·18	14	2·83	3·97
Gindie	2·76	13	5·04	2·17
Kamerunga Nurs'y	5·94	23	13·59	...
Kairi	...	...	7·79	...
Sugar Experiment Station, Mackay	7·92	16	14·21	...
Bungeworgorai ...	...	...	1·67	...
Warren	...	...	5·02	0·75
Hermitage ...	2·12	7	4·36	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for December this year and for the same period of 1912, having been compiled from telegraphic reports, are subject to revision.

Tropical Industries.

QUEENSLAND'S RECORD SUGAR CROP.

The Government Statistician's estimate of the Queensland sugar crop for the year 1913, which may be taken as correct for purposes of comparison, shows a total yield of 241,496 tons, or some 30,000 tons in excess of the highest previous return.* One of the peculiarities which differentiate the sugar industry from most other field pursuits is that the lean year is often followed by one of exceptional productiveness, and *vice versâ*. Thus, 1912 was the worst year experienced since the period of the great drought in 1902; and the year now closing has benefited through the amount of stand-over cane which in ordinary course would have been reaped in 1912. From this point of view, it will be interesting to compare the aggregate of the three-year period 1911-13 with 1908-10, culminating in what has hitherto been our record year for this crop. Thus, taking the estimate for the year now closing and adding it to the actual results for 1911 and 1912, we get a total of 527,852 tons for the three years. On the other hand, the aggregate returns for 1908-10 amounted to 496,438 tons. Thus, the estimate for 1913 shows an increase of 30,740 tons as compared with the yield for 1910; whilst the difference between the figures for the two triennial periods amounts to 31,414 tons in favour of the three years just closed.

The past season has been remarkable for the extreme dryness which characterised the latter half of the year. This, though favourable for harvesting, has meant a somewhat diminished growth of the cane; but on the other hand there has been no interference with the cutting and carting of the crop, and the density has not been lowered, as is sometimes the case, owing to excessive moisture. The extreme dryness has at the same time been a hindrance to the prospects of the 1914 crop; for it has stood in the way of planting, and the young plant cane and ratoons have not come away so well as they should have done under ordinary conditions. It is still early to speak of the outlook for 1914; but it was remarkable how well the crops withstood adversity; and with a continuance of the splendid weather of the past month, it may be anticipated that another successful year will reward the efforts of the farmer. Indeed, it is quite possible that in some of the districts where this year's cane yield has been light, the crop of the coming year will more than compensate for deficiencies.

Thus, the sugar grower has good cause for thankfulness whether he regards the past year or peers into the future. Things have certainly turned out far better than was at one time thought possible; and there has been far less trouble with labour than formerly. One hopeful sign.

* The estimate was published in the January issue of the "Queensland Agricultural Journal."—Ed.

as mentioned from time to time by several of our correspondents, is that a better class of men has been coming forward for engagement in cane-cutting; and though there is quite enough friction in some districts to cause the harvest season to be one of anxiety to the canegrower, there are indications that the industry is coming to be regarded as a stand-by for the unskilled labourer all over the Commonwealth, and especially for men who are desirous of making a "rise" for themselves and families, and who know the worth of money too well to fritter it away either in vexatious strikes or in purchasing still more harmful liquor. Apart from considerations as to the adequacy of the amount of the import duty, we believe the main hope for the continued success of the industry lies first in the skilful and energetic canegrower, who selects the best quality of land for his crop, uses the right description of fertiliser liberally, and sees to it that suitable varieties of cane are properly cultivated with the aid of the best machinery available. After this the sugar industry must depend on the intelligent labour of men willing to give a fair day's work for a fair day's pay—men who know very well that the farmer must get his bit out of it as well as the wage-earner, or the whole thing must go to pieces. The miller is, of course, a necessary element in the business; but we believe that so long as there is cane fit to crush there will, as a rule, be mills capable of doing justice to it, and in the great majority of instances the miller is far-sighted enough to know that a full and regular supply of suitable cane is of more consequence to the success of his enterprise than that he should be able to get cane—good, bad, or indifferent—at a price which cannot pay the grower. The year has been notable for the emancipation of the industry from oppressive Federal control through the medium of excise and so-called bounty; and we shall be surprised if either farmers or mill-owners are ever content again to place themselves in the same position, however difficult they may find it to settle differences which naturally arise between them.

These are the internal affairs of the industry, and should not be available as a handle to outsiders, either in interfering with the Customs protection afforded against black-grown sugar from other countries, or in seeking to impose new restraints upon grower or manufacturer. But let us glance at what the record harvest of 1913 means to the country at large. Let it be remembered that for the most part the sugar-cane which supplies this abundant return has been grown on land which but for this industry would in all probability be still covered with unproductive jungle; and it is harvested and handled by men who would otherwise be swelling the ranks of unskilled labour in Southern cities, already congested, because of the unwillingness of so many to seek work in the country, and make their homes there. We contend that if protection is a sacrifice that the people are justified in making in the interests of manufactures, it is doubly advisable in the cause of effective occupation of the soil, and settlement of our vast and fertile tropical areas.

A mere glance at the figures is sufficient to prove the strength of the position. It has been calculated that the sugar of the present season, when refined, will produce, say 227,000 tons of sugar ready for consumption. The present price of A1 sugar is £21 15s. in Brisbane; £22 in Sydney, and £22 2s. 6d. in Melbourne. As by far the largest proportion of the sugar is consumed in the Southern States, the value may be averaged at £22 per ton, which works out at very nearly £5,000,000 for this year's crop. The greater part of this immense sum goes in wages of one kind or another; and it has to be remembered that under present conditions, the canegrower is as a rule a "small man," so that the proceeds of the industry are more widely distributed and more evenly divided amongst the persons engaged in it than is usually the case with any manufacturing enterprise. From this point of view, and others which we have named, the sugar industry should appeal strongly to all who have regard to the general welfare of Australia; and they will heartily join with us in wishing to all our sugar producers, in every branch of the industry—A Happy and Prosperous New Year.—"Australian Sugar Journal."

NOTES ON DATE-GROWING.

A very interesting and instructive illustrated Bulletin on "Date Cultivation in the Punjaub," Northern India, by D. Milne, Economic Botanist, Punjaub, has lately been issued by the Agricultural Department of that district. We hope that, some day, Queensland farmers and orchardists will realise that as good dates as any in the world can be, and are being, produced, not only in our dry Western country, but also on the coast, and on the slopes of the Main Range. Why we should import dates when we can so easily grow them is among the many things one cannot understand. We might just as well cease growing pineapples, oranges, and mangoes, and import them from other countries.

We have frequently written in this journal on the subject of date cultivation, and at the risk of repeating ourselves we propose to extract from Mr. Milne's monograph such points as would be of value to anyone intending to plant date trees.

THE SOIL AND CLIMATE.

For the successful cultivation of dates, an extremely dry atmosphere, a very high temperature, and a plentiful supply of water are essential during the flowering and fruiting period. The Arabic saying, "the date palm likes its feet in the water and its head in fire" is roughly expressive of the requirements of the plant. The date palm appears to grow and produce fruit almost equally well on sandy, loamy, or clayey soils. The physical character of the soil appears to have little influence on the plant, except that the flowers and fruit may be a little earlier on sandy lands. The soils of the Saharan oases are mostly of a sandy nature; those of the Mesopotamian tract and in Egypt are mostly of very dense clays; while some of the date groves on the coast of Egypt are growing in almost pure sand. On the whole, sandy loams are best suited for date cultivation.*

* Such loams are the soils of large areas of the Central Western plains of Queensland, as at Barcaldine, Saltern, Longreach, &c.—[Ed. Q.A.J.]

A plantation of young off-shoots is much more easily started on a sandy loam than on other soils, however, for reasons to be given later. Practically, any soil on which ordinary farm crops can be grown is suitable for the date palm. With regard to alkali soils, Mr. Milne, quoting W. T. Swingle of the U.S.A. Department of Agriculture, on the soils of the Algerian date palm tracts, says:—" Although this plant can grow in soils containing 3 to 4 per cent. of their weights of alkali, it does not produce fruits unless its roots reach a stratum of soil where the alkali content is below 1 per cent., and does not yield regular and abundant crops unless there are layers in the soil with less than 0·6 per cent. of alkali."

The alkali referred to is a white alkali consisting chiefly of sulphates of sodium and magnesium, and a little of the chlorides of these metals. These soils also contain a great deal of sulphate of lime, which is believed to counteract the poisonous effects of the magnesium salts, and to prevent the formation of the very injurious black alkali. Swingle states: " If a soil at all depths contains 0·6 per cent. of alkali, the growth is slower, and the yield is less than on better lands, and where the alkali content is everywhere over 1 per cent., date palms do not bear fruit regularly, and their growth is very slow."

The adult date palm can withstand very large accumulations of alkali on the surface of the ground. The rise of alkali, so harmful to other crops, is often, therefore, not dangerously harmful to date palms. In laying out a young date plantation, however, the risk of the plants dying before becoming established will be greater if there is over 0·6 per cent. of alkali in the soil. It may not be convenient to have all soils analysed before starting a plantation, but, as wheat, corn, and lucerne crops, and peach, orange, prune, and other fruit trees are all believed to be unable to flourish in 0·6 per cent. of alkali, young date trees may be planted where one or other of the above can grow well. Barley, sorghum, sugar beets, and grape vines are believed to stand from 0.6 to 1 per cent. of alkali, but, unlike the date palms, these plants are easily killed by an accumulation of alkali at the surface of the soil. When dates are planted on lands containing alkali, and the trees obtain their water from a high water-table in the soil, and no irrigations are given to the land between the trees, either to crops, or for other reasons, a white crust of salt very soon forms on the surface of the soil. This is due to the fact that water is constantly depositing its load of salt as it is being evaporated from the surface of the land, and, as the evaporating current is always upwards, the salt deposit at the soil surface continues to be added to. In this way, a very large crust of salt may accumulate on the surface of the soil of a date plantation, even when the soil below the surface contains very little salt. . . . . We often find date trees growing lustily in a soil, the surface of which is covered with a thick deposit of salt. The roots of the trees may, however, be feeding in a stratum from which practically all the salt has been removed and deposited on the surface of the soil, where it does not affect the trees. Very great damage may be done to such a plantation by very heavy rains, or by flooding the land artificially. The reason of this is, that the salt deposit at the surface is dissolved, and a very strong solution of salt is carried down to the roots of the palms. The solution may quite easily be strong enough to be fatal even to vigorous, well-grown trees.

Effects of winds.—The date palm is not harmed by winds, even if they are of considerable violence, the roots of the palm being firmly fixed in the ground, its trunk strong and elastic, and its leaves very tough. It is indeed recorded that, in some cases in northern latitudes, the date trees fail to produce a crop if hot winds do not blow frequently.

Temperature.—Well-established palms do not appear to suffer from excessive heat or excessive dryness of the air if the roots have a sufficient supply of water. Date trees have been reported to stand as low a temperature as 20 deg. Fahr. in winter without harm, but where the temperature is low in the fruiting season the fruits will not ripen properly. Certain varieties of dates ripen at lower temperatures than others, and those varieties that ripen only in the hotter climates generally appear to be superior in quality to those that ripen in cooler climates. In most parts of the world, the fruits begin to form about 1st May. If the climate is hot, and the variety of date is one that requires comparatively little heat to ripen it, the fruit may be ripe in July, while, if the climate is cooler, or the variety be one that requires more heat to ripen it, the fruits may ripen as late as October. . . . . . Various writers conclude that (*a*) the date palm can be grown but will not form flowers and fruits if the mean temperature between 1st May and 31st October is under 64 deg. Fahr.; (*b*) if the mean temperature between 1st May and 31st October is above 70 deg. Fahr., and is above 80 deg. Fahr. for one month at least, early varieties of dates will ripen fruits; (c) for moderately late varieties, these temperatures must be 75 deg. Fahr. and 85 deg. Fahr. respectively; (*d*) for some of the best and latest varieties these temperatures must be 84 deg. Fahr. and 94 deg. Fahr. . . . The amount of heat necessary to ripen the fruits of the date palm has generally been calculated by adding together the daily mean temperatures during the months when the dates are developing, the developing period being considered as extending from 1st May to 31st October. . . Swingle states: "From three years' observations it is considered that about 3,600 deg. Fahr. are required to ripen the Deglet Noor date satisfactorily." The Deglet Noor date is supposed to be the finest date known, and the most difficult to ripen. In Ayata, Algeria, with an accumulated temperature of 3,764 deg. Fahr., Deglet Noor dates ripened well in 1889, and at Bagdad, Mesopotamia, the average of five years' observations showed that excellent varieties ripened with a mean accumulated temperature for the six months of 4,242 deg. Fahr. . . . . No amount of heat has been found too much for date trees when properly cultivated.

Rainfall and Humidity.—In order that the date palm may produce abundant fruit of the best quality, it is essential that the air be very dry from the time the flowers open to the time the fruits ripen. Rain or a damp atmosphere at other times of the year may be beneficial. The presence of water vapour in the air has been considered to cause harm to the date palm in the fruiting season by absorbing the heat from the sun's rays, and thereby preventing the temperature from rising to the great height necessary to develop and ripen the fruits properly. Damp or rainy weather is also injurious directly in preventing the fertilisation of the flowers in spring and in causing decay or dropping off of the fruit when it is developing and ripening in summer.

Swingle's Bulletin No. 53, United States Department of Agriculture, the Egyptian Survey Department's Almanac for 1906, and Fletcher's "Note on Date-palm Cultivation in Countries other than India" are collated by Mr. Milne in the following table:—

HUMIDITY AND RAINFALL.

Locality.	Mean relative humidity during flowering and fruiting season, 1st April to 30th September.	Average rainfall in inches per annum.	Remarks.
	Per cent.		
Biskra, Algeria	30	9·46	Of this amount 4·71 inches fell between 1st April and 30th November
Ayata, Algeria	...	4·39	
Phœnix, Arizona	33	7·08	Of this amount 3·82 inches fell between 1st April and 30th November
Alexandria, Lower Egypt	66·7	8·00	
Cairo, Egypt	53·86	1·08	
Berber, Upper Egypt ...	22	...	
Bagdad	...	4·8	

[TO BE CONTINUED.]

VALUABLE WHEATS.

We have been shown a letter addressed to Mr. Thos. Wood, nurseryman, George street, by Frederico C. Varela, Teneriffe, Canary Islands, describing two varieties of wheat, one of which, the writer says, gives a yield of 400 per cent. (without exaggeration), and the other one gives twice over the ordinary crop, but it has the great advantage, according to Mr. Varela, of thriving where no other cereal would live, because it accommodates its life to the worst kind of wasted (worn out?) soils, and further, with only one rain, it assures a crop in any case. An illustration of these wheats with an affidavit by a Notary Public, *viséed* by the British Consul and other Consulates, will be forwarded to Mr. Wood shortly. If these wheats on trial in Queensland should turn out to be what is claimed for them, a dry season should not be much to be dreaded by the wheat-grower.

Entomology.

SHEEP MAGGOT FLY PEST.

In October last, the Chief Veterinary Surgeon, Mr. A. H. Cory, M.R.C.V.S., and Mr. E. Jarvis, assistant Government Entomologist, were deputed by the Minister for Agriculture and Stock to proceed to the western districts, where the blow fly had become a serious menace to sheepowners, to investigate and report upon the results of their mission. Accordingly the two following reports were furnished by those gentlemen on their return to Brisbane:—

REPORT OF THE CHIEF VETERINARY SURGEON.

BLOW FLIES AND SHEEP.

I have the honour to submit the following report *re* the Blow Fly Pest affecting sheep in the Central District:—

Mr. Jarvis, assistant Entomologist, is reporting from an entomological point of view, therefore, my remarks will not embrace that portion of the subject.

Various sheep stations were visited by us in the Longreach, Emerald, Springsure, and Capella districts, and information obtained from some forty sheepowners, who are responsible for over 1,000,000 sheep.

With a few exceptions, the flies have not caused any serious trouble to sheep until the last two or three years. On one station near Springsure, and two stations in the Capella district, sheep have been more or less affected, according to the seasons, for the past ten years, and one gentleman informed me that he had seen sheep fly-blown in the Jericho district thirty years ago. Rams and other animals with wounds caused through fighting or other mechanical injuries, have always been blown unless attended to.

The worst months of the year, when the flies are most active, appear to be March, April, and May, but this year cases have been known where the flies have worked continuously since February. The activity of the fly is greatly controlled by climatic conditions. After rain a great number of sheep are attacked, the moisture assisting the development of the intermediate stages of the flies, also the spring of new grass which follows acts as a laxative on the sheep when soiling of the wool occurs—which is an attraction to the flies—thus the pest varies in different districts from time to time according to the weather.

The Blow Fly Pest is far more prevalent on the open downs country than in timbered country, which is contrary to the usual idea. Flies prefer a certain amount of shelter, from which they emerge to attack sheep as they pass. Owing to the number of good seasons we have experienced, there has been an over-abundance of grass; at the time of our visit there had not been any rain for about three months, but green feed was plentiful everywhere. In my opinion, the good seasons referred to are largely the cause of the blow-fly pest increasing to such an extent in the open country, where there are innumerable grass tussocks, which provide the necessary shelter for the flies. If these grass tussocks are disturbed at or soon after sunset, hundreds of flies will be found sheltering around them. On the so-called desert country (within about 50 miles radius of Jericho) there is little or no loss, so far, from the flies.

From statistics obtained of the 1,000,000 sheep in question, an average of about 23 per cent. were attacked by the flies last year. Five stations had from 40 per cent. to 70 per cent. affected, the remaining thirty-five stations averaging just over 13 per cent. The flies have become so aggressive that not only are the ewes attacked, but quite a large number of weaners and wethers, in some cases up to 10 per cent. In the case of weaners, one must always remember that worms may be the exciting cause, by producing diarrhoea, which attracts the flies. If such is found to be the case, the cause must be removed. It is recognised by all practical sheep-men that the lighter-woolled and plainer-bodied sheep suffer much less than those with heavy-yolked, dense fleeces and wrinkled bodies; but as sheep are kept chiefly from a wool-producing point of view, it is not expected that the old varieties of crossbreds will again become popular. With the present day improved type of merino sheep, wool is grown from practically every portion of the sheep; a denser wool with a greater amount of grease, which is moister, more easily soiled, and far more attractive to the blow flies.

Nothing new was noticed as regards the symptoms exhibited by affected sheep. The usual place attacked is the base of the tail or hips, but any part may be "fly-blown" if it has become wet or soiled by lying in manure, by some micturating upon others when lying down, or by heavy showers, &c. They are readily noticed by their dull appearance; they leave the flock and mope about by themselves. The wool on the affected part appears ragged or "tuffy," and the sheep shows a disposition to bite or rub itself, with a constant wriggling of the tail (if long enough). When examined, the wool over the diseased part is dark and moist, somewhat in a matted condition, at the base of which is noticed an abundance of maggots of various sizes, and, in cases further advanced, large open sores are found, or subcutaneous cavities practically seething with maggots. The sheep is in great distress, condition is rapidly lost, and the animal dies unless soon relieved of the maggots. The rectum and vagina may also be the seat of maggots. When these parts are affected, prompt and thorough treatment is required. Antiseptics such as corrosive sublimate 1 in 1,000, or lysol 2 per cent., injected by means of a syringe, give satisfactory results.

Frequent inspection of sheep is imperative, because one is impressed, when examining sheep, with the rapidity with which maggots develop. Sheep may be inspected to-day and found apparently sound; in two days' time the same sheep may be examined and found badly blown.

The customary treatment of affected sheep is to shear the wool from the blown area, taking care also to remove the wool for some inches beyond the area, the latter point being very important as the maggots have generally extended beyond the area first noticed. After this has been done, the part is dressed with probably one or other of the following medicaments:—

1. Kerosene and fat.
2. Tar, turpentine, and castor oil.
3. Cooper's powder or fluid dip.
4. Castor oil, tar, and iodoform.
5. Mallison's dip.
6. Turpentine and oil.
7. Sulphur and spirit mixed with fish oil.
8. Little's dip.
9. Quibell's dip.
10. Tar and kerosene.
11. Copper sulphate solution.

The above dressings were used by persons interviewed, but undoubtedly many others have also been tried with more or less success.

Tar dressings injure the wool, and, as the tar dries and the wool grows, it forms a crust, under which maggots are often found. Turpentine is very good, but it is too severe if used alone or on too large a surface; mixed with oil it is much safer.

From evidence obtained, copper sulphate, ½ lb. to 1 gallon of water, appears to give the best results, but it is not without its bad effects. It stains and more or less injures the wool, so it can only be used after crutching, or for dressing fly-blown sheep.

In one case, 125 rams were examined weekly, and, on an average, nine to twenty-five were found fly blown on each inspection, when various dressings were tried. Copper sulphate solution was then tried, and only four rams were found affected in four weeks. The affected sheep are usually dressed in the yards, and I would here point out that sufficient care is not taken to destroy the affected wool and maggots, which should be done by burning or by saturating with a strong solution of arsenic. The same thing applies to hides and other decomposing matter around the yards, consequently the latter become prolific fly-breeding establishments, where the sheep are quickly fly-struck when they are yarded.

I would draw attention to the dangerous practice of using any arsenical solution on wounds, as it is readily absorbed. In several cases I found that practically pure arsenical dip mixture had been used to destroy the maggots, and it not only destroyed the maggots but the sheep also. Even when wounds are not present, arsenical preparations should always be mixed with accuracy, carefully following the directions accompanying the preparation.

Comparatively little has been done from a preventive point of view, although at the present time it must be admitted that little is known on this point. Crutching has been adopted by a good many sheep-owners, and, where it has been thoroughly done (viz., by shearing at least 4 in. on either side of the vagina, extending to about 1 or 2 in. above the root of the tail and down below the hocks), with considerable success. The copper sulphate solution appears the best dressing to apply after crutching, although arsenical dressings have been found beneficial, the chief objection being that there is not sufficient wool left to retain the dip ingredients. The best time for crutching appears to be when the sheep have about six months' wool on.

In the course of our investigations, only seven stations were found which adopted dipping, and I consider the following remarks indicate the good results obtained:—

No. 1.—Dipped 1,000 maiden ewes (hindquarters only) in Cooper's powder dip—no crutching; only twelve ewes fly-blown in six months.

No. 2.—Dipped in June, and up to present date (13th October) not 2 per cent. fly-blown. When struck, the maggots did not develop and spread as with non-dipped sheep. Last year 80 per cent. of sheep struck.

No. 3.—Dipped in May; very satisfactory results since; 40 per cent. of sheep were fly-blown last year.

No. 4.—Dipped hindquarters of ewes in Cooper's five weeks ago; none fly-blown since; those not dipped have been blown. Marked 1,000 lambs in May, sprayed with Cooper's. Only about 1 per cent. blown since, and lesions did not extend.

No. 5.—Dipped last four years, when six or eight weeks off shears; particulars not available.

No. 6.—Dipped sheep in May. So far very satisfactory.

No. 7.—Dipped sheep three months off shears in Royal dip; 10 per cent. affected last year. No flies at present.

Mr. L. P. O'Brien, of Capella, informed us that he erected a shower dip, 12 ft. by 6 ft., capable of holding fifty sheep. Its total cost, including pump, tanks, &c., was less than £8. Three thousand mixed sheep were dipped in June, two months off shears, and up to the time of our visit (13th October) not 2 per cent. had been fly-blown, and it was found that when blown the maggots did not extend as with undipped sheep. Mr. O'Brien had 600 undipped wethers running with these dipped sheep, and he stated that they were continually getting fly-blown. Last year 80 per cent. of Mr. O'Brien's sheep were affected. In this case Cooper's powder dip was used, the cost of which worked out at a fraction over ½d. per head.

Dipping, properly carried out in a poisonous solution, undoubtedly minimises the action of blow flies. A precipitate of arsenic and sulphur is left in the fleece for some months, which not only destroys or checks the development of ticks, larvæ of blow flies, and lice, the latter being more prevalent amongst sheep than is generally believed, but the ingredients are well-known skin stimulants, which improve the growth and quality of the wool.

Mr. W. G. Brown, Sheep and Wool Expert, Queensland, wrote a most instructive article on "Shower Dipping," which appeared in the issue of the "Agricultural Journal" for January last, which I here quote:—

"In the course of my duties during the past twelve months, I have seen more lice and tick-infested sheep on the Downs than I believed possible, when so much advice on the advantages of dipping sheep has poured from the Press, from wool-brokers, and from practical sheepmen all over the States.

"I found that on every well-managed holding the dip was considered an essential part of the working plant, but in the case of smaller holders a large number had no dip, and, among the few who possessed one, carelessness in its use was common. At the risk, therefore, of seeming tedious I propose to show again the certain advantage of dipping in a proper manner, and further describe a method which eliminates any disadvantages of the process as it is too often conducted.

"Stated shortly, the advantages of dipping are:—

1st.—The destruction of ticks, lice, and other vermin which sheep on the Downs or coastal districts are so liable to carry. Ticks are easily noticed, but lice may exist on sheep without the owner being aware of the fact, for the insects are of the same colour as yolk, and very minute. These set up an irritation which causes the animal to rub against fence posts, stumps, and logs. One consequence is a badly-grown, felted, and ragged and generally inferior fleece.

2nd.—The worry causes a falling off in condition. A ticky or lousy ewe, owing to her condition, breeds a less robust lamb than if she were comfortable. The lamb itself becomes badly infested, and, if not dipped, will probably die of poverty.

3rd.—If dipping does not altogether prevent the attack of the maggot-fly, it certainly acts in no small measure against that pest. That fact, from evidence which I have at command, is undoubted, and, for that reason alone, all sheepowners should be compelled by law to dip their sheep, as they are in Victoria and Tasmania. Once a man dips his sheep, he will not require to be compelled, the benefits being so apparent.

"Summed up, therefore, the effects of dipping are—1. A better and more valuable fleece. 2. A more contented and, therefore, better 'doing' sheep. 3. A better and more robust lamb. 4. A fairly large degree of immunity from the attack of the maggot-fly.

"The disadvantages of dipping are—

Initial cost of dip and expense of working it.

Liability of injury to sheep, caused by rough usage, which is nearly unavoidable in ill-constructed dips.

The liability to serious loss after dipping by sudden falls in temperature or other changes of weather.

The liability of the animals swallowing a large quantity of the liquid in the bath, which, if it do not kill, will certainly make very sick sheep.

"The direct benefits of an increased price for a heavier fleece more than balance the cost of the operation. A sheep may be dipped for three-farthings or less, and at least one penny per pound will be added to the value of its fleece.

"As to liability of injury, I shall show below that a new method of dipping has been invented which eliminates all the sources of rough usage, and, further, makes it impossible for a sheep to be poisoned or drowned.

"Care in choosing suitable weather will prevent the losses caused by sudden changes of temperature. A sheep should be dipped as early as possible in the day, so that it may have its wool dry before night.

"The above short *résumé* of the principal effects of dipping sheep is given *apropos* of a method of operation which is radically different to the old plunge bath, and superior to it in every way.

"I met Mr. George Watson, of Tandawanna, some weeks ago, and he told me that for three years he had tried a new and superior method of dipping his sheep. He invited me to inspect his operations, and, a little later, telegraphed me that he was about to dip about 40,000 sheep and invited me to Tandawanna. What I saw I shall describe for the benefit of all sheep-men. I believe the method to be the best and most satisfactory in all respects of any.

"He informed me that he got the original idea from Mr. Charles Keane, of Gurley, New South Wales, but that he has improved on it in many respects since he first used it three years ago. I give below all particulars.

"The idea may be described as a shower bath instead of a plunge, and the essentials are a flat tray roof perforated with holes under which sheep stand quietly while the liquid used is showered upon them. The complete specifications of Mr. Watson's dip are as follows:—

"The shed is 40 feet long by 12 feet 6 inches wide. The roof is flat and covered with No. 22 gauge, flat galvanised iron, soldered at all seams, and perforated with No. 10 holes 3 inches apart. The iron is turned up all around the edge about 6 inches. Thus the roof is really a big iron tray. Roof joists are 6 inches by 2 inches, and placed 18 inches apart, and run across the building. The height of the shower is about 6 feet above the floor. The floor is of corrugated galvanised iron, No. 22 gauge, and not battened. The sheep have not injured it in any way in three years' working. The floor is laid with a fall to the side of 2 inches in 10 feet across the shed. The channels of the corrugation lead into a gutter, which carries the liquor draining off the sheep back into the dip tank where the dip liquor is mixed. The dip tank is an excavation 8 feet by 4 feet by 4 feet, lined with flat galvanised iron and made watertight. From this tank a 3-inch centrifugal pump, worked from a 3½-b.h.p. oil engine, delivers the dip mixture on to the tray roof of the shed, and this falls in a gentle penetrating shower on the sheep standing beneath. A pair of gates at each end of the shed hold the sheep.

"In practice, when the entrance gates are opened, the sheep march straight through to the far end of the shed without the least trouble. Such a thing as 'dip-shyness' is not seen, and they are thoroughly wetted all over in six or seven minutes. I inspected a number of animals, and found that the dip was all over the body in every case. Three or four minutes suffice to drain them; thus a shedful of sheep may be dipped every fifteen minutes, allowing for filling and emptying. The capacity of the Tandawanna shed is from 250 to 300 sheep. One thousand sheep per hour can be dipped without undue haste by four men.

"An excellent feature of the shower dip is its extreme simplicity and small cost of construction. It may be built to work flocks of hundreds of thousands, or small flocks of 1,000 or under. For the small holding, a shed which will wet forty or fifty sheep at a time should not cost more than £10, and a cheap 2-inch Douglas hand pump would be quite effective. Better still, a No. 8 semi-rotary pump could be used, and should give excellent results. This pattern of dip is as good for the small holder as the great.

DRAININGS.

"Mr. Watson informs me that the sheep should be packed in pretty tightly. They cannot then hump their backs, and so prevent the dip getting under them as soon as it ought. After the sheep have drained four or five minutes the surface of the dip tank should be skimmed with a hand skimmer. This will keep the solution fairly clean. A minor source of trouble is the presence of short fribs of wool, which find their way into the dip tank, and from there into the shower. These fribs get into the perforations, but are easily removed by a boy using a broom over the surface of the tray.

"I have gone into this matter at some length, as I consider that there is no other way to dip sheep that approaches the Tandawanna shower-dip. Mr. Watson should receive the thanks of every sheep-master in the Commonwealth for elaborating a simple, cheap, safe, and effective method of dipping sheep. He informs me that the cost works out for dipping at about ½d. per head.

"I shall be pleased to answer any questions on the subject, and give any details which I may have missed above."

Another subject which was inquired into was, whether sheep with tails 3 to 4 in. long are less liable to be fly-blown than those with so-called "stump tails," or with extra long tails.

The evidence obtained was somewhat conflicting, but, after careful consideration, one must conclude that medium tails (3 to 4 in.) are beneficial for the following reasons:—

1. The movement of the tail frightens many flies away when about to attack sheep.

2. If the tail is of sufficient length when depressed, it keeps the wool on the sides of the anus and vagina more or less flattened and less liable to soiling.
3. By leaving the tail long enough to cover the vagina, it is a great protection, when shearing ewes, against injury to the lower commissure of the vagina. In shearing short or stumpy tailed ewes, the lower portion of the vagina (commonly called spout) is frequently cut or injured, consequently when the ewe micturates, the flow of urine is not thrown off in the usual way, but is spread, thus soiling the wool of the hindquarters, which is attractive to flies.

Shearing is carried on in Queensland practically during the whole year, but as contract shearing is largely in vogue, it is necessary for each one to take their turn, therefore all cannot shear at the same time. Personally, from evidence obtained, I am in favour of Spring shearing, as it avoids a full fleece in the hottest weather, and in the wet season, and thus mitigates the action of blow flies.

I would suggest that experiments be carried out at the Gindie State Farm during the next twelve months, to ascertain the best preventive measures against the blow-fly pest. It will be necessary to erect, as soon as possible, a shower dip capable of holding 50 or 100 sheep, also to purchase from time to time sheep carrying wool of different ages. The experiments will not necessarily injure the sheep, therefore they can probably be sold again without any great monetary loss.

SUMMARY.

Until some method of destroying blow flies is found, I would strongly recommend the following points to sheepowners, viz.:—

1. Careful and frequent inspection of all sheep.
2. Total destruction of wool and carcasses containing the larvæ or maggots of blow flies by burning, or saturating with a strong solution of arsenic.
3. Shower dipping of sheep, with two months' wool, in an arsenical dip.
4. Thorough crutching when sheep have six or seven months' wool, and swabbing or dipping hindquarters in a solution of copper sulphate.
5. Isolate and dress thoroughly all fly-blown sheep until completely recovered.
6. During the fly season, place sheep (if possible) where there is short grass devoid of grass tussocks, and other shelter for flies.
7. Do not use arsenical preparations on wounds, and in every case when used, mix according to directions.

It has been suggested that compulsory dipping would be beneficial to all, but, before advising such action, I would recommend that the subject be submitted to the United Pastoralists' Association for an opinion.

[TO BE CONTINUED].

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

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

Order AMARYLLIDEÆ.

CRINUM, Linn.

C. intermedium, *Bail.* n. sp. (Plate 14). Bulb 2-3 in. diam., forming no stem above ground. Leaves tapering to a rather blunt point. Longitudinal nerves numerous, the horizontal veins forming a faint tesselation. Scapes compressed, glaucous, with a reddish tinge towards the base. Bracts large, bracteoles slender. Perianth segments with apiculate yellow tips. The attached plate shows natural size of leaf and inflorescence of plant examined.

Hab.: Wai Weir Island, *E. W. Bick* (May, 1911).

The name is suggested by its close resemblance in some features to C. Douglasii, *Bail.*, and in others to C. brevistylum, *Bail.*, but differing sufficiently from both to entitle it to specific rank. Bulbs of the plant were brought to the Director of the Brisbane Botanic Gardens from Wai Weir Island in June, 1911, and have since only been grown in rather small pots, hence the plants now flowering show but a small growth.

Order AROIDEÆ.

AMORPHOPHALLUS, Blume.

A. campanulatus, *Blume,* forma **darnleyensis,** *Bail.,* n. form. (Plates 15, 16). To this Torres Strait Island plant is added the name of the island upon which it was met with, for although plants of the species have been recorded from islands off German New Guinea, I have neither specimens nor descriptions of the Papuan plant. The normal species has a very wide range, but has not, I believe, previously been found in Australia. The tuber which has recently flowered in Brisbane Botanic Gardens has only had an 8-in. pot to grow in so has not had a fair chance to develop itself, but Mr. Bick says that some of the plants on the island were over 5 ft. high, and had very large tubers, which were used by the natives for food. The stalks were clothed with short prickles.

Hab.: Darnley Island, Torres Strait, *E. W. Bick* (May, 1911)

PLATE 14.—CRINUM INTERMEDIUM, *Bail, n. sp*

PLATE 15.—AMORPHOPHALLUS CAMPANULATUS, *Blume, forma* DARNLEYENSIS, *Bail. n. form.*

(Specimen grown in an 8-in. pot.)

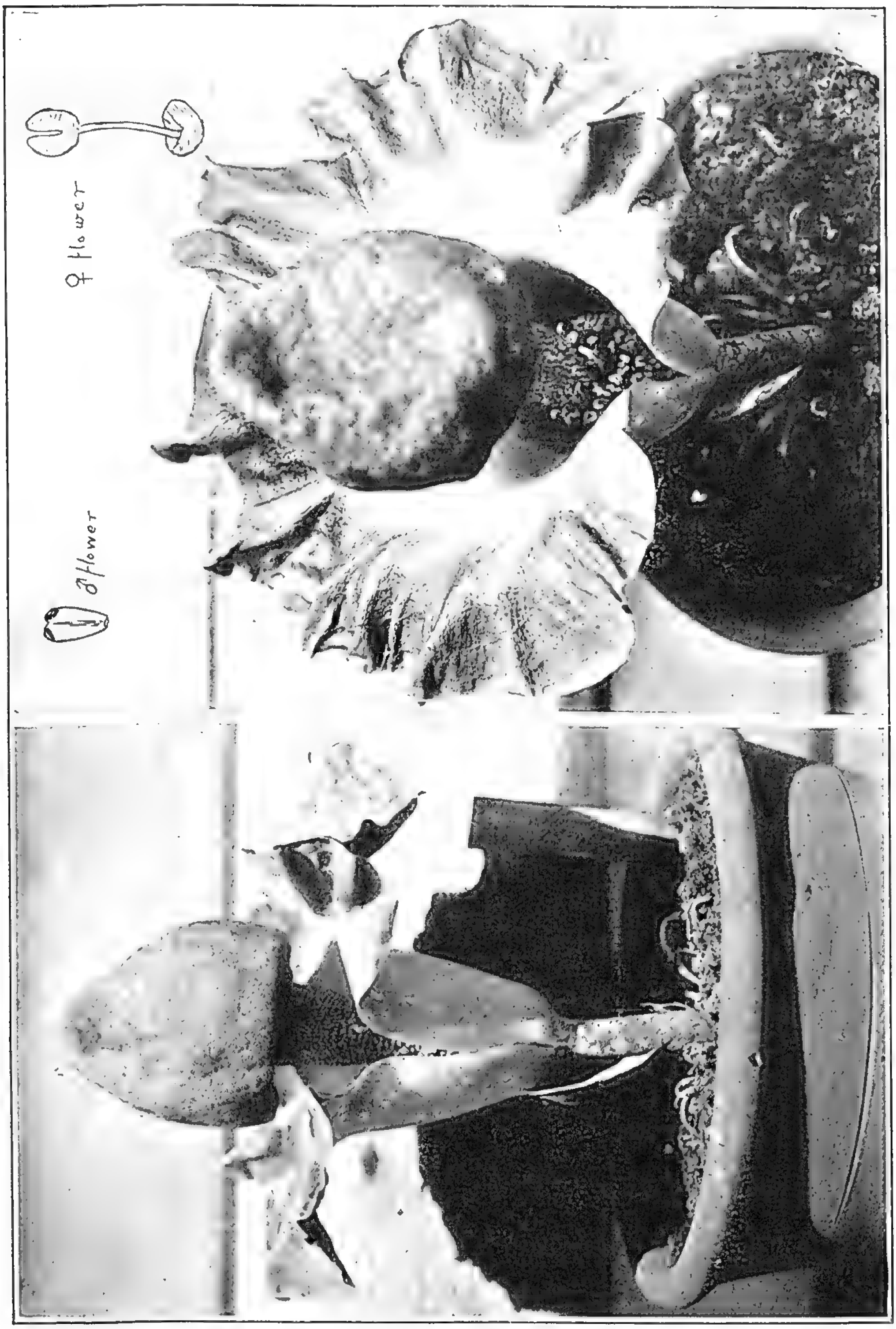


PLATE 16.—AMORPHOPHALLUS CAMPANULATUS, *Blume*, FORMA DARNLEYENSIS, *Bail. n. form.* (Specimen grown in an 8-in. pot).

General Notes.

COCO-NUTS—THE CONSOLS OF THE EAST.

This work which has been received in the islands—the Solomons, Papua, and Malaya—with great favour, was eagerly taken up as to its first edition. Mr. Hamel Smith, editor of the "Tropical Life," author of the book, has now issued a second edition, the first being exhausted. This edition was completed last Christmas, and copies will probably be shortly obtainable in Brisbane. The price of the first edition was 11s. posted, but so much additional matter (some 200 pages) has been included, that the price has been raised to 12s. 6d., or 13s. 6d. post free. The additional sections will include:—

1. The cost of making copra.
2. The Nasicornus beetle fungus.
3. Cost of planting and making copra in Trinidad, B.W.I.
4. Horses (Army remounts) and cattle on coco-nut estates.
5. The manufacture of coir will be entirely rewritten and brought up to date.
6. Edible butter and its manufacture.
7. Samoa notes *re* Rhino Beetle, and present prospects.
8. The Solomon Islands.
9. Mr. H. H. Thiele, Secretary of the Fiji Planters' Association, on "Coco-nuts in Fiji."
10. Farming with dynamite, &c.

It will therefore be seen that the new book will be considerably extended and brought up to date in every way possible.

THE WATER HYACINTH AS A FIBRE PLANT.

The water hyacinth (*Eichornia crassipes*) was introduced into Cambodia about the year 1902, probably from the Philippines or Java. Since then it has spread with extraordinary rapidity, and now occurs in such masses on the rivers that navigation is impeded. It has become necessary to take steps to clear the waterways by collecting the plants by means of booms placed diagonally across the stream and to remove and burn the plants as they accumulate above the boom.

A French professor, Professor Perrot, has recently communicated to the Saigon Chamber of Commerce his opinion that this dreaded water hyacinth is likely to give rise to a new industry. He states that the plant possesses strong fibres which give every promise of being of great value for textile purposes. He has extracted the fibre from the stalk in a Duchemin machine, and finds that, after drying it in the shade, it is quite fit for use. Rope and twine have been made from it, as well as coarse thread suitable for matting and sail cloth, while a local use is indicated for it in its employment for the manufacture of rice sacks in place of jute. On the native loom it affords a strong flexible cloth of about the same strength as jute. The fibre takes dyes readily, and its tenacity is highly satisfactory. Its weight is about the same as that of jute, but can be diminished by treatment with chrome alum; this treatment makes the material waterproof. By Perrot's process, which can be carried out by native workers, 100 kilogrammes of green stems yield 4.5 kilos of fibre. (Sisal leaves yield from 3½ to 4 per cent.—Ed. "Q.A.J.").

If this information proves correct, it will be good news for countries which are cursed with the water hyacinth. It sounds rather too good to be true, at least with the plant as we know it in Ceylon. In any case, it would hardly be advisable to introduce it into another country as a fibre plant, but its successful use as such might afford some compensation to those countries which have unfortunately acquired it.—"Tropical Agriculturist," Ceylon.

PUBLICATIONS RECEIVED.

CABINET TIMBERS OF AUSTRALIA.

BY RICH. T. BAKER.

The casual traveller in the timbered districts of Australia, unless he be interested in forestry or the timber trade, can have no conception of the vast variety of the native timbers of our scrubs and forests which lend themselves to utilitarian purposes, whether for the requirements of our railways, for sleepers, bridges, &c., for house-building, or for the more delicate and æsthetic work of the cabinetmaker and upholsterer. Many such travellers class all Australian timbers as "Gum Trees." It needs only a visit to our Railway Workshops to convince anyone that Australian forests contain quantities of the most beautiful woods for decorative purposes, which would gladly be utilised in all European manufacturing centres. As to those timbers most suitable for cabinet work, it needs but a glance at a publication on these which we have just received from the author, Mr. Rich. T. Baker, Curator and Economic Botanist of the Technological Museum, Sydney, to show the infinite variety of species of such timbers which is to be found in our forests. As Mr. Baker remarks in a preface to the work: "Several factors were instrumental in bringing about the writing of this publication, amongst which was the fact that some of these beautiful woods, owing to the rapid advance of the settler, are in jeopardy of being exterminated altogether, and that, by bringing these in this form before the commercial world, it is hoped the various Forestry Departments of the Commonwealth may be moved to set apart reserves for their reafforestation before it is too late."

The book itself is profusely and beautifully illustrated by colour photography, so perfectly executed that we had no difficulty in recognising them when comparing them with the hundreds of beautiful polished specimens of the cabinet woods depicted, which are on view at the Technological Museum of our Queensland Department of Agriculture. As the New South Wales Minister for Public Instruction says in the introduction: "These coloured illustrations speak louder than words," and "such a technical work as this shows without doubt that our forest trees are worthy of more attention than has been given them in the past, and that they deserve to be still better known in the future." As a work of reference, also, Mr. Baker's work should prove invaluable to students of the various branches of the decorative art in our technical colleges, whom the author has placed under deep obligation by placing within their reach such an excellent *vade mecum* on our cabinet timbers.

Answers to Correspondents.

BUDDING THE MANGO.

G. WILLIAMS, Cairns—

Thanks for your paper on budding the mango, which arrived too late to publish in the February issue of the Journal, but will appear in the following issue.

BRUSSELS SPROUTS.

MARKET GARDENER, Middle Ridge—

Yes, you can grow Brussels sprouts on the Range. A feature of the crop is that it does not require the land to be too rich. If it is, the stems grow lanky, and the sprouts become soft, and inclined to open, as is the case when planted on the coast lands, where they never attain the solidity which is their characteristic when grown in a cold climate. If the seeds are sown in February, or as late as June, you may be fairly sure of success, given a fair season and suitable conditions of soil and climate. The cultivation is the same as for cabbages, but they require more room. When transplanting, the proper distance is 3 ft. between the rows, and the plants 2 ft. apart. To facilitate the formation of the sprouts (which are only diminutive cabbages), the large leaves should be broken down at all the joints in the stem. The sprouts will then form in a thick cluster round the stem from the root to the top.

They should be gathered when they look like half-open rose-buds, and it is advisable, when removing the first crop of sprouts, to do so with a sharp knife, so as to avoid making a large wound, which would be the case if they were plucked off by hand.

If any manure is required, farmyard manure may be dispensed with, its place being taken, as in the case of cauliflowers, by artificials, using per acre (or proportionately per perch) 6 cwt. superphosphate, 4 cwt. kainit, and 6 cwt. of nitrate of soda (the latter in two or three dressings). If farmyard manure is procurable, then apply 12½ tons farmyard manure, 4 to 6 cwt. superphosphate, 4 cwt. kainit, and 4 cwt. nitrate of soda (the latter in two dressings).

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JANUARY, 1914.

Article.		JANUARY. Prices.
Bacon	lb.	9d. to $10\frac{1}{2}$d.
Bran	ton	£5
Butter	cwt.	104s.
Chaff, Mixed	ton	£4 10s. to £6 10s.
Chaff, Oaten (Victorian)	,,	£6 to £7
Chaff, Lucerne	,,	£5 to £7
Chaff, Wheaten	,,	£2 15s. to £4
Cheese	lb.	$6\frac{1}{2}$d.
Flour	ton	£9
Hams	lb.	1s. $3\frac{1}{2}$d.
Hay, Oaten (Victorian)	ton	£6 to £6 10s.
Hay, Lucerne (Prime)	,,	...
Honey	lb.	$1\frac{1}{2}$d. to 3d.
Maize	bush.	4s.
Oats	,,	...
Onions	ton	£10 to £11
Pollard	,,	£5 5s.
Potatoes	,,	£12 to £13
Potatoes (Sweet)	cwt.	3s.
Pumpkins	ton	...
Wheat, Milling	bush.	3s. 8d.
Eggs	doz.	7d. to 1s. 2d.
Fowls	pair	6s.
Geese	,,	5s. 6d. to 6s. 6d.
Ducks, English	,,	3s. 6d. to 4s.
Ducks, Muscovy	,,	4s. 6d. to 5s. 6d.
Turkeys (Hens)	,,	...
Turkeys (Gobblers)	,,	...

SOUTHERN FRUIT MARKETS.

Article.	JANUARY. Prices.
Bananas (Fiji), G.M., per case	14s. to 15s. 6d.
Bananas (Fiji), G.M., per bunch	3s. 6d. to 9s.
Bananas (Queensland), per case	9s. to 11s.
Bananas (Queensland), per bunch	...
Mandarins (Local), Emperors, per case	...
Mandarins (Queensland), per case	...
Oranges (Local), Navel, per case	...
Oranges (Other), per case	...
Oranges (Queensland), per case	...
Papaw Apples (Queensland), per quarter-case	...
Passion Fruit (Queensland), per half-case	5s. to 6s.
Pineapples (Queensland), (common), per case	...
Pineapples (Queensland), (Ripleys), per case	...
Pineapples (Queensland), (Queens), per double-case	10s. to 12s.
Pineapples (Rough),	7s. to 9s.
Strawberries (Local) per dozen punnets (quarts)	...
Tomatoes, per quarter-case	...

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	JANUARY. Prices.
Apples, Eating (American), per case	10s. to 12s.
Apples, Eating (Stanthorpe), per case	6s. to 8s.
Apples, Cooking (American), per case	6s. to 7s.
Apples, Cooking (Stanthorpe), per case	5s. to 7s. 6d.
Apricots, per quarter-case	3s. to 5s.
Bananas (Cavendish), per dozen	$2\frac{1}{2}$d. to 4d.
Bananas (Sugar), per dozen	2d. to $3\frac{1}{2}$d.
Cape Gooseberries, per quarter-case	...
Cherries (Local), per quarter-case	3s. to 7s.
Citrons, per cwt.	...
Cocoanuts, per sack	13s. to 14s.
Custard Apples, per case	...
Grapes (Local), per pound	$1\frac{1}{2}$d. to $2\frac{1}{2}$d.
Lemons (Local), per case	6s. to 8s.
Lemons (Italian), 150 Fruits, per half-box	14s. to 16s.
Limes, per case	...
Mandarins, per case	...
Mangoes, per case	2s.6d. to 5s.
Oranges (Italian), per case	16s. to 17s.
Oranges (other), per case	...
Papaw Apples, per quarter-case	1s. 6d. to 2s. 6d.
Passion Fruit, per quarter-case	3s. to 4s.
Peaches, per quarter-case	3s. 6d. to 4s.
Peanuts, per lb.	3d. to $3\frac{1}{2}$d.
Pineapples (Ripley), per dozen	9d. to 2s. 6d.
Pineapples (Rough), per dozen	9d. to 1s. 0d.
Pineapples (Smooth), per dozen	5s. to 6s.
Plums, per quarter-case	3s. to 4s.
Rockmelons, per dozen	2s. to 6s.
Strawberries, per dozen pints	...
Tomatoes, per quarter-case	2s. to 3s. 6d.
Watermelons, per dozen	6s. to 8s.

TOP PRICES, ENOGGERA YARDS, DECEMBER, 1913.

Animal.	DECEMBER. Prices.
Bullocks	£13 12s. 6d. to £16 10s.
Cows	£7 17s. 6d. to £8 15s.
Merino Wethers	20s. 6d.
Crossbred Wethers...	21s.
Merino Ewes	18s.
Crossbred Ewes	17s. 9d.
Lambs	18s. 6d.
Pigs (Porkers)	...

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 £5 10s. to £6 10s. 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.

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 clear. 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.

QUEENSLAND AGRICULTURAL JOURNAL

Vol. I. MARCH, 1914. Part 3.

Agriculture.

THE COTTON-GROWING INDUSTRY IN TEXAS, U.S. AMERICA.

The Hon. W. H. Barnes, Acting Premier of Queensland, has received from the Prime Minister of the Commonwealth of Australia, the Hon. J. Cook, an interesting letter written by the Acting Consul at Galveston, Texas, U.S.A., in answer to inquiries made by the Dominions Commission in regard to the cotton-growing industry in the United States. This letter, a copy of which has been forwarded to the Hon. the Minister for Agriculture, Queensland, gives valuable particulars concerning the industry in Texas, and, as will be seen, the system adopted in that State synchronises very closely with the methods in vogue in Queensland when cotton was largely grown throughout the Southern districts. It will be noted that the average yield in Texas for 1912 was 600 lb. of seed cotton, yielding 206 lb. of lint, and that the average yield per acre during the previous ten years was, in seed cotton, 500 lb., and 164 lb. of lint. In the annual report of the Under Secretary for Agriculture for 1912-13, the total area under cotton cultivation in Queensland was shown to be 441 acres, which yielded 150,414 lb. of seed cotton, or an average of 341 lb. per acre. This average, however, does not really represent the capabilities of the soil, neither does it represent the results of well-cultivated areas. In many districts yields of over 1,000 lb. of seed cotton per acre were harvested. Yet, if two farmers plant 10 acres of cotton and one of them takes every care of his plants from sowing to picking, and his neighbour allows his field to be smothered with weeds, and his consequently scanty crop to be left to itself to be damaged by wind, weather, and pests, the average crop of the two is set down as possibly less than half the yield had both growers taken equal care to ensure a good crop. It has been repeatedly shown that, in our cotton districts, crops well cared for have yielded from 1,000 up to 2,000 lb. of Upland seed cotton. It is the same with all crops—cereals, roots, or fruit. The careless farmer's returns are boxed with those of the careful man, with the result that it goes forth to the world that our land is only capable of producing crops which, if every field produced on a similar scale, would be unremunerative. The same argument doubtless applies to the average crops in the United States. If the return on every cotton farm were only 500 lb. of seed cotton, selling at, say, 1½d. to 2d. per lb., the monetary return to the farmer would only be from £3 2s. 6d. to £4 3s. 4d. per acre, from which must be deducted £1 5s. per acre for cultivating and 15s. 7½d. for picking, or £2 0s. 7½d.; not to mention cartage, bales, and incidental labour. This would leave the grower a net return at the outside of from £1 1s. 10½d. to £2 2s. 8½d. per acre, irrespective of the incidental expenses. That this is not the true state of the cotton industry is shown by the fact that the United States farmers produce some 12,000,000 bales of ginned cotton per annum, which they would not do if their returns were as here reckoned. Corn and hogs would be more profitable. The same argument will apply to cotton-growing in Queensland, where the conditions of culture are, as stated, practically identical with those in practice in Texas—*i.e.*, large plantations, although experimentally tried in this State many years ago, were found to be impracticable, and hence the industry was carried on in exactly the same manner as described in paragraphs 14 and 15 of the attached letter. That is to say, that the whole of the cotton grown and exported from Queensland has been the produce of small farms, the areas ranging from 5 to 40 acres. We specially draw attention to these two paragraphs, since it is to the small farmer, and not to the big plantation owner, that the success of the industry was, is, and will be due.

Following is the letter to which reference has been made:—

DOMINIONS ROYAL COMMISSION.

British Consulate,
Galveston, 11th July, 1913.

SIR,—With reference to your despatch of the 14th ultimo, enclosing a list of questions concerning the cotton-growing industry in the State of Texas, I have the honour to submit herewith answers to the questions propounded.

I am, &c.,
(Sgd.) S. W. BARNES,
Acting Consul.

The Secretary, Dominions Royal Commission.

Enclosure.

LIST OF QUESTIONS AND ANSWERS ON THE COTTON-GROWING INDUSTRY IN THE STATE OF TEXAS.

1. What varieties of cotton are grown in Texas?—The King's Improved, Prolific, Russell's, Bohemian, Rowden, and Triumph

(Meade's). These are all classed as "moderate staple" cotton. The two last-named varieties are sown more frequently than any other sorts.

2. What was the average yield per acre in 1912 of (*a*) seed cotton and (*b*) lint?—The average yield per acre in 1912 of seed cotton was 600 lb. and 206 lb. in lint. In this connection it should, however, be mentioned that 1912 was an exceptionally good cotton-yielding year, and that the average yield per acre during the previous ten years was in seed cotton 500 lb. and 164 lb. in lint.

3. What is the usual cost of (*a*) cultivating and (*b*) picking of seed cotton per acre and per lb.?—The cost of preparing the land—that is, ploughing up the old crop, planting the seed, and cultivating the growing crop until maturity—is, approximately 6 dollars (£1 5s.) per acre, and 75 cents (3s. 1½d.) per 100 lb. is paid for picking cotton.

4. What are, roughly, the proportions of white and black labour employed in Texas in (*a*) cultivating and (*b*) picking?—The proportions of white and black labour employed both in the cultivation and picking of cotton are three-fourths white and one-fourth black labour. A large quantity of Mexicans are brought over the border every year to expedite the picking of cotton in Texas.

5. What, in each case, are the average wages paid for (*a*) cultivation and (*b*) picking?—The average wages paid the labourer for cultivating cotton are from 20 dollar (£4 3s. 4d.) to 25 dollars (£5 4s. 2d.) per month with board and lodging, or from 75 cents (3s. 1½d.) to 1 dollar (4s. 2d.) per day. These wages are paid both the white and black labourers and are maintained the year through. As previously stated, the rate paid both the white and black labourer for picking cotton is 75 cents (3s. 1½d.) per 100 lb. of cotton in the seed.

6. How do these wages compare with similar wages in other agricultural occupations?—The staple crop in Texas is cotton, and, although there are some farms in the State where grain and other crops are grown exclusive of cotton, the wages paid to the farm hands are about the same in respect to all crops cultivated.

7. Is female and child labour employed to any extent in (*a*) cultivating and (*b*) picking? If so, what are the wages usually paid to women and children—(*a*) white; (*b*), black?—Women and children are employed in the cultivation as well as in the picking of cotton. The wages paid to the former are but little less than those paid to the men, and no difference is made in regard to the colour of the worker. Children are paid the same price for picking cotton as are the men and women, and the same wages in proportion to their strength and ability to cultivate the crops.

8. Can figures be given as to the relative efficiency of white and black labour in (*a*) cultivating and (*b*) picking, to be measured by the number of pounds of seed cotton picked per day?—No figures are obtainable that would give the relative efficiency between the white and black labour in the cultivation and picking of cotton. The hot sun in the middle of the day gives the black man less inconvenience than it does the white man, but comparing their work at the end of the day, results prove that

the best black labourer is not a better worker than the best white labourer, and taking the average of the two colours it will probably be found that there are fewer trifling white men than black.

9. Is white labour showing a tendency to replace black labour in cultivating or picking?—The number of white labourers is increasing more rapidly than the black.

10. Is a picking machine in use? If so, of what kind is it, and to what extent has it been a success?—A few cotton-picking machines have been used experimentally. It is reported that quite a number of the Price-Campbell cotton-picking machines (the sale of which is controlled by Mr. Theodore Price, of New York City) were sold last year, and will be used the coming season. It is thought that the cotton-picking machine will soon be looked upon as a necessity on the large cotton plantations, where generally the supply of pickers is not equal to the demand.

11. How many weeks does picking take?—The length of time required for picking cotton depends almost entirely upon the conditions of the weather during the time the cotton plant is making cotton. With favourable weather, from the time the first bolls open until a frost kills the plant, cotton is being produced from the same stalks. With a mild cotton season, it is gathered from the same stalk from July until December, and on rare occasions until January and February.

12. Is it hurried to any extent through fear of frost?—No; the cotton plant alone is injured by the frost; the ungathered cotton is not injured except by very heavy rains and high winds.

13. Is "family labour" employed at all in cultivating and picking, or is it the case in the United States of America, as it is said to be the case in Australia, that the farmer considers cotton-picking a "mean" occupation, and does not like his family to engage in it?—All the members of the family of the farmer who is in moderate circumstances assist in the cultivation and gathering of the crops on the farm, and the cotton crop is no exception to this rule. More hands are needed to pick cotton than to cultivate it, and the farmer looks to outside help to pick his cotton. Men and boys, and sometimes whole families, leave the small towns and go into the country during the cotton-picking time. Neighbours help neighbours in this particular work more than in any other. Cotton-picking parties are made up similar to sheep-shearing parties in Australia. The average picker can pick from 100 lb. to 200 lb. during the day, but as much as 500 lb. have been picked during the same time where all the conditions were favourable.

14. Is cotton cultivated on a small scale tending to replace cultivation on large plantations; and, if so, is it combined with other forms of agriculture—*e.g.*, dairying, or stock or sheep raising?—The great bulk of the cotton raised in Texas is grown on comparatively small farms; big plantations are largely of the past, owing to the inability of the farmer to procure enough pickers to pick his cotton at maturity. Successful cotton-picking machines may reinstate the large farms. Cotton cultivation in this State leads all other forms of agriculture combined, and the farmer generally plants most of his arable land in cotton because

of all crops it is the most reliable one from which he can raise money for his immediate use. Dairying, stock, sheep, and poultry raising are small issues compared to the growing of cotton.

15. Is cotton grown at all as a by-product on farms?—"Diversification of crops" has been for many years drilled into the minds of the Texas farmer as being the means whereby he can "best raise the mortgage on his land"; but, in spite of all the literature that has been printed and distributed among them, the farmer still holds to his cotton crop as pre-eminently the surest way of making money. There are but few farms on which cotton is grown as a by-product.

16. Have you any observation to make as to the possibility of growing cotton under the following conditions:—(*a*), Good soil; (*b*), good climate; (*c*), only white labour?—The possibility of growing cotton in good soil with only white labour has in Texas proved to be quite successful. There are small towns and farming sections in Texas where the black man or woman is not allowed to apply for work, and the "Darkie"—so long associated in the South with the cotton-fields and for many years considered indispensable to the farmer who grows cotton—is gradually passing. The change can be looked for in the use of modern machinery on the farm, thus making the labour lighter and less burdensome; by means of instructions on farming, now being sent out gratuitously to the farmer through the "Texas International Congress," offering money prizes for the best yield per acre of the various crops not only to the farmer himself but to his sons; free lectures given every year at the Agricultural and Mechanical College of Texas on all subjects pertaining to farming; State instructors travelling through the country visiting the farms and giving advice as to what lands need in the way of fertilisers, &c.; and teaching the farmer that he need no longer look upon his calling as one of constant toil and labour, but by employing the most up-to-date methods of getting the largest yield out of his land, farming becomes a legitimate, scientific, and healthful way of making a good living.

BRITISH COTTON-GROWING ASSOCIATION AND AUSTRALIA.

As a result of inquiries made by the Dominion Royal Commission as to the possibilities of cotton-growing in Australia and subsequent correspondence and a conference between members of the commission and representatives of the British Cotton-growing Association, the Government of the Commonwealth of Australia, the Government of Queensland, and the Imperial Institute, a letter on the subject was sent recently by the chairman of the association to the Dominions Royal Commission.

The letter mentions first how anxious and willing the association is to prove definitely whether cotton can be grown on a commercial basis in any part of Australia. It is pointed out, however, that, in regard to their supplying a large sum of money for the necessary experimental work, the fact that the association has already spent over £170,000 on such work prevents their being able to afford to devote any large sum of money towards carrying out the work under immediate consideration. It is suggested to the Queensland Government that, in the first instance, an agriculturist with good practical knowledge of cotton-growing should be engaged for a period of three years, and he might with advantage be attached to one of the local Agricultural Departments. He should conduct experiments preferably on experimental plots situated on estates. This is often done in the United States and in Egypt, and it is generally arranged that the farmer shall be guaranteed a minimum crop. To assist in these experiments, the association would contribute the sum of £100 per annum towards their cost, for a period of three years, dating from 1st July, 1914.

It is essential to recognise that the question of the seed which is to be used for sowing is the most vital factor. "No matter how good the soil, or how favourable the climatic conditions, or how excellent the cultivation, unless the seed is sound and well matured and of a variety suitable to the district, the result must be failure." The danger of growing several varieties in one district is also pointed out. For example, if cotton 1½ in. long and worth, say, 10d. per lb., is mixed with cotton 1 in. in length and worth, say, 7d. per lb., it is probable that its value will be less than 6½d. per lb. For this reason, amongst many others of equal importance, it is urged that the seed supply should be left in the hands of the Government, and that no one should be allowed either to import or distribute seed except under license from the Government. Further, the ginning and the baling of the cotton should be under Government control, for it is just as dangerous to mix different growths together in the ginning and baling as it is to so mix the seed.

As regards the type of cotton which should be cultivated, only experience will enable one to decide definitely which type will be most suitable. Sea Island and perennial cottons are to be ruled out at once*. Indian cotton is of very low value and would be useless. Egyptian does well under irrigation, but is hardly to be recommended as a rain crop.

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* We find that the reasons given by Mr. J. Arthur Hutton, chairman of the British Cotton-growing Association, for barring the cultivation of Sea Island and perennial cottons in Queensland are well worthy of consideration. He says:—" As to the type of cotton which should be grown (Mr. Hutton says) only experience will enable one to decide definitely which type will be most suitable. I may, however, state at once that there are two types which should not be encouraged—viz., Sea Island and perennial cotton. The market for Sea Island cotton is a very small one, and is already very fully supplied from the United States and the West Indies. As to perennial types, they may do well enough on a small scale; but, speaking from experience spread all over the world, in the long run their cultivation is not a profitable one, and the type of cotton, though suitable for mixing with wool, is not suitable for cotton-spinning. There is also the great disadvantage that they give every facility for the spread of cotton pests and diseases. The modern practice is to cultivate all cotton as an annual and to have all the plants destroyed at the end of each season, so as to prevent them acting as a bridge to convey the pests from one season to another. For the same reason 'ratooning' or pruning back the plants for a second season's growth, should be absolutely forbidden for there is the additional disadvantage that the fibre deteriorates year by year."

In support of the above, the report of Messrs. Henry W. Frost and Co. re Sea Island Cotton in the Southern States of America shows that the total exports of Sea Island Cotton from the United States to Liverpool, Manchester, and Havre up to 15th November, 1913, were 3,220, 3,672, and 1,662 bales respectively. The prices ranged from 12d. to 14¾d. per lb. c.i.f.—Ed. "Q.A.J."

As regards American, the shorter staple varieties, owing to their low value, are not likely to prove profitable. It must be remembered that, although it has been proved experimentally that cotton can be grown in Queensland,† the legislation against the importation of black labour makes the scale of wages so high that it is necessary to grow only the best types of high value, if the cultivation is to be a success commercially. It would therefore appear that some of the high-class varieties of American Upland cotton would be most likely to answer purposes in Queensland.

After consideration of the whole question, the committee of the association authorised the following offer to the commission:—

As already stated, £100 per annum will be contributed if the Government decide to undertake the experimental work suggested above. The association will also supply, free of charge, small quantities of seed for experimental purposes; they will report on samples, superintend sales, keep separate accounts for each shipper, and superintend the remittance of the proceeds. As well as this, the association will pay the ocean freight, and will superintend the insurance of the cotton; the association will, when required, make arrangements for financing cotton or seed by accepting bills drawn on shipment. The association will, furthermore, supply ginning and other machinery, baling material, and other stores on easy terms of payment, and will give the buyer full advantage of all cash and trade discounts. Finally, the association will guarantee a minimum price for Australian cotton in Liverpool or London of 6½d. per lb., less insurance, port, and other charges (which amount to about ½d. per lb.) for all cotton forwarded to them for sale and which shall have been produced from an annual variety grown from seed issued by the Government, and which shall be shipped in a clean and merchantable condition. Any surplus which may be obtained over the abovementioned price of 6½d. per lb. will be remitted to the planter. It is stipulated that this offer does not apply to any cotton grown from perennial varieties or from ratooned cotton.—"Agricultural News," Barbados.

COTTON-PICKING IN QUEENSLAND.

In the report issued by the Dominions Commission on the cotton industry in Queensland, details are given of the proposal of the British Cotton-growing Association to establish cotton-growing, which the Commonwealth and Queensland Governments have accepted. The Commissioners state that black labour is absolutely unnecessary for the successful cultivation of cotton, and that 75 per cent. of the labour in the cotton-fields of Texas (U.S.A.) is white. We have persistently pointed out that in Queensland cotton in its palmiest as well as in its decadent cotton-growing days, has been grown, picked, ginned, and prepared for market entirely by white labour, and in this matter we are quite in accord with

† Cotton-growing in Queensland has long ago passed the experimental stages, as witness the exports of Queensland cotton between the years 1866 and 1873, when the exported cotton rose to 2,602,100 in 1871.—Ed. "Q.A.J."

the dictum of the Commissioners. But the report further says:—"It is estimated that picking in Australia will cost 3d. per lb., whereas in the Southern States of America it is more." As a matter of fact, the cost of hand-picking cotton in America is 1 dollar 10 cents per 100 lb., or about ½d. per lb. To this we reply that if the cost of merely picking the cotton in Queensland amounted to 3d. per lb., there could be no possibility of establishing the industry, seeing that Upland seed cotton is sold to-day at 2d. to 2½d. per lb.—*i.e.*, from ½d. to 1d. less than the alleged cost of picking, which can be shown to have never amounted to more than ½d. per lb. in this State. Young pickers can average at cotton picking from 60 to 80 lb. per day, and adults can pick from 100 to 200 lb. per day, one grower, an American, in the Central District reaching 250 lb. per day. If the price of picking were 3d. per lb. the latter would be able to make £3 2s. 6d. per day or £18 15s. per week! A boy or girl of twelve years of age paid at the same rate would make from 15s. to £1 per day. It is therefore clear that either a printer's error has occurred in the published report or that the cabled news is incorrect, or that the Commissioners have confused the value of seed cotton with the cost of picking. A 1,000-lb. crop of cotton in the seed is worth at present rates, say 2d. per lb. or 2½d. for the best samples of Upland. This gives the producer from £8 6s. 8d. to £10 1s. 8d. for his crop; but, according to the report of the Commissioners, the cost of picking this 1,000 lb. of seed cotton would be £12 10s., resulting in a dead loss of from £3 3s. 4d. to £2 8s. 4d., without taking into consideration the primary cost of planting, subsequent cultivation, cartage, baling, &c.

At ½d. per lb. for picking, young pickers can earn in, say, six to seven hours, without distressing themselves, from 2s. 6d. to 3s. 4d. per day, or 15s. to £1 per week, whilst expert adult pickers can earn from 8s. 4d. to 10s. 5d. per day, or from £2 10s. to £3 2s. 6d. per week.

Another view of the matter is, that with ginned cotton at the present English market price of 6¾d. per lb., the 1,000 lb. of seed cotton yielding 400 lb. of lint are worth £11 5s. Deduct cost of ginning (£1 0s. 10d.) and £12 10s. for picking (at 3d. per lb., as per report), irrespective of other charges, the cost amounts to £13 10s. 10d. for a return of £11 5s. The absurdity is at once apparent.

WHEAT EXPERIMENTS AT ROMA—SEASON, 1913.

[CONTINUED.]

CULTURAL.

Inaugurated in 1907, in an endeavour to ascertain the most desirable system for the farmer to adopt in order to obtain the maximum returns for his labours from the land in this district.

As mentioned previously in connection with these experiments, erosion, situation, and differences in the character of the soil has influenced the yields of some blocks, so much so as to prohibit the results from being used for comparative purposes. Notwithstanding this, a good

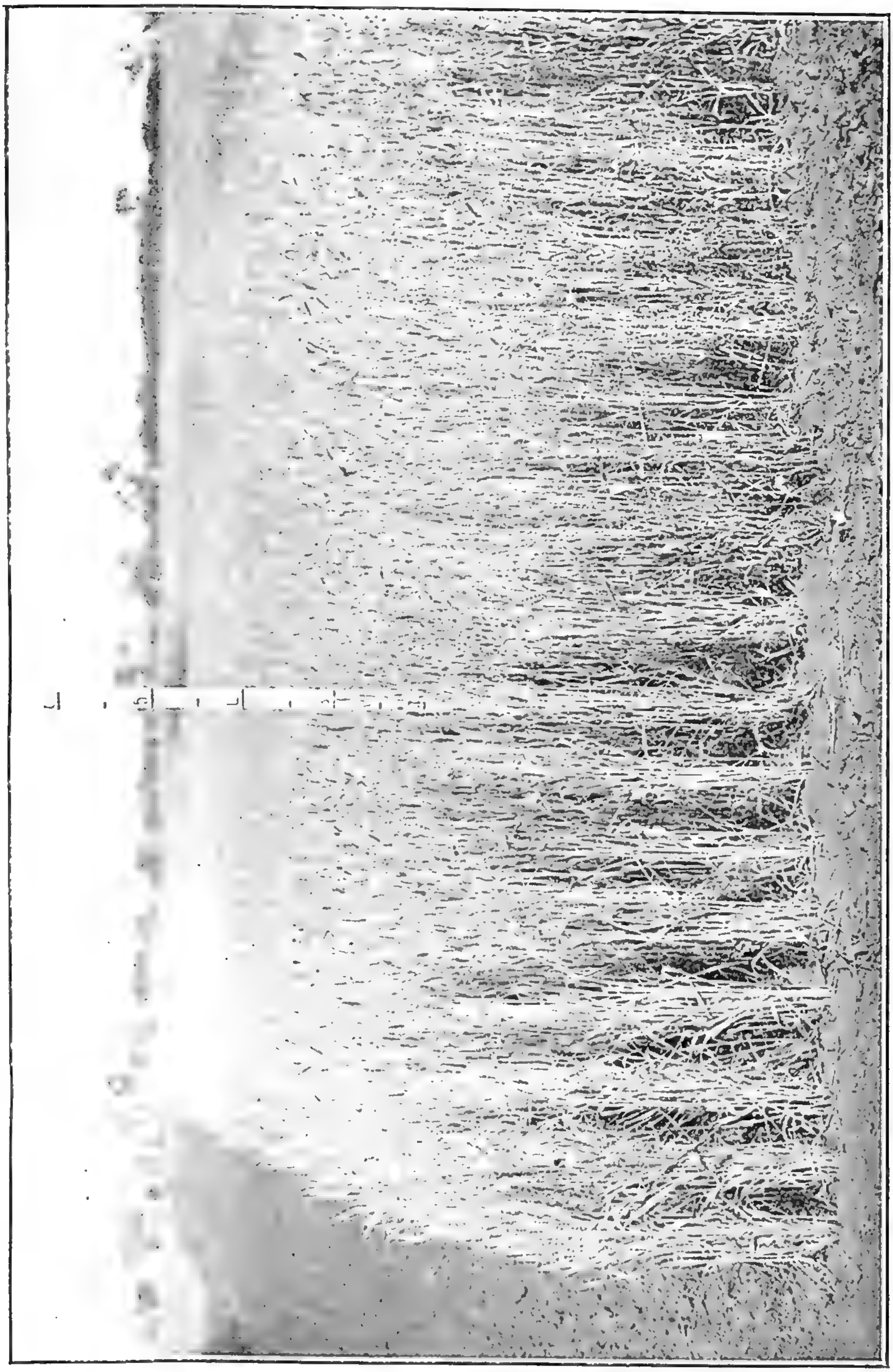

Plate 17.—Bunge No. 1, Unmanured, Roma State Farm.

deal of information has been acquired, and it has been proved conclusively that in seasons such as have been experienced since the plots were laid down, providing systematic operations are practised, wheat-growing can be carried out successfully on soils even where only shallow working is permissible.

The results obtained last season and the average yields to date, &c., are as follow:—

Variety wheat: Bunge No. 1.

Quantity: ½ bushel to acre.

Treatment seed: Bluestone and lime.

Sown: 3rd week May.

Peeping: 30th May.

Germination: Even and good.

Harvested: 3rd week October.

Manure applied: ½ cwt. super.; ¼ sulph. of potash.

Preparation seed bed: Once ploughed; twice cultivated; thrice harrowed.

Block.	Treatment.	Yield—1913.	Average.	Remarks, 1913.
1	Ploughed 4 in., rolled during growth	24·05	17·04	Height 2 ft. 6 in., even crop, thin.
2	Ploughed 4 in., harrowed once during growth	24·01	17·06	Height 2 ft. 6 in., even crop, thin.
3	Ploughed 4 in., harrowed twice during growth	25·04	16·06	Height 2 ft. 6 in., even crop, thin.
4	Ploughed 4 in., harrowed thrice during growth	26·05	18·09	Height 2 ft. 6 in. to 3 ft., patchy.
5	Ploughed 6 in., a little deeper every year; 4 in. first ploughing	28·05	19·04	Height 3 ft., even crop.
6	Ploughed 5 in., no after cultivation	27·03	18·09	Height 2 ft. 6 in. to 3 ft., uneven, frosted in places.
7	Ploughed 6 in., no after cultivation	26·81	20·03	Height 2 ft. 6 in. to 3 ft., uneven, frosted in places.
8	Ploughed 6 in., rolled during growth	24·68	20·05	Height 2 ft. 6 in. to 3 ft., uneven, frosted in places.
9	Ploughed 6 in., harrowed once during growth	27·05	22·05	Height 3 ft., more even than 6, 7, 8, frosted in places.
10	Ploughed 6 in., 40 lb. seed to acre	25·01	22·04	Height 3 ft., where not affected by trees on roadside, which reduced yield.
11	Ploughed 6 in., 18 lb. seed to acre	23·05	18·08	Height 2 ft. 6 in. to 3 ft., uneven, trees affected yield, ground badly scoured and broken, frosted slightly.
12	Ploughed 6 in., harrowed twice during growth	25·02	20·06	Height 2 ft. 6 in. to 3 ft., uneven, trees affected yield, ground badly scoured and broken, frosted slightly.
13	Ploughed 6 in., drilled in 4 in. approx.	27·05	20·01	Height 2 ft. 6 in. to 3 ft., uneven, ground not so broken, not so much frosted.
14	Ploughed 6 in., seed drilled in 3 in. approx.	26·08	19·04	Height 2 ft. 6 in. to 3 ft., uneven, patchy, ground broken shallow.
15	Ploughed 7 in. approx.	24·04	19·01	Height 2 ft. 6 in. to 3 ft., uneven, patchy, ground broken shallow.
16	Ploughed 8 in. approx., rotation crop panicum	26·02	20·05	Height 2 ft. 6 in. to 3 ft., uneven, patchy, ground broken shallow.
17	Ploughed 8 in., rotation crop pumpkins	23·09	20·05	Height 2 ft. 6 in. to 3 ft., infested with couch (introduced), which spreads during summer cultivation.
18	Ploughed 8 in., rotation crop, rape	22·00	17·09	Height 2 ft. 6 in., thin, ground bakes
19	Ploughed 8 in., rotation crop cowpea	22·06	18·06	Height 2 ft. 6 in., thin, ground bakes.
20	Ploughed 8 in., bare fallow ...	21·01	18·00	Height 2 ft. 6 in., thin, ground bakes.

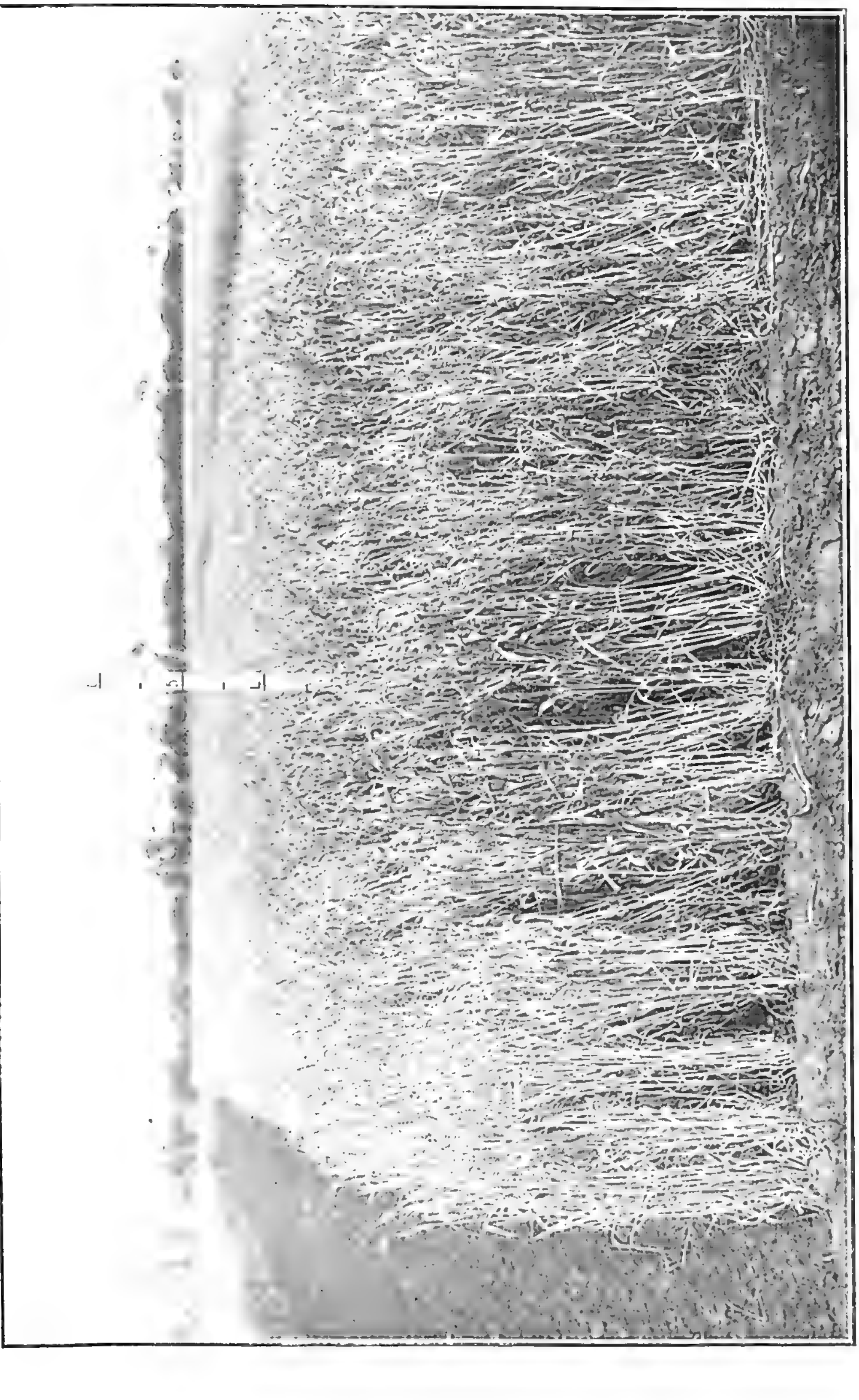

Plate 18.—Bunge No. 1, Stable-manured, Roma State Farm.

Blocks 1, 2, 3, 4, 18, 19, and 20 are situated on the highest ground, where the soil is an admixture of sand, clay, and loam, comparatively shallow, which runs together and sets on the surface, so that after once being wetted the physical condition is such as to preclude anything but a minimum amount of moisture penetrating it.

Soil on blocks 5, 6, 14, 15, 16, and 17 is slightly better, patches of sandy loam being met with. Blocks 7, 8, 9, and 10 are the most even so far as quality of soil, and are situated on the lowest ground. The effects of frosts were most apparent in these blocks. Blocks 11, 12, and 13 have been practically put out of commission through being situated on a slope over which all the water running off the other blocks has to pass.

THE PRICE-CAMPBELL COTTON-PICKING MACHINE.

In June and August, 1911, we drew attention to the probability of the vexed question of cheaply harvesting our cotton crops by means of the invention of what was, and still is, said to be a perfected cotton-picking machine by Mr. Angus Campbell, of Texas, U.S.A., and we quoted "The World's Work" for December, 1910, to the following effect:—"The average field hand can pick between 200 and 250 lb. of seed cotton in a day, though fast pickers often get as much as 400 to 500 lb. The machine can cover 8 or 10 acres a day. In a good field it would pick 8,000 or 10,000 lb., and in a poorer field 4,000 to 5,000 lb. With it a man could go over a 40-acre farm twice in ten days and picking time would be the least busy time of the year."

Again quoting the "World's Work" on the questions as to whether it would pay the grower to have his cotton picked by the machine, and whether it would pay the machine owner to pick it at such a price as would enable the grower to realise a good profit from his crop, we wrote:—" As we took a 100-acre farm and a half bale (200 lb. lint, equal to 600-lb. seed cotton) crop as an example of the cost of picking the crop by machinery, we will consider the same area as being picked by hand. In twice picking by the former method, the cost is set down at £30 to pick 600 lb. seed cotton per acre on 100 acres; that is to say, that 60,000 lb. of cotton are picked for £30. By hand, the cost of picking in the United States is 1 dollar 10 cents per 100 lb., or about ½d. per lb. This is the price paid in Queensland. Hence 60,000 lb. would cost £125 to pick by hand, as against £30 by machine, not to speak of the vast saving of time and labour. The cotton-grower within reach of a machine would have nothing to do with this crop at picking time, and would, therefore, be at liberty to attend to other work, which, under the hand-picking system, would have to be neglected or additional labour would have to be employed. The capabilities of cotton-growing in Queensland are enormous, and the advent of this machine should prove an incentive to farmers all over the cotton districts to plant as many acres of cotton as possible, with a view to making the State what it can easily become—the greatest cotton-growing country in the world without employing a single coloured labourer."

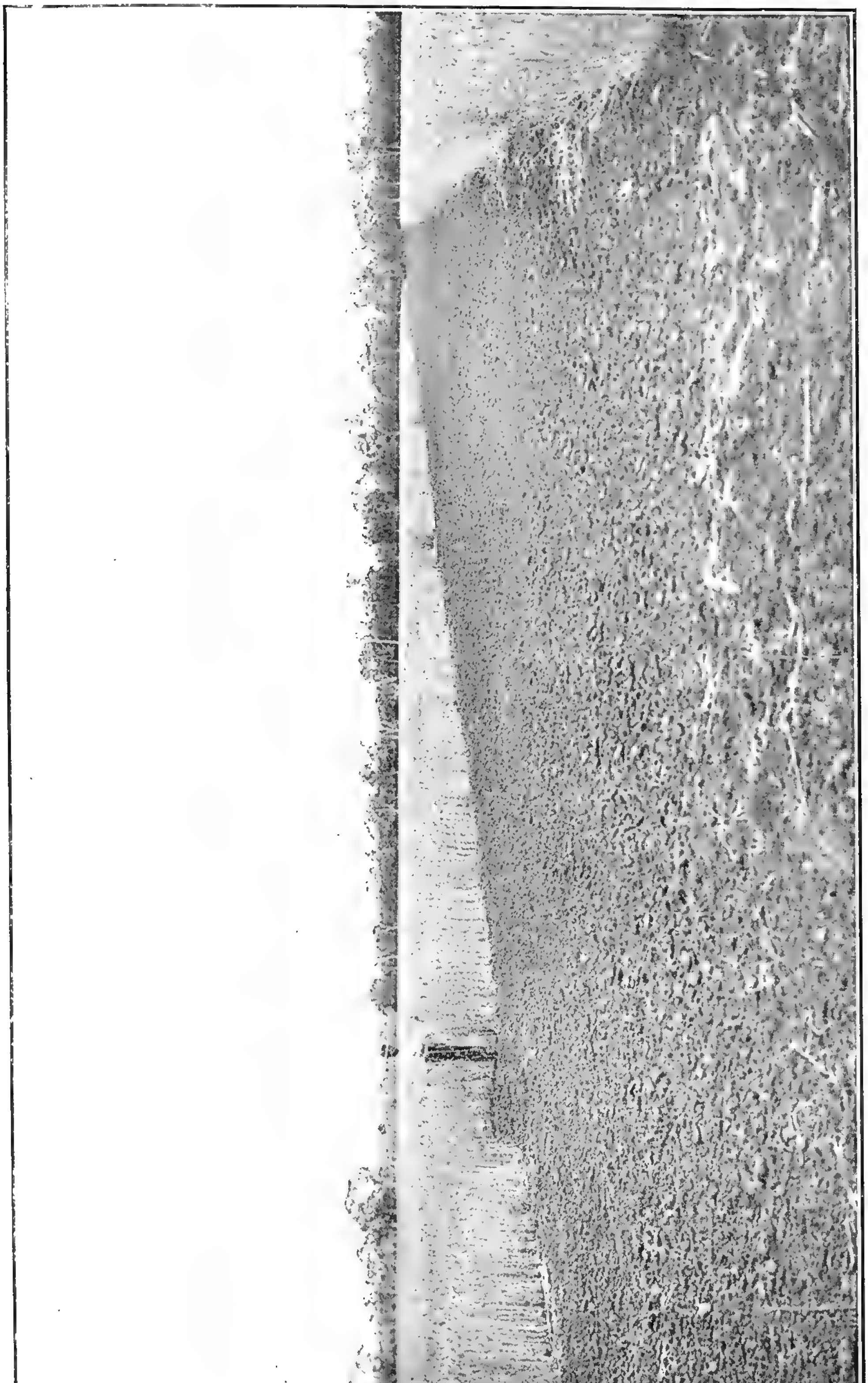

PLATE 19.—BUNGE NO. 1, GENERAL VIEW, CULTIVATION EXPERIMENTS

Since the above was written the Agent-General for Queensland, Sir Thomas Robinson, in response to a request from the Rockhampton Chamber of Commerce, obtained from the Executive Engineer in London a report on the working of the machine, which he was afforded an opportunity of witnessing in operation, and was satisfied that it could discriminate between ripe and unripe cotton-bolls, finger over the delicate plant, get the lint, and leave the rest unharmed. The exhibitors then stated that it was capable of "doing the work of fifty niggers."

Strange to say, although Mr. Price's assistant, who was conducting the demonstration, assured the Engineer that he would supply him with export prices in the course of a few days, the former suddenly went back to the United States. Later on, a letter was received by the Engineer from New York, signed by Mr. Price, in which he stated that he regretted to report that he was not yet in a position to name an export price on the machines, or to offer them for shipment abroad, as the inventors had all they could do to meet the American demand.

Thus, although apparently the machine does what is claimed for it, cotton-growers outside the United States will not be afforded an opportunity of purchasing one.

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

Date.	January.		February.		March.		April.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	4·56	6·46	5·21	6·42	5·41	6·20	5·57	5·47
2	4·57	6·46	5·21	6·42	5·41	6·19	5·58	5·46
3	4·58	6·46	5·22	6·41	5·42	6·18	5·58	5·45
4	4·59	6·46	5·23	6·41	5·42	6·17	5·59	5·43
5	4·59	6·46	5·24	6·40	5·43	6·16	5·59	5·42
6	5·0	6·47	5·24	6·39	5·44	6·15	6·0	5·41
7	5·1	6·47	5·25	6·39	5·44	6·14	6·0	5·40
8	5·1	6·47	5·26	6·38	5·45	6·13	6·1	5·39
9	5·2	6·47	5·27	6·37	5·45	6·12	6·1	5·38
10	5·3	6·47	5·28	6·37	5·46	6·11	6·2	5·37
11	5·4	6·47	5·28	6·36	5·46	6·10	6·2	5·36
12	5·4	6·47	5·29	6·35	5·47	6·9	6·3	5·35
13	5·5	6·47	5·30	6·35	5·47	6·8	6·4	5·34
14	5·6	6·47	5·31	6·34	5·48	6·7	6·4	5·33
15	5·7	6·47	5·31	6·33	5·49	6·6	6·5	5·31
16	5·8	6·47	5·32	6·32	5·49	6·4	6·5	5·30
17	5·9	6·47	5·33	6·31	5·50	6·3	6·6	5·29
18	5·9	6·47	5·33	6·30	5·50	6·2	6·6	5·29
19	5·10	6·47	5·34	6·30	5·51	6·1	6·7	5·28
20	5·11	6.47	5·35	6·29	5·51	6·0	6·7	5·27
21	5·12	6·46	5·35	6·28	5·52	5·59	6·8	5·26
22	5·13	6·46	5·36	6·27	5·52	5·58	6·8	5·25
23	5·13	6·46	5·37	6·26	5·53	5·57	6·9	5·24
24	5·14	6·45	5·37	6·25	5·53	5·56	6·9	5·23
25	5·15	6·45	5·38	6·24	5·54	5·54	6·10	5·22
26	5·16	6·45	5·39	6·23	5·54	5·53	6·10	5·21
27	5·16	6·44	5·39	6·22	5·55	5·52	6·11	5·20
28	5·17	6·44	5·40	6·21	5·55	5·51	6·11	5·19
29	5·18	6·43	...	...	5·56	5·50	6·12	5·18
30	5·19	6·43	...	...	5·56	5·49	6·12	5·18
31	5·20	6·43	...	...	5·57	5·48	...	...

PHASES OF THE MOON.

		H.	M.	
4 Jan.	☾ First Quarter	11	9	p.m.
12 "	○ Full Moon	3	9	"
19 "	☽ Last Quarter	10	30	a.m.
26 "	● New Moon	4	34	p.m.
3 Feb.	☾ First Quarter	8	33	p.m.
11 "	○ Full Moon	3	35	a.m.
17 "	☽ Last Quarter	7	23	p.m.
25 "	● New Moon	10	2	a.m.
5 Mar.	☾ First Quarter	3	3	p.m.
12 "	○ Full Moon	2	18	"
19 "	☽ Last Quarter	5	39	a.m.
27 "	● New Moon	4	9	a.m.
4 Apr.	☾ First Quarter	5	41	a.m.
10 "	○ Full Moon	11	28	p.m.
17 "	☽ Last Quarter	5	52	"
25 "	● New Moon	9	22	"

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF JANUARY, 1914.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Madame Melba	Holstein	10 Nov., 1913	1,140	3·9	49·61	
Lady Loch...	Ayrshire	31 Aug. ,,	978	4·2	46·01	
Miss Bell ...	Jersey	25 Sept. ,,	711	5·6	45·20	
Lavinia's Pride	Ayrshire	11 Dec. ,,	951	3·9	41·38	
Bee	Jersey	7 July ,,	657	5·4	40·20	
Glen ...	Shorthorn... ...	27 Oct. ,,	975	3·6	39·00	
Rosine ...	Ayrshire	27 Nov. ,,	833	4·1	38·20	
Miss Lark ...	,, ...	27 Dec. ,,	840	4·0	37·54	
Burton's Lady	Shorthorn... ...	23 June ,,	714	4·7	37·78	
Nellie II. ...	,, ...	5 June ,,	904	3·7	37·21	
Bluebelle ...	Jersey	13 July ,,	726	4·5	36·72	
Pauline ...	Shorthorn... ...	8 Oct. ,,	853	3·8	36·11	
Butter ...	,, ...	27 Sept. ,,	870	3·6	34·80	
Burton's Lily	,, ...	29 Dec. ,,	823	3·7	33·88	
Lady Margaret	Ayrshire	20 Mar. ,,	621	4·8	33·60	
Miss Melba	Holstein	22 Jan. ,,	693	4·2	32·60	
Honeycombe	Shorthorn... ...	7 June ,,	688	4·2	32·36	
Sweet Meadows	Jersey	20 Aug. ,,	432	6·8	32·29	
Auntie ...	Ayrshire	15 July ,,	700	4·1	32·11	
Queen Kate	,, ...	4 Jan. ,,	885	3·2	31·23	
Cocoatina ...	Jersey	19 May ,,	491	5·4	30·04	
Countess of Brunswick	Shorthorn... ...	22 July ,,	630	4·1	28·89	
Bella ...	Ayrshire	16 Dec. ,,	697	3·7	28·68	
Gem... ...	Shorthorn... ...	8 Aug. ,,	665	3·8	28·16	
Silver Nell ...	,, ...	26 Sept. ,,	684	3·7	28·15	
Daisy ...	Holstein	14 Feb. ,,	804	3·0	26·48	
Lennie ...	Ayrshire	1 Sept. ,,	731	3·2	25·78	
Lonesome ...	,, ...	26 Oct. ,,	684	3·4	25·74	
Miss Morton	Shorthorn... ...	14 Oct. ,,	675	3·3	24·61	
Miss Edition	Jersey	25 Sept. ,,	612	3·6	24·48	
Gretchen ...	Holstein	19 June ,,	552	3·9	24·01	
Lady Brunswick	Shorthorn... ...	27 Oct. ,,	557	3·7	22·91	
Lilley ...	,, ...	2 June ,,	478	4·1	21·92	
Doreen ...	,, ...	3 Nov. ,,	503	3·9	21·89	
Miss Jean ...	Ayrshire	13 Jan. ,,	504	3·8	21·33	
St. Elizabeth	Jersey	19 June ,,	295	6·1	20·24	

Fed on natural grasses, with an added ration of 40 lb. of sorghum ensilage per head per day.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JANUARY, 1914.

Four thousand four hundred and fifty-three eggs were laid during the month, an average of 111·3 per pen. Moritz Bros. again win the monthly prize, with 143 eggs. The following are the individual records :—

Competitors.	Breed.	Jan.	Total.
A. H. Padman, S.A.	White Leghorns ...	133	1,333
Moritz Bros , S.A.	Do.	143	1,323
J. R. Wilson	Do.	113	1,316
T. Fannin	Do. (No. 2)	126	1,292
Loloma Poultry Farm, N.S.W.	Do.	119	1,290
Range Poultry Farm	Do.	115	1,252
O.K. Poultry Yards	Do.	95	1,244
R. Burns	Black Orpingtons (No. 2)	123	1,216
E. A. Smith	White Leghorns (No. 2)	111	1,214
T. D. England	Do.	104	1,208
J. F. Coates	Do.	119	1,202
J. Zahl	Do.	120	1,187
H. Tappenden	Do.	115	1,173
S. E. Sharpe	Do.	110	1,172
F. McCauley	Do.	110	1,167
A. T. Coomber	Do. ...	109	1,166
R. Burns	Black Orpingtons (No. 1)	95	1,166
W. D. Bradburne, N.S.W.	White Leghorns ...	126	1,165
J. McKay	Do.	114	1,153
Mrs. Munro	Do.	118	1,152
E. A. Smith	Do. (No. 1)	115	1,148
Cowan Bros., N.S.W.	Do.	106	1,146
Doyle Bros., N.S.W.	Do.	97	1,136
Mrs. Sprengel, N.S.W.	Do.	127	1,131
Yangarella Poultry Farm	Do.	118	1,125
H. Hammill, N.S.W.	Do.	116	1,121
A. F. Camkin, N.S.W.	Do.	117	1,120
T. Fanning...	Do. (No. 1)	128	1,083
J. Murchie	Brown Leghorns ...	121	1,074
Mrs. Craig	White Leghorns ...	131	1,072
R. Jobbling, N.S.W.	Do.	97	1,071
D. Grant	Do.	91	1,066
C. Leach, N.S.W.	Do.	109	1,062
J. Archibald, N.S.W.	Do.	92	1,057
J. Gosley	Do.	99	1,045
A. Schbrowski	Brown Leghorns ...	77	1,005
T. Stephens, N.S.W.	White Leghorns ...	87	995
Mrs. Bieber	Brown Leghorns ...	104	994
A. C. Collis, N.S.W.	White Leghorns ..	110	992
J. Andersen, Victoria	Red Sussex	93	995
Totals	...	4,453	45,789

KILLING FOWLS BY DISLOCATION OF THE NECK.

To kill fowls by the dislocation of the neck, take the bird by the legs in the left hand, catching the extreme ends of the wings in the same hand, to prevent the fowl fluttering; then grip the bird's head between the first and second fingers of the hand, the palm of the hand being uppermost, and press the thumb on top of the head, the back of the fowl being upwards. The legs should be held against the left hip of the operator, and the head laid against the right thigh, near the knee. The fowl should then be quickly and firmly extended, at the same time pressing the thumb and bending the head suddenly backwards, so that the neck will be dislocated just below the junction with the head; death will immediately ensue. Muscular contraction will take place for a few minutes, so it is best not to place the fowl on the ground, as thus it will damage its flesh. Some poulterers, in addition to dislocating the fowl's neck, run a knife through the neck just below the ear, so as to allow the bird to bleed, and to render its flesh whiter. But if the fowl be hung by its feet for a minute or two directly after the vertical column is broken, the blood will drain to the head and neck, and there will be no necessity to use a knife. It is, of course, of great importance that the blood be thoroughly drained from the body, otherwise the flesh will present a reddish appearance, which gives the carcase a common look, and detracts from its value in the market.—"Garden and Field."

TO CLEAN IVORY.

1. The curators of the anatomical museum of the "Jardin des Plantes," France, have found that spirits of turpentine is very efficacious in removing the disagreeable odour and fatty emanation of bones or ivory, while it leaves them beautifully bleached. The articles should be exposed in the fluid for three or four days in the sun, or a little longer if in the shade. They should rest upon strips of zinc, so as to be a fraction of an inch above the bottom of the glass vessel employed. The turpentine acts as an oxidising agent, and the product of the combustion is an acid liquor, which sinks to the bottom, and strongly attacks the ivory if allowed to touch it. 2. Make a thick paste of common whiting in a saucer. Brush well with a toothbrush into the carved work. Brush well out with plenty of clean water. Dry gently near the fire. Finish with a clean, dry, hard brush, adding one or two drops (not more) of alcohol. 3. Mix about a tablespoonful of oxalic acid in ½ pint of boiling water. Wet the ivory over first with water, then with a toothbrush apply the acid, doing one side at a time, and rinsing, and finally drying it in a cloth before the fire, but not too close.

State Farms.

KAMERUNGA STATE NURSERY.

Since the heavy rainfall of January (28.97 in.) and that of the three last weeks of December (13.59) the manager, Mr. C. Wood, reports that it has been arduous work to keep growing crops clean, but owing to the porosity of the soil and the occurrence of ten fine days between the rains, it was possible to get through so much weeds by horse-hoe and hand that nearly all the crops planted in December were coming on well. A number of young coffee plants, mangoes, and other trees, both fruit and shade, were successfully planted out. The newly imported Teff grass (*Erogrostis Abyssinnica*), a small plot of which was planted on 29th December, had attained a height of from 12 to 16 inches, and was showing signs of flowering. The seed must have been of good quality and probably all germinated as the grass came up too thickly. Mr. Wood considers that from its appearance it will make good hay, when the wet weather takes up and the grass makes a taller and stronger growth.

Some rice which was imported from French West Africa, and said to be perennial, had germinated, although only a small percentage, but as far as grain is concerned, it does not appear to be of much value, but if, as reported, it proves to be perennial, it should be very useful as a fodder.

BUNGEWORGORAI—ROMA.

The manager, Mr. R. E. Soutter, reports for the month of January exceptionally hot weather, the maximum temperature being 109 degrees F., with an average of 96.3 F.; minimum, 57 degrees F., average, 70.2 F. The rainfall was very scant, there having been only five falls totalling .90 in.; the total for the seven months ending 31st January amounted to 5.60 in. The dry weather militated against first-class work in preparing the land for the wheat crop of 1914, the greater portion of the ploughed land turning up very lumpy to the desired depth, but in good condition to derive the maximum benefit from heavy rains. During the last fortnight of the month 30 acres were turned over, which is about half of what could have been done were the ground in suitable condition and the weather cooler. The December sowings of sorghum and panicum were destroyed by the extremely dry, hot weather, the light rains wilting the seed. Maize on fallow land is reported as holding out well, but that sown on land previously cropped was not in such good condition, and even with rain was expected to give only a poor crop for silage purposes.

Cowpeas which were thoroughly established prior to the last rain, were growing luxuriantly. There is no doubt about the extreme hardiness of this crop and its ability to thrive under conditions fatal to others with respect to lack of moisture and extreme heat. The same may be said of Soya bean, and Teff grass, which, the manager says, can thrive on a minimum amount of rain during growth providing there is moisture in the soil, having a better root system than the common annual grasses. Crossbred grasses—*i.e.*, Rhodes with Native grasses—have come into ear, and it is hoped that the seed will ripen in time to raise the F.2 generation. Types of these ears will, if possible, be arranged for display at the next Exhibition at Bowen Park.

From the general report on the various crops, we learn that the weather has been ideal for the vineyards, and that it was expected that, given fair conditions during the first fortnight of February, the grape crop will have been harvested without mishap. In the orchard, the lemons were shedding their fruit in large quantities; but, if rain were to fall shortly, the oranges and mandarins would still recover. As regards the stock, the horses and cattle look exceptionally well, considering the state of the pastures. The prickly pear is being cleared off, and advantage had been taken of the dry state of the weather to collect and burn all the logs and fallen branches in the swamp, these being a menace to live stock when covered by water.

WARREN.

The weather during the past month has been most trying. Scorching winds and promises of storms have been the order of the day since 1st February.

The district has a droughty appearance, and it seems as if our little locality has been forgotten when the seasonable rains were given this year. Crops which looked well at the beginning of the month are now in much need of moisture.

The work at this farm during the past month has been:—The cutting and carting of 35 acres of lucerne; this was saved in good order, and is stored in stacks. Land was prepared for potatoes, lucerne, and cereals. We have also disced and harrowed the lucerne paddocks since carting. The orchard has been ploughed, and land prepared for the removal of some of the fruit trees.

The small falls of rain which fell on 22nd January (0·25), 24th (0·2), and 28th (0·48)—total 0·75—were only sufficient to give the weeds a start. This necessitated a lot of chipping of weeds in the maize crops.

The plot of Teff grass, sown as an experiment, was completely destroyed by the hot winds, and dry weather, while the Rhodes grass alongside is green and growing. The rice plot is also completely gone.

With regard to maize, I notice that the white varieties are holding their own far better than the yellow and red, but they are all in need of rain at present.

The Manchurian millet has only attained a height of about 18 in. this season, but is keeping nice and green.

KAIRI.

The manager's report on this farm for the month of January shows that in consequence of heavy rains which fell during thirteen days of the month, alternating with warm, bright weather, growing conditions were ideal. Grass was in superabundance, and stock all in the pink of condition. The maize crop was doing well, in spite of the depredations of wallabies; the maize-breeding plots were thriving, whilst cowpeas and other small crops round the homestead were also making good progress. Grass-planting had been begun on No. 4 clearing, but was not being pushed until clover seed arrived to sow with it.

With the advent of the young grass the dairy cows improved wonderfully, and more increase was to be expected than occurred at the end of last year. The natural increase of stock for the month was one colt foal from "Flower," and five males and three females from the common cattle. The cream returns were steadily mounting up. The want of the necessary dairy buildings, yards, &c., has been a considerable handicap, but good progress was being made with them, and it was expected that the milking-shed would be in use in about a fortnight from the date of the manager's report. Two young Jersey bulls had been sold, and one had been delivered to the purchaser. A sow received from Gatton College had given a litter of five pigs, all of which had been sold.

A CORRECTION.

In the report of the Manager of the Kamerunga State Nursery for January, the non-running legumas were given as: Poona Cowpea, Black and Yellow Pigeon Pea (*Phaseolus Max.* and *P. Mungo*).

The brackets give the impression that the enclosed botanical names are the names of the Black and Yellow Pigeon Pea, which is incorrect. Commas instead of brackets would have shown what was intended, and that was, that Pigeon Pea *and* Phaseolus max., and P. Mungo were meant.

The botanical name of Pigeon pea is "*Cajanus indica.*"

THE GIANT HEVEA.

In the Acre territory, it is said, there is a speciman of the *Hevea brasiliensis* which measures 25 ft. in circumference. This tree holds the record of the Amazon Valley, both for size and yield. It is reported to give a revenue of about £432 a year,* and is the sole support of a family of seven, but this is probably an exaggeration, as with rubber at 3s. a lb. £432 a year represents an output of nearly 3,000 lb.—a tall order. The Rubber Defence superintendent has ordered it to be photographed with the family assembled beneath it.—" The Rubber World."

* This estimate may have been made when rubber was bringing 10s. per lb.—[Ed. "Q.A.J."]

The Orchard.

BUDDING THE MANGO.

By G. WILLIAMS, Cairns.

Some fifteen years since, plate budding as a means of propagating mangoes was brought to public notice by Mr. Horace Knight, who had devoted considerable time and attention to the improvement of the quality of this fruit in the Central district. The system had much to recommend it, mainly in respect of adaptability to working over partially developed trees which on attaining fructification were not up to expectations—a frequent experience with seedling trees. It did not, however, for various reasons, commend itself for application to young trees such as sent out by nurserymen, and has not supplanted inarching. The attention requisite in connection with inarching can only be compensated by increased charge for plants, consequently that of worked mango trees has remained comparatively high—generally considered prohibitive. It is to be deprecated that propagation (other than by raising from seeds) of mangoes and other Northern fruits which have been improved by cultivation and selection, has received so little attention in this part of the North—from Cairns to Cooktown—where the quality and variety show unmistakable deterioration. The fact that trees or plants are most readily propagated in such districts wherein they thrive most luxuriantly would not appear to have received any consideration, otherwise it is difficult to account for the fact of absolutely nothing being accomplished where it would be expected that some result would be shown.

The early mango crop of Cooktown, Port Douglas, and Cairns, in fair seasons, is fit to place on Southern markets when these are practically depleted, and though high prices are obtained for earliest shipments from the former port, the average quality can only be classed as most inferior, and what should, to these places, be a profitable export, is, under present circumstances, a poor and hazardous one. On the lines of past experience, it is evident that supplies of worked trees for the North must continue to be drawn from Southern nurseries (in any case even the buds of varieties of requisite quality are unobtainable locally). Still, it is quite likely that results of propagation by budding in the ordinary manner will not be by any means so successful as in the North.

Experiments conducted locally during last year prove conclusively that mango plants can be budded as successfully in early stages as any other type of fruit tree—citrus for instance—concerning which very erroneous impressions had prevailed. The directions published in the "Queensland Agricultural Journal" (May, 1913) for budding citrus trees, apply also, in most details to mangoes, excepting that further development of stock may advantageously be allowed. Excellent results have been obtained from one and two year old seedlings, ordinary shield buds being inserted in the usual manner, just as the terminals of stock are breaking into growth. It would be unreasonable to anticipate success at any other stage, on account of the successive periods of growth being frequent, and these of but short duration. Best results are obtained where buds for insertion are plump and well developed. Such buds are not characteristic of mango growth, but are readily obtained by cutting back by an inch or two (or more where required) the extremities of small branches from which it is proposed to take the buds; this being done a week or two before they are required for use. The actual time required can only be gauged by immediate local circumstances. The fact of buds being well developed admits of speedy attachment to the stock, so essential to success where growth is characterised by rapid cessation.

The most favourable time for the operation is during the warmer months, and, if followed immediately by heavy rains, results are poor, consequently, a moderately dry time should be chosen, the growth in stock being maintained by watering.

NEW CITRUS TREES FROM CHINA.

One of the most remarkable of the wild species of the genus Citrus is definitely described for the first time in the "Journal of Agricultural Research," vol. I., No. 1.

The reader may remember that the question of wild citrus species was dealt with in the last issue of the "Agricultural News," Barbados, and the present account forms, therefore, an interesting and important continuation of the subject.

The species under consideration has been named *Citrus Ichangensis,* Swingle. As far as is known, this plant is native farther north than any other evergreen species of citrus, only the deciduous *C. trifoliata* having a more northerly range. Besides having the most northerly range of any known evergreen species of citrus, it occurs at the highest altitudes reported for any other wild species of the genus.

C. Ichangensis is cultivated in China in the vicinity of Ichang; and it bears a very large lemon-like fruit that is of sufficiently good quality to cause it to be shipped to markets several hundred miles distant.

In the space of this article it would not be possible to reproduce in full Swingle's description of the species, but it may be noted that the species differs from its congeners in having very large thick seeds and slender leaves four to six times longer than broad, with very large winged petioles often as large or larger than the blade. It differs from *Citrus histrix,* DC., in having oblong rather than triangular winged petioles and much larger flowers with conate stamens. The bulky seeds of *Citrus Ichangensis* with their large brown caps and thickly formed cotyledons are not at all unlike those of the African species of hard-shelled citrus fruits belonging to the genera Balsamo-citrus and Aeglopsis.

A wild species of citrus—collected by Hooker and Thompson, in 1850, amongst the Khasi Hills, in Assam—has been described by Swingle, as a sub-species, namely, *Citrus Ichangensis latipes*, Swingle. It differs from *C. Ichangensis* in having the leaves more variable in size and shape with the tops acute, not caudate, the flowers in few-flowered (three to five) panicles instead of solitary, and the fruits oblate instead of prolate spheroidal in shape. The fact that Hooker and Thompson called this plant a wild orange is additional evidence that the lemon-like appearance of the Chinese form is a constant sub-specific character.

POSSIBLE USES OF THE SPECIES.

The large size of the seeds makes it probable that *Citrus Ichangensis* will produce vigorous seedlings, and hence it is likely to be of value as a stock on which to graft other citrus fruits. The numerous large seeds, however, possess the drawback of greatly reducing the proportion of juice because of the space they take up. Since the plant is a native of China and Assam, and very hardy, its suitability for growth in the Southern States is practically a foregone conclusion, and there is every probability that this species will play a great part in the development of citrus cultivation in America. In conclusion it may be pointed out that the discovery of *C. Ichangensis* in a part of China as accessible as Ichang is a further proof of the rich harvest of new species of plants that awaits the botanist and agriculturist in China.

In connection with the above account, attention may be called to an article in the " American Breeders' Magazine " (July-September, 1913), dealing with *Cudrinia tricuspidata,* a representative of the natural order Moraceæ, and recently introduced to the United States from China. Its fruit, although small, is sweet and edible, and because of its hardiness, the shrub can probably be grown in the southern half of the United States. In China, the leaves are used for feeding silk worms at times when mulberry leaves are scarce. It is believed that it might be usefully employed for hedge purposes, and there appears to be little doubt that the fruit, if successfully crossed with the Osage orange, will provide a progeny yielding produce of great value as food for live stock.—" Agricultural News," Barbados.

CITRICULTURE IN THE PHILIPPINES.

FORMULAE FOR FUNGICIDES AND INSECTICIDES.

We are indebted to the author, Mr. P. J. Webster, Horticulturist in Charge of Linao Experimental Station, for a most interesting Bulletin (No. 27) on " Citriculture in the Philippines," in which he treats in a practical manner of the orange, pomelo, lime, mandarin, tangelo, &c., from propagation, transplanting, budding, grafting, nursery and field culture, manuring, harvesting, grading, packing, marketing, being the result of the author's experience for seven years in citrus culture in Florida, and two years in the Philippines. Although the treatise deals with the industry in those islands, the information it contains should be of general interest to orange-growers in Queensland as well as in other tropical countries. The work is profusely illustrated throughout. A most valuable addendum is disease and insect pests of citrus trees, from which we take the liberty of extracting the various formulæ as here given:—

No. 1.—BORDEAUX MIXTURE.

For Fungi.

Copper sulphate	1.5 kilograms (3½ lb.)
Unslaked lime	1 „ (2¼ lb.)
Water	100 litres (22 gals.)

Any of the non-arsenical sprays may be rendered effective against biting insects by adding to them Paris green or arsenate of lead at the same rate as recommended in formulas Nos. 10 and 11.

Place the copper sulphate in a feed sack and suspend it in a barrel containing 50 litres of water so that the sack is entirely covered by water. Slake the lime in another vessel and when slaked dilute to 50 litres. Before mixing stir the two solutions vigorously. Then dip a bucket from each solution and pour the two liquids together in a spray barrel, at the same time agitating the mixture vigorously. An excess of copper sulphate is injurious to the foliage, and before spraying the mixture should therefore be tested. This is done by inserting and holding in the mixture a clean steel blade for one or two minutes. If copper is deposited on the blade, more lime must be added. Use the mixture at once.

No. 2.—CARBOLIC-ACID SOLUTION.

For Footrot and Barkrot.

Crude carbolic acid	1 litre (1¾ pints)
Water	1 „ (1¾ pints)

Mix well and apply to the cut surface with a brush. Do not apply the mixture so heavily that it spreads over the live tissue or runs down over the sound portions of the bark, for the mixture is extremely poisonous and is deadly to all living plant tissues.

No. 3.—GOOD CAUSTIC-POTASH WHALE-OIL SOAP.

For Scale and Sucking Insects.

Whale-oil soap ..	3-6 kilograms (6¾ to 13½ lb.)
Water	100 litres (22 gals.)

Dissolve the soap in cold water, strain and apply.

No. 4.—KEROSENE EMULSION.

For Scale and Sucking Insects.

Kerosene	7.5 litres (6 quarts)
Hard soap	.25 kilogram (½ lb.)
Water	4 litres (3½ quarts)

Dissolve the soap in boiling water, and while still hot add the kerosene. Churn the liquid steadily for fifteen or twenty minutes by using a force pump, the liquid being pumped back into the vessel until it is emulsified. Sufficient hot water should be added to increase the volume of solution to 16 litres (3 gals.). For spraying dilute at the rate of 1 litre (1¾ pints) of the stock solution to 15 litres (3½ gals.) of cold water.

No. 5.—Resin Wash.

For Scale and Sucking Insects.

Resin	9 kilograms	(20½ lb.)
Caustic soda (98 per cent.)	2.25 ,,	(5 lb.)
Fish oil	1.5 litres	(2½ pints)
Water	75 litres	(15 gals.)

Pour 75 litres (16½ gals.) of water over the resin (which should be well broken up), caustic soda, and fish oil in a large iron kettle, and boil for three hours. Then add hot water from another boiler (which should be provided for this purpose) from time to time, and stir thoroughly until there are 190 litres (41½ gals.) of the solution. If desired for immediate use dilute each litre of the solution with 2 litres (3½ pints) of cold water before using. If kept as a stock solution, it should be diluted at the same ratio when used.

No. 6.—Self-boiled Lime-Sulphur Wash.

For Fungi and Scale.

Quicklime	3 kilograms	(6¾ lb.)
Sulphur (flour or flowers)	3 ,,	(6¾ lb.)
Water	100 litres	(22 gals.)

Place the lime in a barrel and pour on enough water to cover it. When the lime begins to slake, add the sulphur after running it through a sieve to break the lumps. Stir the mixture constantly and add water as needed to form a thick paste at first and then gradually a thin paste. The lime will supply enough heat to boil the mixture several minutes. As soon as the lime is well slaked, add water to cool the mixture and prevent further cooking. Strain carefully, working the sulphur through the strainer and dilute to 100 litres (22 gals.)

No. 7.—Soda-Sulphur Solution.

For Red Spider and Rust Mites.

Sulphur	12 kilograms	(27 lb.)
Caustic soda (98 per cent.)	8 ,,	(18 lb.)
Water	10 litres	(2 gals.)

In a wooden vessel make a thick paste by mixing the sulphur with the prescribed amount of water. Then add the caustic soda, mixing it thoroughly with the paste. As the mixture becomes heated gradually add water, stirring the solution thoroughly to prevent burning, until 75 litres (16½ gals.) is obtained.

In spraying for rust mites dilute at the rate of 1 to 2 litres (1¾ to 3½ pints) of the solution to 200 litres (43 gallons) of water. If the spray is employed against red spider use the same amount of the stock solution to 50 to 100 litres (11 to 22 gals.) of water.

No. 8.—LIME-SULPHUR DUST.

For Rust Mite.

Sulphur	10 kilograms (22¼ lb.)
Air-slaked lime	10 „ (22¼ lb.)

Mix the two ingredients well, and dust the trees twice a month until the insects disappear. It is best to apply the remedy in the morning while the plants are still wet with dew.

No. 9.—KEROSENE-CARBOLIC ACID EMULSION.

For Ants and Mealy Bugs.

Kerosene	15 litres (3 gals.)
Crude carbolic acid ..	.9 „ (1½ pints)
Soap	.5 kilogram (1⅛ lb.)
Water	100 litres (22 gals.)

Dissolve the soap in boiling water together with the carbolic acid, and while still hot add the kerosene. Churn the liquid steadily for fifteen or twenty minutes by the use of a force pump as in making kerosene emulsion. For spraying, dilute each litre of the emulsion with 18 litres (3¾ gals.) of water. In using this insecticide for ants spray the liquid into their nests.

No. 10.—ARSENATE OF LEAD.

For Biting Insects.

Arsenate of lead ..	0.5-1 kilogram (1⅛-2¼ lb.)
Quicklime	.5-1 „ (1⅛-2¼ lb.)
Water	100 liters (21 gals.)

Slake the lime in a wooden vessel; dilute to 100 litres (22 gals.), and dissolve the arsenate of lead in the liquid.

No. 11.—PARIS GREEN.

For Biting Insects.

Paris green ..	60-120 grams (2 to 4 oz. troy)
Quicklime	0.5-1 kilogram (1⅛-2¼ lb.)
Water	100 litres (21 gals.)

Place the lime in a wooden vessel and slake; dilute to 100 litres (21 gals.) and add Paris green. London purple may be substituted for Paris green, and is then used at the same rate. Both these poisons, particularly the Paris green, have a tendency to settle, and the liquid should be kept in constant agitation during the spraying, else the spray from the bottom of the barrel may seriously damage the foliage, while the remainder is useless.

No. 12.—THE MALLY FRUIT-FLY REMEDY.

For Fruit Flies.

Arsenate of lead	0.6 kilogram (1⅓ lb.)
Sugar	7.5 „ (17 lb.)
Water	100 litres (22 gals.)

Dissolve the arsenate of lead in a small quantity of water; dilute to 100 litres (22 gals.) and add sugar.

The first application should be made a month before the presence of the larvæ in the fruit is expected, and thereafter an application every ten to fourteen days is thought advisable, bearing in mind that the poisoned bait should be on the trees as long as the flies are present in the grove. About 1 to 1.5 litres (1¾ pints to 2½ pints) of spray is sufficient to a tree of 6 to 7.5 meters (19 to 24 ft.) spread. Apply the spray so that the liquid falls in small drops over and through the tree.*

GRAFTING THE PAPAW.

Much interest has of late been aroused amongst papaw-growers by the investigations of Mr. Ashton W. Gardner, Jamaica, who showed that the papaw could be grown from cuttings, and later by the successful experiments in grafting side-shoots of a tree which has had its top broken off, and hence sends out numerous shoots, on to a young seedling tree a couple of feet high. Before we heard of this we made an experiment in grafting a shoot from a female tree on to a young male tree which flowered when it was a little over two feet high. When young, the stem of the papaw is solid, and as it grows towards maturity the stem becomes hollow, and this led to experiments in "feeding" the tree per the hollow with sugar and water. Our experiment was made in precisely the manner as hereafter described in a reprint in the "Queensland Sugar Journal" of 8th January from a pamphlet issued in March, 1913, by the Agricultural Department of Washington, containing a paper by Mr. D. Fairchild, Agricultural Explorer in Charge of Foreign Seed and Plant Introduction, and E. Simmonds, Superintendent in Charge of the Sub-tropical Plant Introduction Field Station, on the above subject. Our experiment was successful up to a certain point, when the graft was accidentally pulled out after remaining healthy for over a fortnight, when it had apparently "taken."

The extract which was published in the "Sugar Journal" reads:—Investigations by Mr. Ashton W. Gardner, of Kingston, Jamaica, showed that the plant could be grown from cuttings, and the matter was taken up from this point of view by the Florida Field Station. But the process turned out to be so slow as to be of little value for conditions in South Florida.

With the discovery, however, of a practical method of rapid asexual propagation the papaw enters upon a new era of possibilities. It has been found by the writers that seeds of the papaya, when planted in the greenhouse in February, produce young seedlings large enough to graft some time in March; that these grafted trees, which can be grown in pots, when set out in the open ground in May or in the latter part of April, make an astonishing growth and come into bearing in November

* The British equivalents to the metric measurements are only approximate.—Ed. "Q.A.J."

or December, that they continue bearing throughout the following spring and summer, and, if it is advisable, can be left to bear fruit into the following autumn.

A single March-budded plant will bear from two to three dozen fruits during the following winter and spring, and these fruits will average from 2 to 3 lb. apiece, so that a single papaya tree should yield 48 to 72 lb. of fruit within 15 months. It has been found, however, that the papaya is a plant peculiarly subject to root-knot, caused by a species of nematode, and it is, therefore, important that it be handled as an annual tree crop, and be not planted year after year on the same ground, but in rotation with other crops.

METHOD OF GRAFTING EMPLOYED.

The method of grafting the papaya is so extremely simple that it seems remarkable that it was not discovered earlier. The difficulty

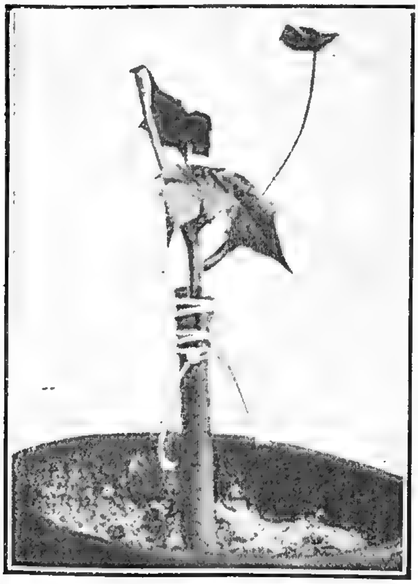

PLATE 20.—PAPAW BUDDING.

evidently lay in the fact that a bearing papaya tree under ordinary circumstances has no bud wood for grafting purposes. After a seedling begins to fruit, it does not normally produce side shoots which can be used for grafting. It has been observed for some time, however, that if the top of a bearing tree is cut or broken off accidentally, a large number of shoots begin to form, one from the upper part of each leaf scar; that is, the axil of the leaf. This takes place three or four weeks after the tree is decapitated. It is these small shoots, of which as many as fifty or more may be produced by a single tree, that are used in grafting the papaya. One of these shoots is taken when a few inches long and about the diameter of a lead pencil, is sharpened to a wedge point, the leaf surface reduced, and inserted in a cleft in a young seedling papaya plant which has been decapitated when 6 to 10 inches high, and split with an unusually sharp, thin grafting knife. (See illustration.) At this age the trunk of the young seedling has not yet formed the hollow space in the centre. It is not necessary for the stock and the scion to be of equal size; the scion should not, however, be larger than the stock. After inserting the scion, the stock is tied firmly, but not tightly, with a short piece of soft twine. The grafted plant should be shaded for a few days after the grafting has been done, and the twine should be removed on the sixth or seventh day. The best success has been secured in these experiments by grafting potted seedlings in the greenhouse or under the shade of a lath house, presumably because the stock can be kept in good growing condition under these circumstances. Under these conditions fully 75 per cent. of successes can be expected. In the field, also, this method has been successfully followed.

A number of grafted papayas are now being prepared for a somewhat extensive experiment at Miami during the coming season, and as large a stock as possible of several selected seedlings will be provided for experimental planting in May, but the writers wish to point out particularly that as this was the first season it is possible that there may be drawbacks to the development of the papaya plantations of grafted plants, notwithstanding the fact that all the indications point towards the method of grafting as the logical one upon which to place this remarkable tropical fruit plant.

[Our illustration is also reproduced from the "Queensland Sugar Journal," and is a fac-simile of the tree we grafted some weeks ago.—Ed. "Q.A.J."]

QUEENSLAND DATES.

We should be glad to receive any information concerning date trees which have been planted by any of our readers or others. Such information, we would suggest, should state the variety planted, whether raised from seed or off-shoots (if the latter, whence obtained), and approximate weight of each when planted; date when planted; date of first fruiting; how pollinated, whether naturally or artificially; distances apart; whether irrigated artificially or not; whether cultivated or left to Nature; nature of soil and subsoil; number of bunches per tree; whether the fruits on a bunch all ripen at once or at different times; if marketed, how prepared, and selling price.

Tropical Industries.

THE LUCE CANE HARVESTER.

It would appear that the invention of a perfect cane harvester, one which will not only cut and strip the cane, but, what is most important, one which will top the cane at the proper point, no matter what the length of the cane, has been achieved by Mr. George D. Luce, who has (says the "Louisiana Planter" of 6th December) given an exhibition of his cane harvester at Audubon Park. That journal says:—The apparatus itself and the work it has been doing have been examined by many interested persons, and some of them very competent judges. The concensus of opinion among these is that Mr. Luce has developed a sugar-cane harvester that will go into practically any field of thin cane or heavy cane, where the canes are planted in rows.

The machine is driven by gasoline engines of competent power, and does each one of the three elements of cane cutting—the cutting at the bottom, the cutting at the top, and the stripping of the cane—with an equal degree of accuracy. Working as we saw it on 3rd December at the Sugar Experiment Station in Audubon Park, in a field of sugar-cane estimated by Mr. Taggart, the assistant director there, to give a yield of 30 tons per acre, we were simply astonished and gratified to see the excellence with which the work was done, foreshadowing, as it seems to do, the complete success of Mr. Luce along the lines that he has developed.

We are naturally led to compare Mr. Luce's machine with the Cockrell machine that was exhibited at Reserve last year. At Reserve there was some trouble with the traction engine, it not seeming competent to do the work then needed. We stood by Mr. Luce's machine on Wednesday, after having stepped off the distance at the end of one of the cane rows, a distance of 42 feet, and the machine was started by its engineer and travelled the 42 feet in this 30 ton cane per acre without any hesitation and without any stopping. We presume that this has been the first time that any sugar-cane harvester has accomplished that distance in heavy cane without a single stop.

Mr. Luce's machine weighs about 3¼ short tons. He believes that by gradual improvements this can be reduced to 1¾ short tons; but with the weight of his present machine it made a surprising progress through the cane row.

Mr. Luce has geared his cutting discs so that their movement makes sliding cuts on the cane, and not a direct, forcible cut, as is done with other disc machines. This may be one of the reasons of its successful traction in heavy cane.

The cane where cut by the knives at the bottom is controlled by link belt chain guides that pick the cane up from close to the ground, as well as those that are standing vertically, and bring all of these canes in a vertical line to a point at which these guiding chains completely grasp the cane, holding it firmly in position. The stream of sugar-cane thus entering the machine enters at an angle established for the purpose, which, with some 5 or 6 feet of travel, carries the cane forward and upward until it strikes the top of the chute, when the firm grasp of the guide and feeding chains so hold the canes that the soft tops bend over, sometimes breaking off, and at that point disc cutters are arranged so that all of the canes are cut at the desired point thus attained. It struck us that in this point Mr. Luce has made a wonderful display of inventive ingenuity, and it seems to be the solution of that most vexed problem of all, the cutting of the canes properly at the top. When we recognise the fact that our sugar-canes vary in length of ripe cane from 5 to 10 feet, more generally, say, from 5 to 8 feet, after the top is off, we can appreciate Mr. Luce's achievement. These canes thus topped have in the meantime been stripped by the spring whips that move in reverse direction from the movement of the cane.

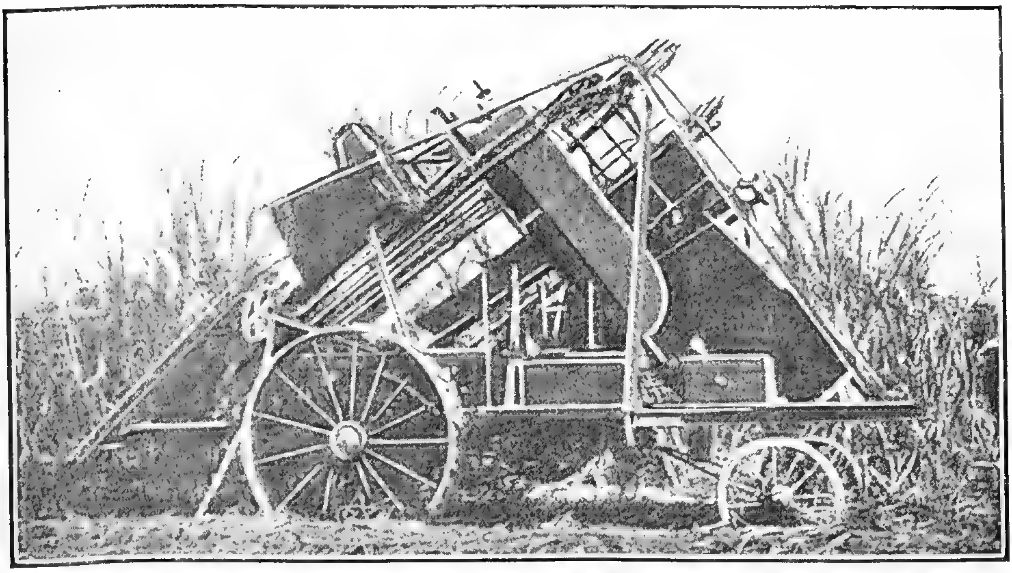

PLATE 21.—THE LUCE CANE HARVESTER.

The final delivery of the canes is down an open chute, forming a continuous windrow.

We especially inquired as to any control of the cutting apparatus as to height. Ordinarily plant canes or highly fertilised canes might give canes varying from 6 to 10 feet in length, while stubble canes and canes less well fertilised might run from 5 to 7 feet in length. We noted at once that there was an arrangement to shift from one length to another, just as readily as an automobile may have its speed changed. This, however, still leaves the Luce machine cutting the cane at the last ripe joint, whether the canes be long or short, as the bending of the top of the cane becomes a gauge point to determine their approach to the cutting discs of the topping part of the machine. It is stated that Mr. Luce has expended 100,000 dollars (£20,000) in developing his machine up to its present condition. He thinks that there are still some improvements that might be made, although even now the machine is a working apparatus. He believes that its weight can be materially reduced by a careful study of the strength of the materials, and the diminution down to the limit of safety.

Mr. Luce intends to try the machine now in regular plantation work. A few hours' work would cut down all the cane at Audubon Park, which, of course, the management could not permit, as the Audubon Sugar School is now giving its practical lessons to a class of students in the station's sugar-house and in the station's canefield. It has pleased Professor Dodson, the director, and his various assistant directors to afford inventors every possible opportunity to perfect their apparatus, and we owe much to them for their hearty co-operation along these lines. Mr. Luce, we believe, contemplates going over on Bayou Lafourche with his machine to give it a complete canefield trial over there, and we wish him the success that he deserves, and the success that his machine indicates as already secured at Audubon Park.

The photograph appeared in the "Louisiana Planter."

NOTES ON DATE-GROWING.

(CONTINUED FROM FEBRUARY ISSUE.)

THE ADVANTAGES AND DISADVANTAGES OF PROPAGATING DATE PLANTS FROM SEEDS, AS COMPARED WITH PROPAGATING THEM FROM SUCKERS (OFF-SHOOTS).—TIME OF YEAR TO SELECT SUCKERS AND METHODS OF DETACHING THEM FROM PARENT TREES.

Propagation by Seeds.—If 100 seeds are sown, about 50 of the seedling plants will probably be male trees, and will, of course, bear no fruits. Of the 50 female, perhaps 10 trees or fewer will yield passable fruits; 5 or 6 of these will probably yield fruits of a quality equal to that of the mother tree, and one, or not even one, may yield fruits superior to hers. The characters of the male and female palms used to produce the seeds will, of course, materially affect the number of useful seedlings got.

Age at which the Sex of Seedlings can be Known.—The sexes cannot be known with certainty till the tree bears flowers; and as this will occur five to ten years after the seeds are sown, land, labour, and water will have to be provided for 100 trees for from five to ten years before the 90 more or less useless trees can be weeded out, and the ten, or fewer, passable ones can be selected.

Bearing of Date Seedlings.—The seed-bed should be prepared in March or April* as for any ordinary farm crop. The seeds should be planted in it to a depth of from 1 to 2 inches in rows, 3 to 4 feet between the rows, and then irrigated. The bed should be watered once a week till the seedlings show above ground, and should then be watered as frequently

* About September or October in Queensland.

as will keep the ground moist enough to grow any ordinary farm crop. The seedlings are extremely hardy. If they are well treated they will grow faster and come into flower sooner. They repay good treatment well, as only when they come into flower and fruit can the fruitless males and worthless females be weeded out. When three to four years of age, every alternate plant may be taken out of the nursery and planted elsewhere. The remainder may be left until flowers and fruits are shown, and the worthless varieties can be thrown out. If they can be left in the seed-bed without choking each other up, they may all be left there until they show flowers or fruits. Transplanting may be done as in the case of off-shoots (as will be described later). The rearing of date trees from seeds is not advisable for ordinary date cultivators when good off-shoots can be obtained.

The Fruit Formed as an immediate result of Pollination not affected by Characters of the Male.—The reason that so few good female trees are got from ordinary seeds is, that the female trees are generally pollinated by male trees of inferior quality, and they, of course, influence the off-spring. As the female trees are almost always propagated by off-shoots in date-growing countries, and the fruit formed as the immediate result of pollination is not affected by the character of the male used, ordinary dategrowers have no incentive to breed good male trees.

Advantages of Planting by Off-shoots.—In ordinary date cultivation, propagation should be done by off-shoots. No useless trees have to be cultivated if this method is adopted, as all off-shoots from female trees will become female trees, and will yield fruits of the same quality as the mother treee. By planting off-shoots, therefore, it is possible to obtain a plantation of trees all yielding fruits of exactly the same quality. Where the date trees are reared from seeds, no individual tree bears fruits exactly like those borne by any other, and therefore the cultivator cannot supply a large quantity of fruits of exactly the same quality. This is a very important disadvantage for trading purposes.

Time of Year to Select Off-shoots.—Off-shoots should be selected when the fruits are ripe and hanging on the mother trees, as at that time there can be no doubt about the quality of the fruits that the off-shoots will bear. The trees from which off-shoots are required should then be marked with paint or in any other convenient way, and their positions recorded in a note-book, a rough plan of the positions being made if necessary.

Detaching Suckers from Female Trees.—The off-shoots are severed from the parent tree by means of an ordinary axe, the cutting being done in a plane parallel to the stem of the latter. The cut should be made as near to the tree as possible without unduly harming it. The axe should be sharp and the blows light. Every care should be taken not to shatter the off-shoot in removing it from the mother. The wound on the mother should be earthed up at once, and it is well to first coat the wound with coal tar or other material generally used to cover plant wounds.

Size of Suckers to be Transplanted.—Off-sets, to be transplanted should have all the adult leaves cut back as in photo. No. 1. Practically nothing but the tender young leaves in the central bud and the bare stalks of the old leaves should be left on the plant. The object in doing this is to reduce the amount of water transpired from the transplanted off-shoots through the medium of the leaves owing to being severed from

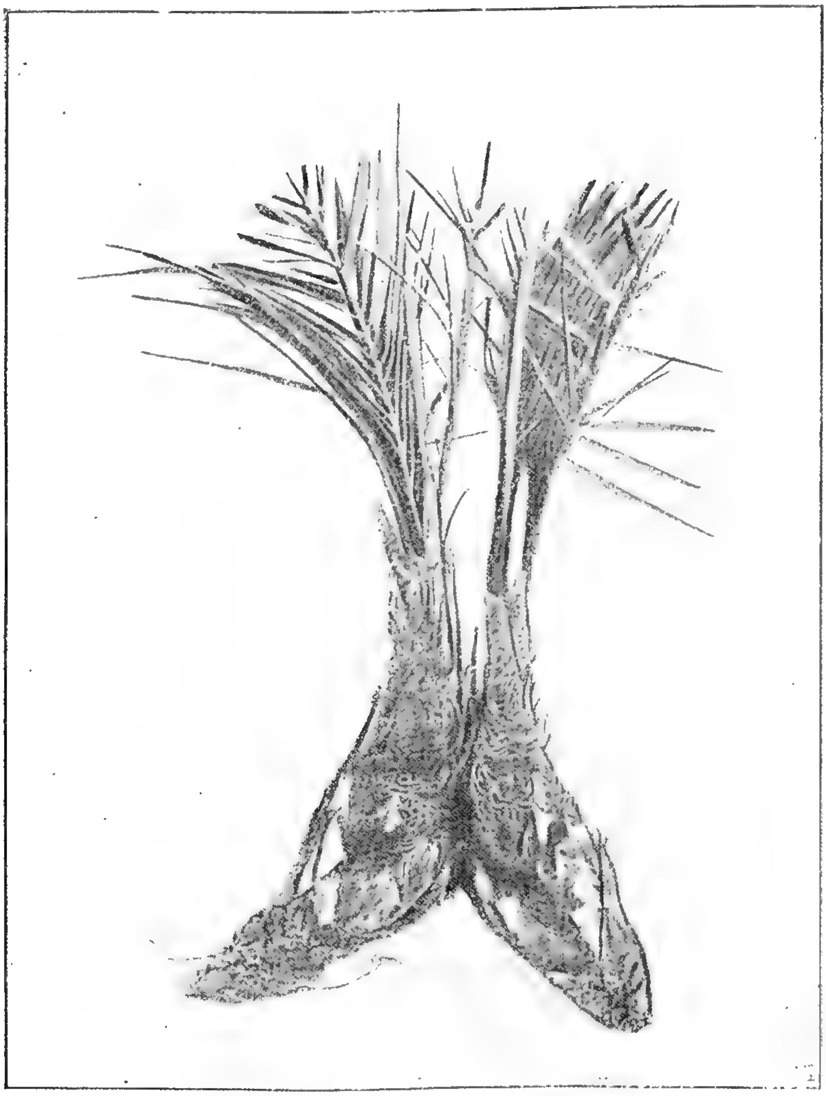

PLATE 22.—SHOWING TWO SUCKERS WITH LEAVES TRIMMED BACK AND READY FOR PLANTING.

its parent. If the amount of water given off by the leaves is greater than that taken up from the soil the plant must dry up, and will die. After the adult leaves have been trimmed back, the off-shoots should not weigh less than 6 lb. Off-shoots less than this usually die when transplanted, as, if by any chance the amount of moisture in the soil around the off-shoots becomes less than what is required, the plant has not sufficient strength in it to replace those rootlets that may have been dried up. From the weighment of a large number of plants, I find that the average weight of an off-shoot when trimmed and ready for planting is 12 to 15 lb. Off-shoots are usually fit for transplanting when they are three to four years old, but the larger the off-shoot is the better, as there will be less danger in shattering it when removing it from the parent tree, and more chance of its doing well when transplanted.

To Induce Off-shoots to Form Roots.—Six months to a year before the off-shoots are removed earth is sometimes piled up round the bases of the mother trees and kept moist. This induces the off-shoots to send out rootlets, and increases their chances of taking root when planted out.

Care of Off-shoots after removal from the Parent Tree until Planted.—When suckers are transported long distances, and a considerable time elapses before they can be planted, it is advisable to coat their bases with mud, and cover them with palm fibre, grass, or straw and matting, leaving the crown of the off-shoot exposed. The palm fibre is kept damp by occasional sprinkling with water. The water must be applied lightly, otherwise the mud tends to be washed off the palms. The mud used should have rather more sand than clay in it, and should be about as thick as cream. Dipping is done in a box or in a hole in the ground which should be at least 6 in. wider than the diameter of the largest sucker, and 6 in. deeper than the largest base to be coated. The box or hole is filled with mud, and a sucker is placed in it and withdrawn. It is then immediately bound in wet fibre, &c. If many trees are to be treated, a larger hole is better, as it has to be refilled with mud less frequently. Care is taken not to admit the mud into the crown of the plant. . . . Suckers have been known to keep healthy for about three months when treated in this manner (Gaskin). The bases of the off-shoots may be simply bound up with a covering of palm fibre to protect them during transport to where they are to be transplanted. More frequently, no packing of any sort is done. They should, however, have their bases placed in water on the same day as they are removed from the parent tree. If this is done, and the off-shoots are strong, probably little harm will happen to them if they are not planted for a month. It is well to plant them as soon as possible, however.

Cost of Off-shoots in Arabia.—In Basia, in 1910, the cost of 100 date-suckers fit for transplanting ranged from 50 to 75 rupees (£3 6s. 8d. to £4 3s. 4d.).

PLANTING DATE TREES AND CARE OF YOUNG PLANTATIONS.

The Advantages and Disadvantages of having Dates in Plantations as Compared with having the Trees round the Borders of Fields.—If date trees are grown on the edges of watercourses or fields, a large number of palms may be grown without diminishing the area of land under other crops. Once established, they can also be grown with little or no additional water supply, as the water supplied to the field crops is usually sufficient for the palms. When palm trees are grown in a plantation, a large number of plants can be more easily watered and attended to when young than if scattered around the edges of fields, and when the trees are bearing fruits the latter can be more easily guarded from birds and other enemies. The death-rate among young date-suckers in the first two years after being planted out is so alarming when water has not been regularly given in suitable quantities, and where the trees have not been properly attended to, that, in cases where these attentions cannot be ensured, it would probably be better to plant the trees in a nursery and grow them there till they have developed a good root system, and then

PLATE 23.—ARABIAN DATE PLANTATION AT CENTRAL JAIL, MULTAN, PLANTED IN 1910. PHOTOGRAPHED ABOUT TWO YEARS LATER. ONIONS GROWING BETWEEN THE LINES.

transplant them into permanent places with a ball of the nursery earth undetached from their bases. A year's growth or more will be lost by planting the trees a second time, and they will have to be well attended to till they establish themselves in their new positions, but the death-rate among the plants will be very much decreased. Much less water will be required for a number of trees in a nursery than if they are widely scattered over a large enclosure. Even when old trees have to be replaced in a date plantation, it may be advisable to grow the suckers in a nursery for a time before planting them in their permanent positions, as these young plants require much more water and attention than the older trees, and they are very apt to be neglected if scattered about in odd places. In suitable localities, dates are probably a more paying crop than any other; and, if vegetables, lucerne, and other crops are grown between the trees, a piece of land laid out in a first-class quality of date trees ought to be a very paying investment. When the difficulty of the enemies can be got over easily, however, I think it would be well to have a considerable number of trees planted round the edges of the fields and along water-channels. As the many factors involved differ not only in different districts, but with each individual cultivator, each intending date-grower will have to decide what is best to be done in his own case.

(TO BE CONTINUED.)

HOW COCOANUT BUTTER IS MADE.

According to the United States consul at Carlsbad (Austria), most of the cocoanut butter manufactured in Bohemia is made of Cochin-China or Indian copra, which is received in large wooden tuns. The dried copra is sliced, and the fat is extracted by oil presses—quite a simple process. This raw oil contains soap fats and does not have a pleasant odour. It is placed in large tanks, and the first step in the refining process is the addition of powdered chalk, which absorbs the soap fats and settles to the bottom of the tank. The oil on the surface is pumped into another tank, passing through four or five filters as the second step in the refining process. It is then forced into a tank heated by steam pipes to about 270 to 518 degrees F. This process continues until the oil is as clear as crystal and begins to bubble. It is then pumped into an automatic weighing apparatus and run into the moulds, where it is allowed to cool. The tablets or cubes are removed to the packing table. Part of the oil is run into various-sized tubes and is also placed on the market in this form. The soap fats, combined with the chalk, are treated with sulphuric acid, which dissolves the chalk, leaving the fats floating on the suface of the solution. These are drawn off into tubes and are sold to manufacturers of soap. The trimmings of the copra slices are made into a powder, which commands a good price as fodder for cattle and pigs. The cocoanut fat is white, but when manufactured into butter is coloured to resemble oleomargarine. Sesame oil is added to make the product more pliant. Cocoanut butter keeps well either raw or refined, and does not spoil for months, even in warm weather. It is claimed that the ordinary consumer cannot detect the difference between this butter and oleomargarine. Six or seven years ago the output of cocoanut butter in Austria was about 40 tons a day. It is now approximately 300 tons. The price has increased from 18.25 dollars (£3 15s.) to 26 dollars (£5 8s. 6d.) for 200 lb. The factories claim that they cannot keep up with the demand. The market is controlled practically by two firms—one in Vienna, the other in Aussig.

Entomology.

SHEEP-MAGGOT FLY PEST.

[CONTINUED.]

REPORT OF THE ASSISTANT GOVERNMENT ENTOMOLOGIST.

I have the honour to report that on the 2nd October I visited the Central-Western District in company with Mr. A. H. Cory, Chief Government Veterinary Surgeon, for the purpose of obtaining specimens of sheep-maggot flies and identifying our injurious species.

At Longreach we were met by Mr. Telford (the local representative of the Queensland Pastoralists' Association), and, during the following week, drove to various large sheep stations and made the acquaintance of some of the leading pastoralists. Proceeding later to Emerald, we studied conditions obtaining in the Springsure District, and obtained additional samples of maggots from several localities.

It is not my intention to deal comprehensively with this subject, but to avoid as far as possible needless repetition of facts already widely known, and, by recording original observations, to add a little information to that already published on the question.

A FEW MISCELLANEOUS NOTES.

The disastrous drought of 1902 is supposed to have favoured the rapid multiplication of this pest in New South Wales and led to its acquiring the fatal habit of blowing live wool, but I am disposed to think that in parts of Queensland, at any rate, drought conditions may operate differently, and tend to check rather than promote the breeding of flies.

Intense dry heat, coupled with a minimum amount of shade and dew and prolonged abnormally, soon extracts all moisture from a dead animal, and myriads of maggots, unable to develop properly under such conditions, are compelled to pupate before being fully grown. Many of these pupæ become too dry and so perish, and the remainder, as a result of such premature transformation, produce undersized flies which are mostly of the male sex.

FIRST APPEARANCE OF THE PEST.

Blown sheep are said to have been first noticed in Queensland in 1883, but the trouble did not assume a serious aspect until many years afterwards. The fly was in evidence in Barcaldine in 1903, although no alarm was occasioned until six years later. At Gindie and Longreach, however, it failed to appear until 1910, and in parts of the Springsure district has not become a pest until quite recently.

LOSSES.

Many stations experienced heavy losses last season, the fly being unusually aggressive, attacking lambs and wethers alike, and blowing ewes a month off shears. At Capella 600 wethers, with two months' wool, were continually getting blown, and one station had about 50 per cent. of ewes "struck."

On a selection at Longreach 40,000 out of 100,000 ewes were "blown," and it is stated on good authority that a couple of men made £400 in two months out of wool collected from dead carcasses of fly-blown sheep on one station only.

FRESH DEVELOPMENTS IN BLOWING.

A breeder at Emerald had about 4 per cent. of three months' old lambs blown around the base of the horns. This occurred in March, while they were feeding in long grass kept fairly moist by heavy dews. Mr. J. S. Rowan, of Talleyrand, has noticed a number of instances of sheep being blown in the eyes during hot weather.

One of the most pathetic sights witnessed, however, was a mob of eight-months-old weaners, 10 per cent. of which were badly blown under the tail.

SHEEP-MAGGOT FLIES.

I was rather surprised at not seeing a single specimen of the yellow-bodied blow fly *Calliphora villosa,* which occurs commonly in Brisbane, and, according to Froggatt, blows sheep in New South Wales.

This species is said to come into houses at Longreach during the winter, and Mr. W. G. Brown, State Sheep and Wool Expert, has noticed it at Alpha in July in considerable numbers. The closely-related maggot fly *Calliphora oceanicæ* was not seen at Longreach, but I saw a couple of specimens at Emerald.

Apparently the dry heat of our Western climate is uncongenial to both these flies, which seem to prefer a more humid atmosphere and are most abundant near the coast. They have never been observed on living sheep either at Longreach or on Peak Downs, and their occurrence during the cooler seasons need occasion no alarm.

Unfortunately they are well represented in Queensland by two equally obnoxious sheep maggot flies, which are responsible for the present critical state of affairs and are widely distributed throughout an area embracing about 50,000 square miles. In the absence of necessary technical literature on the Muscidæ, I have provisionally identified one of these species as *Calliphora rufifacies*;* the other fly is evidently the so-called European "green bottle fly," a slightly smaller insect of somewhat similar colouration to the above, but more slender in shape.

Both of these flies congregate plentifully on garbage in back yards, and have an objectionable habit of entering homesteads, and, in the

* The correctness of this identification has since been confirmed by the Department of Agriculture, New South Wales.

absence of fly-proof doors, swarming over food at meal times like ordinary house flies. They are especially fond of cake and jam tarts, &c., a liking that is not without economic interest as showing the readiness with which they should be induced to take sweetened poisoned baits.

I have bred both species from maggots taken from live wool procured at Crossmore, Talleyrand, Strathdarr, Emerald, Springsure, and Gordon Downs in the Longreach and Peak Downs District.

It may interest pastoralists to know that the little clusters of white substance observable on blown wool are eggs of maggot flies, and that sometimes this stage is dispensed with, and the female deposits living larvæ among the wool. These, when fully grown, drop from the animal and, entering the soil, change into pupæ, somewhat resembling those of ants (mis-called "ants' eggs"), but firmer and generally much darker.

Lucilea sericata has previously been recorded as a sheep-maggot fly by Mr. Tryon, and was bred by me from maggots taken from live wool forwarded to this office by Veterinary Inspector H. O'Boyle from the Western-Central District in 1910.

Calliphora rufifacies, however, has not hitherto been known to blow sheep in Queensland, and in view of its specific identity being of general interest, I have thought it advisable to give a short description of the living fly so that it may be easily recognised.

DESCRIPTION OF *CALLIPHORA RUFIFACIES.*

General colour golden green, with irridescent coppery tints. Prothorax with three longitudinal pinkish dorsal streaks, more or less distinct, the middle one being faintest. Metathorax with sub-dorsal coppery streaks, a transverse row of four black spines close to posterior edge, and other spines arranged as shown in the accompanying sketch.

Under portion of thorax and head clothed with short white hairs, particularly in the male.

First abdominal segment and hind edges of second and third segments dark blue, anal segment light metallic gold, tinged with irridescent copper and bearing a few rather long black spines.

Head broader proportionately than in *Lucilia sericata,* with eyes light chocolate brown, and antennæ reddish yellow. Face blackish above, yellow beneath, and clothed with white pubescence.

Length of full-sized female 10 mm. and of male 9 mm.

NOTE.

After death the characteristic golden-green colour darkens to bluish, and occasionally living specimens are greenish blue, but this is very exceptional. When bred in confinement under an average mean temperature of 75·5 deg. F., the life-cycle of this species occupies twelve days, eggs laid at Longreach on 7th October producing maggots that pupated seven days later, from which the flies emerged on the 18th of the same month.

The larva of this species is the so-called "hairy maggot," erroneously thought by some to be an advanced stage of the smooth maggot of *Lucilia sericata.*

CONTROL SUGGESTIONS.

The following recommendations relate exclusively to the entomological side of the question, other preventive measures, including dips, sprays, and crutching, &c., being fully dealt with by my colleague—Mr. A. H. Cory, M.R.C.V.S., Government Veterinary Surgeon—in his official report.

TRAPPING FLIES.

In a recent number of the "Queensland Agricultural Journal" (August, 1913) I suggested the advisability of adopting some systematic method of trapping the adult flies, and alluded to the possibilities ahead of future experimentation in this direction.

Observations in the field have more than ever convinced me of the value of this method of control, which is not only simple and practicable, but goes to the root of the trouble, by preventing the laying of eggs and larvæ, a matter of the first importance when it is remembered that each female fly deposits about 500 eggs.

There are various ways of trapping flies, but arsenical poison baits appear to promise the best results, and have already been tried in a small way by one or two pastoralists at Emerald, who found that a dead carcass or a sheep skin wetted with Cooper's poison dip killed many of the flies attracted to it.

A few experiments with sodium arsenite have proved very satisfactory, and I find that a bait composed of ½ dwt. of this poison mixed with ¼lb. of sugar and 4¼ fluid oz. of water, is greedily eaten by blow flies, either in a liquid state or when crystallized. Our common meat flies—*Calliphora villosa* and *oceanicæ*—were found to be quickly affected, being disinclined to fly ten minutes after sucking it, and quite dead in half an hour.

Carcasses sprayed with this bait would doubtless attract and destroy millions of blow flies, but when used for such a purpose they should always be surrounded by a suitable wire mesh to avoid the possible destruction of useful birds.

Traps of this sort are easily constructed, and should be designed with a view to preventing any maggots that might develop and drop from the carcass from reaching the soil to pupate.

The use of decaying animal matter as an attraction, however, has many drawbacks, and it may be possible before long, to employ a better kind of trap, using the same poison bait, but alluring the flies by means of some strongly smelling chemical substance.

It has occurred to me that a trap of somewhat similar design to the "Hodge fly-trap" used for controlling stable flies in America, would, if adapted to suit our requirements, be very suitable in coping with sheep-maggot flies. Its record in the States is reported to be 37½ quarts of flies in a week, and I see no reason why it should not do splendid work in Queensland.

To make the best use of this form of trap it would be advisable to take full advantage of the habit which flies have of flying to strong light, and construct a small chamber of weather-boards about 7 by 5 by 5 feet in size, in which to place the bait and fix the trap.

The initial expense in installing a number of such chambers would be trifling in comparison to the permanent benefit derived, and, once established, it would only be necessary to renew the bait at intervals and make periodical visits to remove dead flies.

Before attempting any extensive system of trapping, experiments should be conducted to determine the average range of flight of these maggot-flies, and the greatest distance at which they can perceive odour from dead animals and will travel to reach it, &c.

DESTRUCTION OF DECAYING ANIMAL MATTER.

The value of this control measure cannot be over-estimated, as it is surely the height of folly to allow so formidable a pest to breed unrestrainedly. And yet, with but few exceptions, this is just what is being permitted at the present time, and pastoralists evidently do not fully recognise the importance of checking such wholesale breeding. Shearing-sheds are admittedly centres of infection, and it is commonly believed that sheep are more liable to get "struck" whilst in such places than at any other time.

We visited several sheds and invariably noticed heaps of blown wool lying about the yards, and a dead sheep or two, or offal, &c., close to the buildings.

Upon turning over one of these carcasses, squirming masses of maggots in all stages of growth were disclosed, and further inspection revealed the presence of additional thousands inside the body. It is no exaggeration to state that every dead sheep is a possible breeding ground for many thousands of flies, for it must be remembered that the life-cycle of these insects—from egg to winged state—is completed in less than three weeks, so that a carcass would be likely to lie long enough to supply food for two or more successive broods of flies.

Is it any wonder, then, that such insanitary shearing-sheds quickly become sources of infection and are a continual menace to the entire flock?

We were pleased to meet a selector at Emerald who makes a practice of burning all such refuse as soon as discovered.

He was troubled with fly about two years ago, but is now free from attack, and attributes his good fortune entirely to the abovementioned systematic destruction of breeding matter. Such cleaning up may not always be easy, especially on open country where there is little or no wood available, but it is highly important that the present careless state of affairs should be remedied, and I would suggest that it be made compulsory to destroy all decaying animal matter lying in the vicinity of shearing-sheds.

PRESERVATION OF BIRDS.

This question is an eminently practical one, and intimately associated with the present trouble. It was observed that, as a general rule, timbered country or scrub land affording shelter for bird life was free from, or but slightly infested by, sheep-maggot flies, whilst on extensive areas devoid of trees the pest was generally at its worst.

This was particularly noticeable both at Longreach and Emerald on well-timbered stations adjoining open country, the former being usually free from fly and the latter infested.

Mr. W. G. Brown, State Sheep and Wool Expert, tells me that he has not yet heard of a single instance of blown sheep on the so-called "desert" or spinfex country.*

This class of land is not open, as the name erroneously implies, but supports a great variety of edible shrubs, and although unable to explore the district I should imagine it would be fairly rich in bird life.

On a well-timbered selection near Emerald, where I heard the notes of a number of kinds of small birds, the owner was not troubled by maggot-flies. His neighbour, however, only a mile distant, whose land was comparatively open, had 5 per cent. of his ewes "struck," and told me that from the first he had noticed the great scarcity of bird life on his selection.

The above facts are significant, and suggest the advisability of not only protecting our insectivorous birds, but of encouraging them to breed more freely by providing suitable cover, and, where needful, introducing useful indigenous species. The shade derived from such shelter would also be appreciated by stock, especially in open country, where I am told it is not unusual in hot weather to see sheep standing with their heads against fencing posts trying to find relief from the burning heat. It is surprising how birds will endeavour to make the best of surrounding conditions and continue to breed in spite of seemingly insurmountable obstacles.

Whilst at Strathdarr, I was shown two nests of the Black and White Fantail (better known as "Shepherd's Companion"), in Parkinsonia trees, the foliage of which gives very little shade and is too open to screen nests from view.

Another little bird was building close to the house in a deciduous tree about 4 feet high, and entirely leafless at the time of our visit; and swallows were nesting under the roof of a veranda.

* Since writing this report, however, he informs me that a case has occurred at Alpha.

Parkinsonia aculeata is exceedingly hardy and has thoroughly adapted itself to Western climatic conditions, but many of our native trees in the district afford denser shade and are more suitable for breeding purposes.

SOME USEFUL BIRDS NOTICED AT LONGREACH.

Crows.—These birds are commonly seen on dead carcasses, and have been observed to pull aside dried skin to get at the maggots beneath, and to pick pupæ of the fly from soil under dead sheep. In addition to eating maggots, &c., they undoubtedly help to check the breeding of flies by cleaning up decaying animal matter.

NOTE.—We cannot at this juncture afford to dispense with the services of the crow, and, although it occasionally kills sickly sheep and lambs, I would strongly advise its protection for the present.

Scavenger Kite.—This is a most useful bird and should be carefully guarded from injury; it is said to be an introduction from Java, and appears to feed exclusively on carrion.

Magpie Lark or Peewee.—Not very plentiful.

Ground Lark.—Met with constantly in the open.

Shepherd's Companion.—A notable fly catcher.

Magpie.—Common in places.

Swallows.—Very numerous; an exceedingly useful species.

Jay.—A few specimens noticed.

Bustard ("Wild Turkey").—Plentiful, a great destroyer of grasshoppers.

NATURAL ENEMIES.

At Talleyrand I was fortunate in finding unmistakable evidence of the presence of a parasite of *C. rufifacies* affecting a large percentage of the pupæ of this fly found under a dead sheep. The carcass was nearly dried up, and all insects had emerged, so I collected a few hundred living pupæ and larvæ close to Longreach in the hope that some of them would be parasitised.

On the 29th instant, scores of hymenopterous parasites, apparently belonging to the Chalcidæ, emerged from these pupæ, all being of the one species—a small shining black wasp, 2½ mm. long, with legs (except femore) and basal joint of antennæ light yellow.

Its small size and general structure indicate that it is especially fitted for crawling among wool or other substances in search of its host. No secondary parasites have appeared up to the present.

PREDACEOUS ENEMIES.

Staphylinid beetles were more or less in evidence under dead animal matter, the largest of these (*Creophilus* sp.) being fairly numerous and probably useful to some extent; this is a matter, however, that awaits further investigations.

Much benefit might result from the introduction into Queensland of other species of the same family, some of which are known to devour maggots of flies.

It is of interest to mention, for instance, that in 1904 Compere discovered a styphlinid beetle at Sao Paulo feeding upon fruit-fly maggots, and succeeded in introducing it into Western Australia to help to fight the Mediterranean fruit-fly.

ISOLATION OF BLOWN SHEEP.

The separation of blown from unblown sheep is advisable, on the grounds that the former attract maggot-flies, and, if herded by themselves, would be likely to divert attack from the unaffected portion of the flock. In addition to the above advantage, the blown animals would be under better control, and their progress towards recovery, or the reverse, more easily observed.

STOMACH WORMS A CONTRIBUTING FACTOR.

Wool soiled by diarrhœa or scouring, due to the presence of intestinal worms, is very attractive to blow flies, and illustrates the importance of avoiding the evil of over-stocking pasture, and the necessity for prompt treatment of animals affected with stomach troubles.

In conclusion, I would suggest the adoption of the following preventive measures:—

1. The wholesale destruction of adult sheep maggot flies by means of poison baits and traps placed near shearing-sheds, homesteads, and clumps of trees, &c.
2. The prompt destruction of all dead animal matter noticed around the homestead or in the paddock.

   Note.—A quarter of a pound of meat is said to furnish sufficient food to breed 250 blow flies.
3. The preservation of insectivorous and carrion-eating birds, the introduction, where advisable, of useful indigenous species, and the planting of patches of trees suitable for cover in which they may breed in security.
4. The study of the natural enemies of sheep-maggot flies, both predaceous and parasitic.
5. The isolation of blown sheep from those unaffected.
6. The destruction, as far as possible, of the stomach worm, *Strongylus contortus*.

The above recommendations call for concerted and systematic action on the part of pastoralists, who, up to the present, have done little or nothing to avert a situation which, to say the least, is alarming, and, if allowed to continue unchecked, is likely to seriously hamper the future prosperity of one of our great industries.

DESTRUCTION OF HOUSE-FLIES BY AN ANT.

Professor J. F. Illingsworth, Ph.D., Professor of Entomology, College of Hawaii, Honolulu, has been making investigations at the College as to the work of the little brown ant (*Pheidole megacephala*) in the destruction of house-flies, and his investigations indicate that this ant is the principal factor holding house-flies in check under the tropical conditions of Fiji. Writing to the "Hawaiian Forester," the Professor says:—

"It is roughly estimated that fully 75 per cent. of the flies are destroyed. I first called attention to the value of this ant as a destroyer of house-flies while carrying on investigations in the Fiji Islands during the past summer.

"The remarkable scarcity of house-flies in Fiji indicated that something was effectively destroying them. With all the open refuse-pits which prevail there, one would naturally conclude that these flies would multiply in hordes. In fact, if nothing held them in check in a country with the climatic conditions of Fiji, they would become so abundant that humans would not be able to exist. Recognising this fact, I suspected that some parasite was preying upon them, and began a series of experiments to discover it. The refuse-pits were found to be very free from maggots, much to my surprise, and later I discovered that this was due to the fact that the little brown ants got most of the eggs and larvæ of the flies almost as soon as they were produced. The eggs and newly-hatched maggots of the house-fly are very small, but by very close observation I was able to see the ants carrying them off in myriads. I also found that the ants even attack and destroy the full-grown maggots whenever they appear on the surface of the manure.

"In one experiment 200 newly emerged adult flies were entirely destroyed by the ants, which accidentally found their way into the breeding cage. The attack was only discovered after most of the flies had been dismembered. A few were still in the toils, with six or eight ants holding them by wings and legs while others proceeded to cut them to pieces. All of the fragments were finally carried away to the nests of the ants.

"While this species of ant is not so abundant here as in Fiji, it is gratifying to know that they have the same fondness for an insect diet. House-flies being one of man's worst enemies, coming from filth on to his food and spreading all sorts of contagion, people in tropical countries are particularly fortunate in having such a check upon their spread. Though the little brown ants are often a nuisance by getting into things which are unprotected, we must give them credit for the good work that they do for us.

"As is well known here, ants can easily be kept out of cupboards, &c., by surrounding the legs with tapes wet in an alcoholic solution of corrosive sublimate. This treatment remains effective for a long time unless the tapes become wet or dusted over."

Mr. E. Jarvis, Assistant Government Entomologist, says that this particular ant is widely distributed in Queensland, and that it is a destroyer of many kinds of insects. They may be "a nuisance," as above stated, but "let them have all credit for the good work they do for us."—Ed. "Q.A.J."

Our esteemed correspondent, Mr. J. A. Hamilton, of Tolga, might obtain some of these ants, which would, according to what we know about them, quickly abate the nuisance he complains of as to slaughter-house refuse.

THE ORANGE MOTH.

Little has been heard of late years of the destruction of oranges in Queensland orange groves, caused by the Orange-piercing Moths (Fam. Ophiderinæ).

In 1898, and also in previous years, these moths were very much in evidence in the months of March, April, and May, when the oranges, although full-grown, were still green. As early as 1869, a French botanist, Mr. A. Thozet, who had a fine orange grove at Rockhampton, discovered one of these moths, *Ophideris fullonica*; and, having scientifically dissected the moth, he made the discovery that it possessed a remarkable proboscis which enabled it to bore holes through the skin of the fruit, and then feed on the juice. This discovery he recorded in the Rockhampton "Bulletin" of that year. In 1871, Mr. Thozet further made this known to Mons. J. Künckel d'Herculais, assistant naturalist at the Paris Museum of Natural History, accompanying his statement with illustrative examples* of the insect concerned.

Again in May, 1875, the destructive rôle enacted by these insects was enlarged upon by Mons. Thozet in a communication over the signature "Pomona," appearing in the Rockhampton "Bulletin" of —— May and the "Capricornian" of 8th May.

The late well-known Queensland lepidopterist, Mr. W. H. Miskin, disputed the finding in a letter on "Insect Enemies of the Orange," printed in the "Queenslander" of 22nd May, 1875. To this "Pomona" furnished an able reply, dated 10th June, 1875, which appeared in the Rockhampton "Bulletin" of that month. This controversy between Messrs. Thozet and Miskin, having been in due course brought under the notice of d'Herculais, he was induced to again consider Mr. Thozet's allegations, and, as part of his inquiry, to examine the proboscis or sucking organ of the moth to which it referred. This renewed investigation on his part then brought to light the marvellous and exceptional structure that it exhibited, and that seemed to answer so well to the function of piercing comparatively hard substances that had been attributed to it by Thozet. This he made known in a special memoir entitled "Les Lepidoptères, à Trompe Perforante, Destructeurs des Oranges,"† that was comunicated by Emile Blanchard to the French Academy of Science on 3rd August, 1875, and printed in the annals of that society.

* These examples were shown to us when on a visit to Mons. Thozet in 1874.—[Ed. "Q.A.J."]

† The Lepidoptera, with perforating proboscis, destroyers of oranges.

F. Darwin also described this strongly fashioned piercing organ of *Ophideres,* and wrote to Mr. Thozet, " congratulating him on his discoveries," remarking that they supported his own observations on the habits of *Phalenes* that perforated the nectaries of certain flowers.

We need not repeat all the arguments of the most noted entomologists of the day, who were all agreed that Mr. Thozet was absolutely correct in his description of the proboscis of this moth, and that Mr. Miskin's impugnment of Mr. Thozet's observations was inadmissible.

In Vol. II., Part 4 of the " Queensland Agricultural Journal " for 1898, will be found an exhaustive paper on " The Orange-piercing Moths," by H. Tyron, Government Entomologist, which we hope to reprint shortly in pamphlet form. Meanwhile, the accompanying photograph will give a plain illustration of the moth (of which there are numerous varieties), the caterpillar, the chrysalis, and the remarkable proboscis which enables the insect to inflict so much damage on an orange grove. The moth has lately been much in evidence in some parts of the State, and not only has it confined its attention to oranges, but also to mangoes and, it is said, to bananas. Even grapes have been the subject of its visitation, and Mr. Tryon noted that grapes, especially the Black Hamburg, shed their fruit in a way which might " very possibly be ascribed to the fact that Orange Moths had visited the bunches."

REMEDIES.

1. By means of the cane or scrub knife cut off at the roots all plants which it may be concluded, by direct observation, support the caterpillars, or moths in their immature state, or that may be identified with food plants from the descriptions previously given (pp. 310 and 311), and growing in scrubs or on rock banks in the vicinity of orange orchards, and destroy at the same time whatever caterpillars or chrysalises may be thus encountered.

2. Where it is practicable, and economically justifiable, destroy the entire woody vegetation where such food plants may be expected to exist.

3. Remove all brushwood from the vicinity of orange orchards, that the moths may have little or no harbouring places in the intervals between their nocturnal visitations.

4. Afford, if practicable, a counter-attraction; and capture or net the moths thus diverted from pursuing their destructive work. They are especially partial to highly-flavoured bananas of the Cavendish type. Thus, suffer to remain on one or two of the latter plants, if growing conveniently, as many bunches; till the over-ripe fruit drops to the ground. Or, preferably, hang in places that can be conveniently visited, wrapped in calico, small bundles containing similarly conditioned fruit of this description—five or six bananas in each. These to be nightly visited with lantern and net in hand, when the not readily disturbed Orange Moths amongst others may be captured.

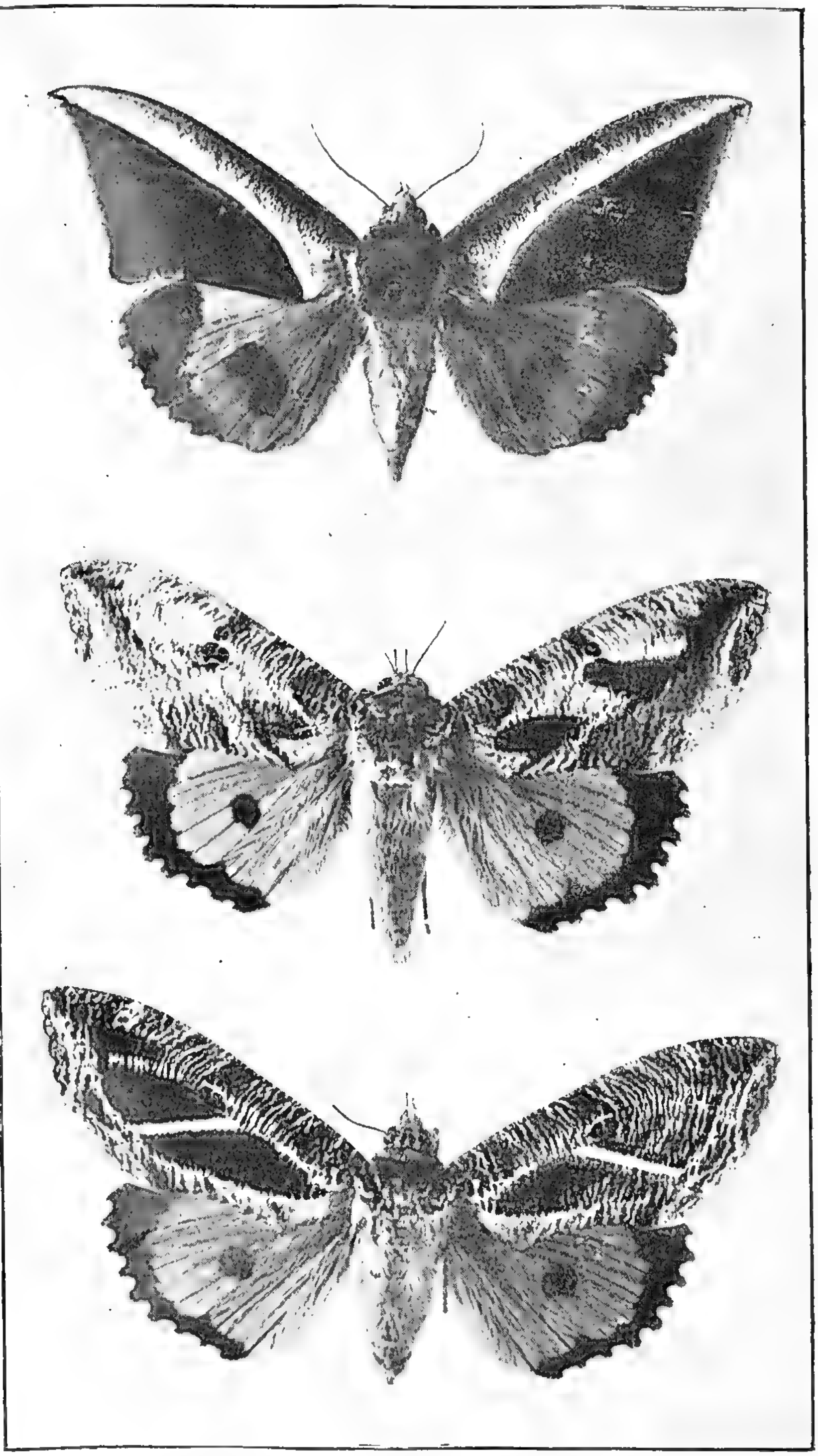

PLATE 24.—MÆNAS-SALAMINIA, *Fabr.* ARGADESA MATERNA, *Linn.*
(Male and Female.)

5. Poison the moths by impregnating the bananas with a syrup containing a small proportion of arsenite of potash made by boiling equal weights of white arsenic (arsenious acid) and bicarbonate of potash in

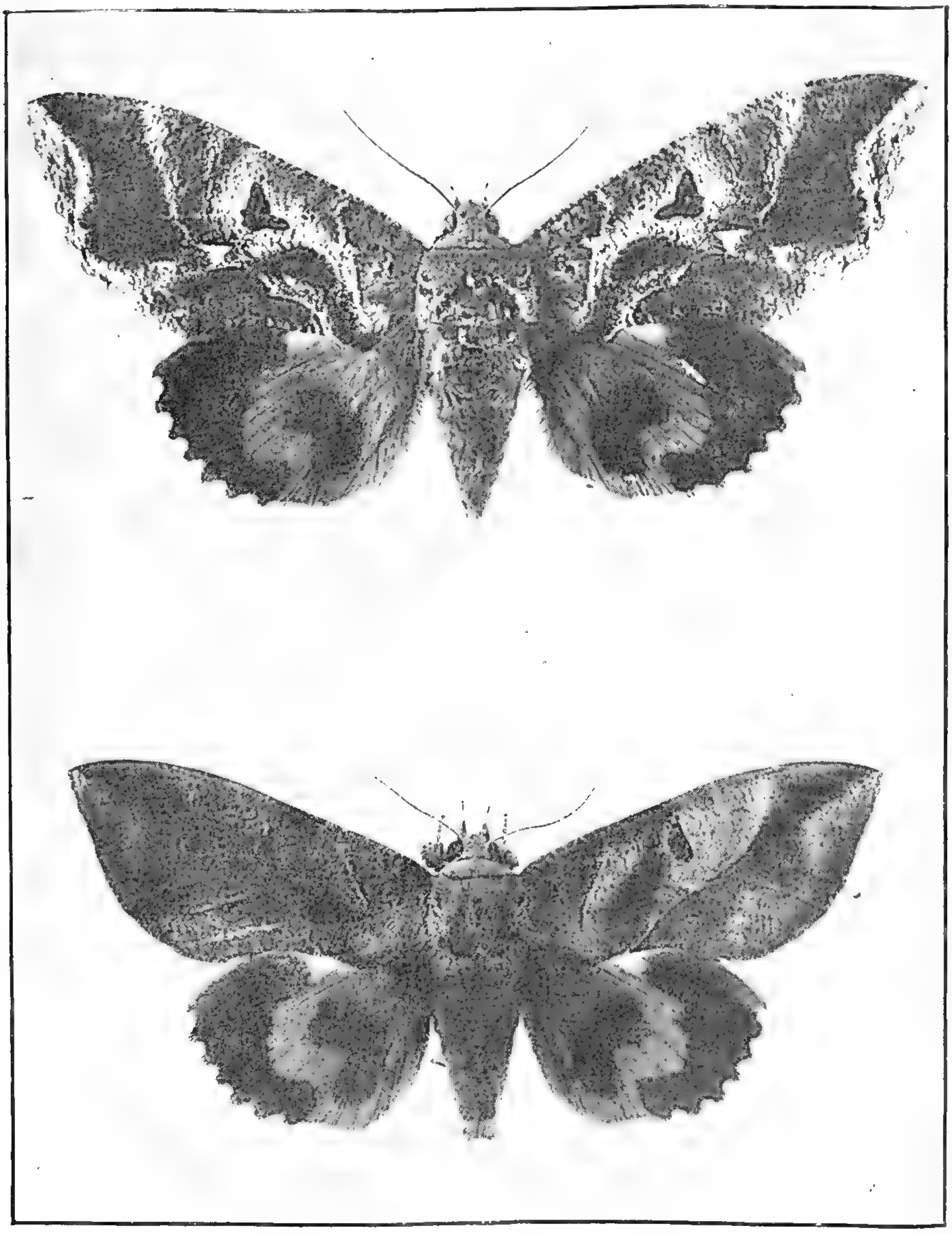

PLATE 25.—OTHREIS FULLONICA, *Linn.*
(Male and Female.)

water. Sixty-four grains of each of the chemicals named to 4 oz. of water form convenient proportions for the manufacture of the poison.

It must, however, be borne in mind that the best results may be obtained by beginning operations long before the season for oranges commences. From what has been already stated (*vid.* p. 311) the early broods of the insect—viz., those that occur before the end of December—

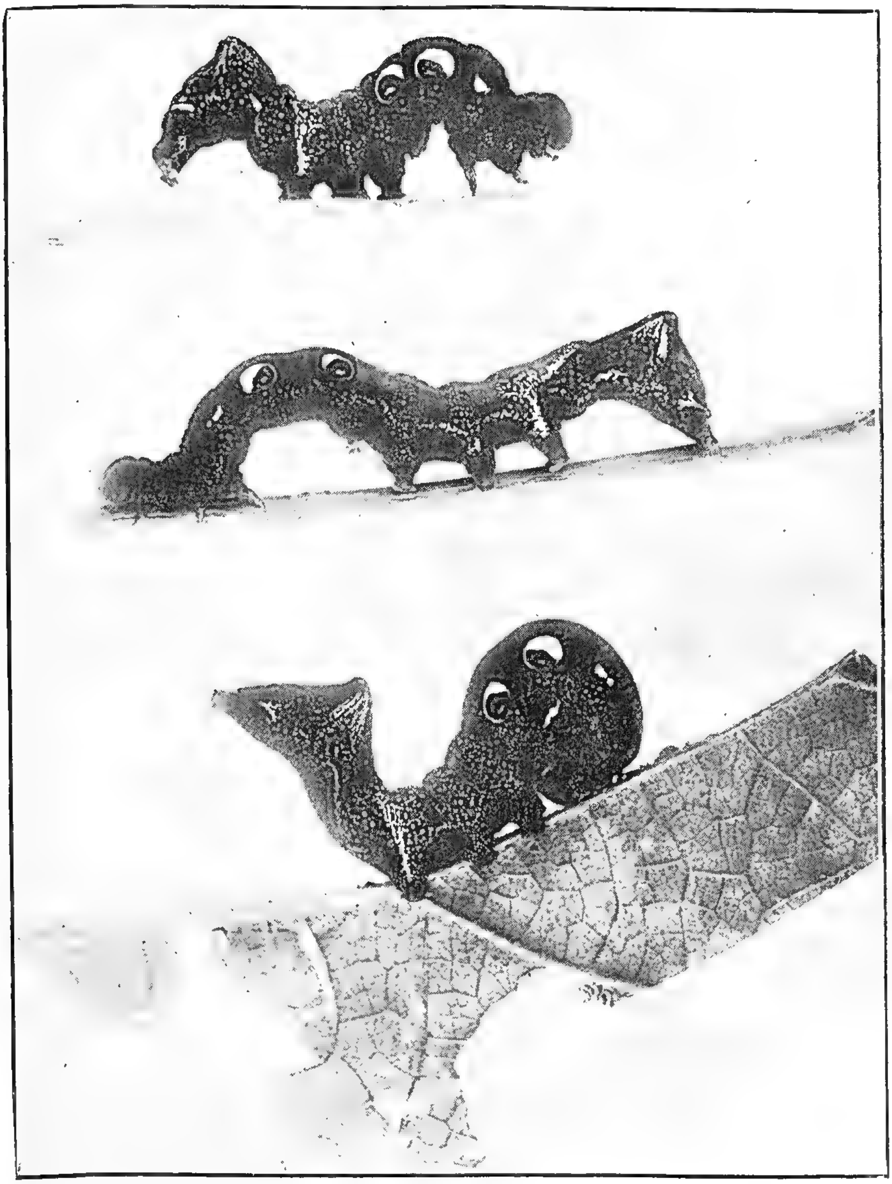

PLATE 26.—OTHREIS FULLONICA, *Linn.*

are comparatively small, but from them arise, by accessions with the birth of each successive brood, the very large numbers that visit orangeries notorious for injury to their fruit of the nature described.

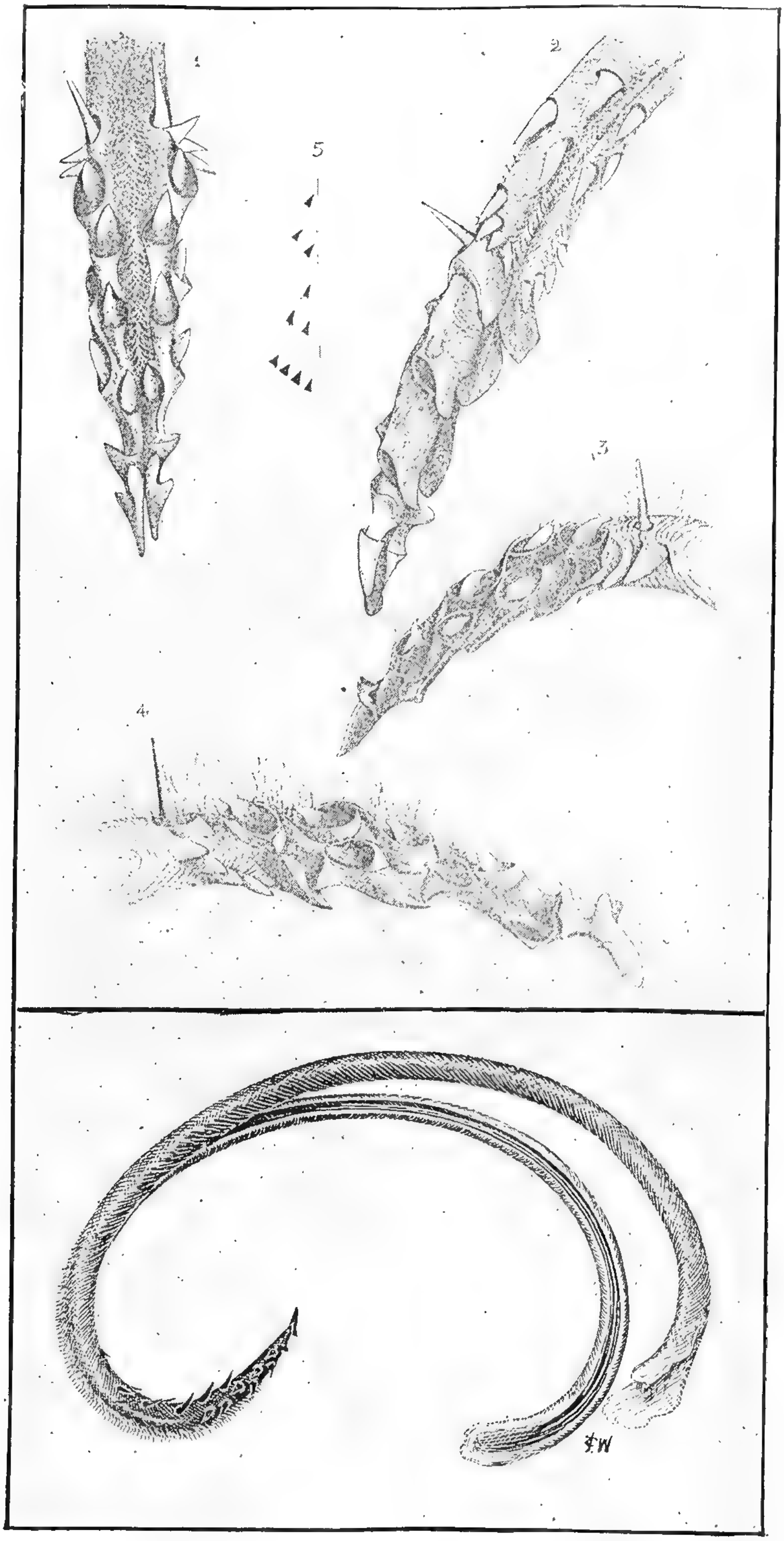

PLATE 27.—PROBOSCIS OF ORANGE-PIERCING MOTHS.

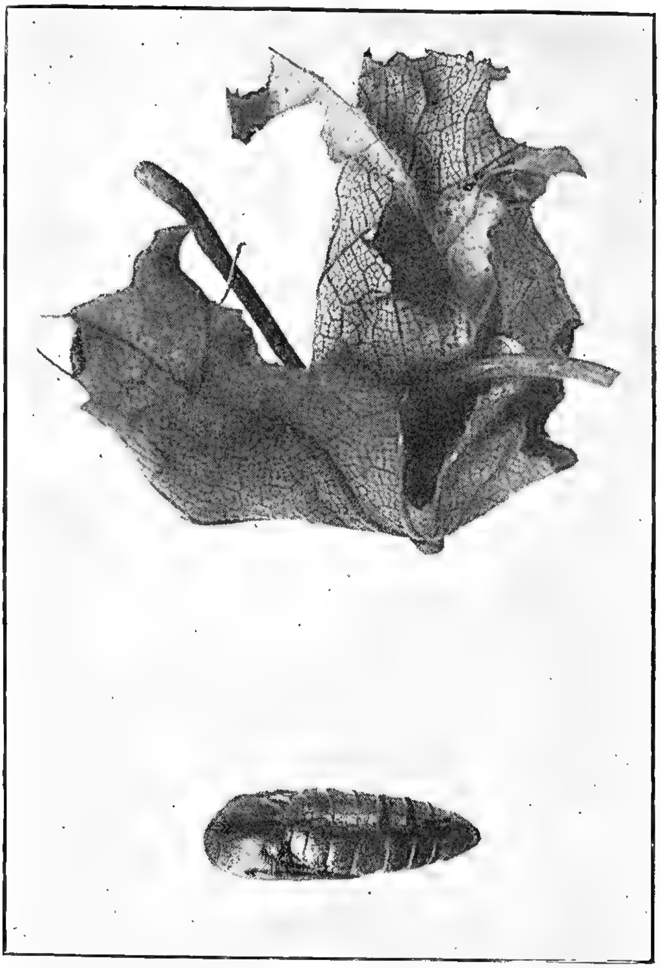

PLATE 28.—OTHREIS FULLONICA, *Linn.*
(Chrysalis in Leaf and Isolated.)

UP-TO-DATE MACHINERY.

A Victorian farmer, now of the Downs, writes:—" In Brisbane, the other day, I dropped into the machinery depôt of W. A. Preston and Co., where I was introduced to old and valued friends of my native State; Victorians are no strangers to ' Robinson's' disc ploughs. These ploughs suited soils in Victoria similar to what we have here, so that I expect to see them largely in use in the immediate future. The smooth, silent running of an oil engine so fascinated me that I closely investigated. Well-known people gave it such a character for power, utility, and economy that a 3½ B.H.P. ' New Way' oil engine became mine on the spot. I can recommend this depôt to those in search of up-to-date machinery—farming and dairying in particular. The manager is exceptionally clear and explicit to questioners."

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

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

Order ASCLEPIADEÆ.

HOYA, R.B.

H. Macgillivrayi, *Bail.* sp. nov. (Plate 29). A strong glabrous climber. Leaves subcoriaceous, about 4 in. long, 2 in. broad across the blunt cordate base, from which it tapers to an acuminate apex; margins recurved; nervation seen under a lens quite dense, the nerves alone prominent and only a few of these conspicuous. Petioles under 1 in. long, minutely glandular at its junction with the lamina. Peduncles and pedicels slender for the size of the flowers—the former 2 in., the latter 3 in. long. Flowers about six (6) in an umbel. Calyx segments broadly ovate, 2 lines long. Corolla phialaform (saucer-shaped), 2½ in. diam., segments broad, pale lavender, the tips and edges darker. Corona purple, ¾ in. diam., segments linear, obtuse.

Hab.: Claudie River, Lloyd Bay, *Dr. W. Macgillivray.*

The plant under notice approaches in its leaves those of *Hoya coriacea,* Blume, while the inflorescence approaches that of *Hoya imperialis,* Lindley.

HOW TO PRODUCE LARGE CARROTS.

On the subject of how to obtain monstrous carrots, such as seen on the exhibition table, a successful grower writes:—The ground should be deeply trenched, working in plenty of soot as the work proceeds. When ready to sow, rake the surface down level. Afterwards stretch lines across the ground 18 in. apart, then, with a crowbar against the line, holes should be made 12 in. apart and 2 ft. deep and 4 in. across at the top. These must be filled up with a mixture of three parts sifted loam, two parts leaf soil, and half part of wood ashes and dry powdered fowl manure. Make the soil moderately firm, and sow a few seeds on the top of each, to be ultimately thinned out to one. Keep them well watered during dry weather, and fine soil should be placed around the collar of each as the season advances to prevent the crown from becoming green. They will, when pulled, be found to be splendid shape, of good colour, and free from side growth and stringy roots.

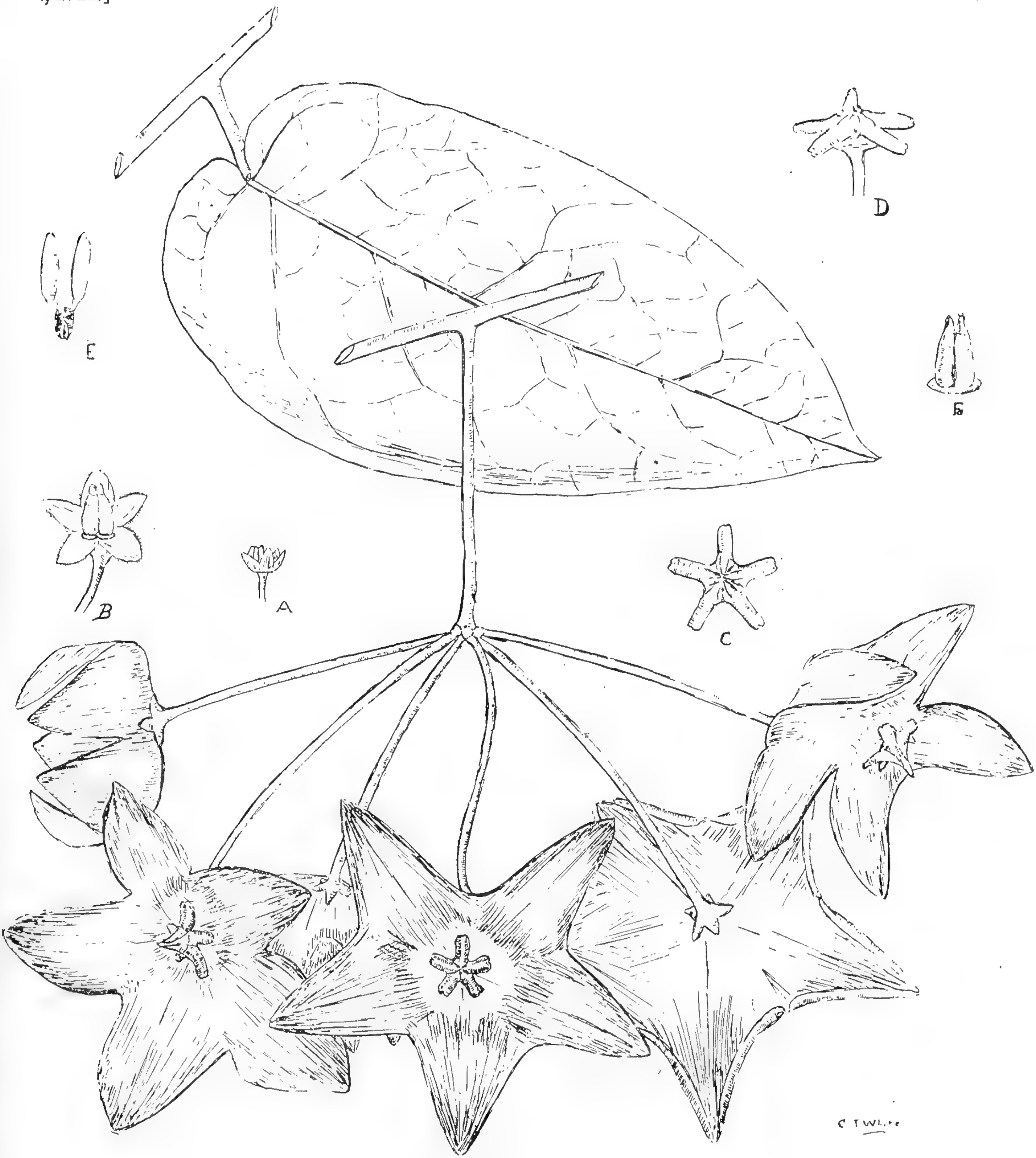

PLATE 29.—HOYA MACGILLIVRAYI, *Bail., sp. nov.*

A—Calyx and pistil (nat. size). B—Calyx and pistil (enl.). C—Corona, viewed from above. D—Corona, side-view (nat. size). E—Gland, with pollen-masses (enl.). F—Ovaries (enl.).

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JANUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JANUARY, 1913 AND 1914, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Jan.	No. of Years' Records.	Jan., 1914.	Jan., 1913.
North Coast.	In.		In.	In.
Atherton	13·49	11	7·23	37·99
Cairns	18·87	25	21·69	32 03
Cardwell	17·69	25	21·68	27·90
Charters Towers ...	6·97	25	6·12	2·95
Cooktown	15·10	25	33·93	26·43
Herberton	10·06	25	6·41	26·43
Ingham	17·14	20	17·36	29·28
Innisfail	25·50	25	15 52	53·61
Mossman	22·71	5	32·80	22·75
Townsville	15·02	23	14·90	11·69
Central Coast.				
Ayr	12·67	25	10·11	8·80
Bowen	11·59	25	6·83	6·99
Mackay	15·83	25	22·52	26·17
Proserpine	18·30	10	11·19	17·54
St. Lawrence ...	11·04	25	7·97	13·75
South Coast.				
Crohamhurst ...	13·37	20	6·71	17·41
Biggenden	5·18	14	1·33	3·84
Bundaberg	9·48	25	1·39	45·48
Brisbane	6·59	63	3·90	4·94
Childers	8·06	17	2·20	28·78
Esk	5·94	25	2·58	3·96
Gayndah	5·65	25	4·13	12·20
Glasshouse M'tains	...	...	6·27	17·82
Gympie	7·31	25	5·05	18·17
Kilkivan	6·57	25	1·52	8·88
Maryborough ...	7·95	25	2·07	23·57
South Coast—continued:	In.		In.	In.
Nanango	4·84	25	3·25	5·31
Rockhampton ...	9·54	25	0·74	16·56
Woodford	7·43	25	4·06	9·79
Yandina	10·15	19	6 95	20·63
Darling Downs.				
Dalby	4·17	22	3·28	2·95
Emu Vale	3·32	17	1·95	2·74
Jimbour	4·13	24	2·27	2·30
Miles	4·29	25	2·60	2·63
Stanthorpe ...	4·05	22	2·06	3·44
Toowoomba ...	5·87	22	3·73	7·45
Warwick	3·87	22	1·52	2·50
Maranoa.				
Roma	3·98	21	1·13	3·43
State Farms, &c.				
Gatton College ...	4·48	14	5·40	4·71
Gindie	3·82	13	2·66	3·18
Kamerunga Nurs'y	17·98	23	28·97	...
Kairi	...	...	..	11·05
Sugar Experiment Station, Mackay	14·70	16	24·88	...
Bungeworgorai ...	...	...	0·92	3·51
Warren	...	...	0·75	12·98
Hermitage ...	2·71	7	1·41	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for January this year and for the same period of 1913, having been compiled from telegraphic reports, are subject to revision.

General Notes.

EXPERIMENTAL FEEDING WITH SOME ALLEGED POISON PLANTS OF NEW SOUTH WALES.

(FROM THE AGRICULTURAL GAZETTE OF NEW SOUTH WALES.)

(BY J. BURTON CLELAND, M.D., Ch.M. (Syd.), Principal Microbiologist, Microbiological Laboratory, Department of Public Health, Sydney).

From time to time various reports have appeared dealing with plants deleterious to, or supposed to be deleterious to, stock of various kinds. The most notable contributions have been from Mr. J. H. Maiden, the Government Botanist of New South Wales, and from Mr. F. M. Bailey, C.M.G., Colonial Botanist, and Mr. Gordon, of Queensland. These authorities have collected together numerous references to the reputed poison plants of Australia, systematically arranged according to their natural orders.

In using the list of plants collected by the abovementioned authors, which have been considerably added to by other contributors, it is found that in a number of instances it is more a matter of suspicion as regards the plant incriminated rather than any actual proof that it is responsible for the harm resulting. Since it is hard often, when insufficient information is available, to differentiate illness or death resulting in some way from the ingestion of poison plants from illness or death due to the action of micro-organisms, it is probable that it has frequently happened that deaths really due to the one cause have been attributed to the other, and *vice versâ*.. Animals, for instance, suddenly dying from anthrax, may be suspected to have fed upon an intensely poisonous weed, and, similarly, two or three sudden deaths from a poison plant may be attributed to anthrax. Unfortunately, very few of the alleged poisonous plants of Australia have been systematically experimented with; the result is that much material has to be dealt with in a microbiological laboratory which is probably not associated in any way directly with micro-organisms. Were our poison plants and their attributes better known in many cases, then perhaps these obscure illnesses and deaths could be sheeted home to their actual cause. This would tend to lessen considerably the routine labour of laboratory work. With this object in view, and in the hope that any work undertaken in regard to poison plants might eventually lessen the labours the Microbiological Laboratory is called upon to undertake in investigating these obscure diseases, the opportunity was taken to carry out certain experiments at Milson Island, with such plants as were available in the district and were on the black list as having been suspected of being poisonous.

The accompanying paper is a short summary of the results of those experiments, which appear to have been the means of eliminating from the black list a few plants on which suspicion had formerly rested. A note of warning must, however, here be given, namely, that though the plants did not prove poisonous under the conditions of the experiment and in the amounts given, it does not necessarily follow that under other circumstances they might not be deleterious.

ORDER DILLENIACEÆ.

Hibbertia diffusa.

It was noticed on Milson Island that a small Hibbertia with rather large spathulate leaves and large yellow flowers was left quite untouched in the rabbit paddock in which all other plants were eaten off. This suggested that possibly the plant might contain some poisonous constituent. In consequence, the following experiments were conducted:—

Sheep.—A sheep was fed from 11th March to 14th June, almost daily, the amount eaten varying from about 2 oz. to, later, 6 oz. No ill effects were noticed.

Rabbits.—Four rabbits were also fed upon the plant. The first died suddenly after fifteen days' feeding. The second seemed to be paralysed after eleven days' feeding, and shortly afterwards died. The third was fed from 15th April to 27th April, and again on 30th April, 1st May, and 3rd to 9th May, on which latter date it died; the control rabbit also died on this date. The rabbit experimented on seemed paralytic in its hind legs for two days before it died. A fourth rabbit was fed almost daily from 5th July to 14th July, 1912, and on 15th July it died.

Comment.—These experiments suggest that though this plant eaten in small quantities is not poisonous to sheep, it is injurious to rabbits.

ORDER EUPHORBIACEÆ.

Omalanthus populifolius.—Native Poplar.

Maiden (" Agricultural Gazette " of New South Wales, Vol. 8, Part I., January, 1987, p. 18) quotes Baron von Mueller as stating in the " Australasian Chemist and Druggist," September, 1883, that cattle succumb to the effects of this plant, the final cause of death being hæmaturia. In the " Garden and Field " for 1894, p. 243, Mr. Maurice Holtze considers that this plant causes redwater in the Northern Territory; but he has evidently confused redwater due to tick fever with the South Coast redwater of this State.

Experiment at Milson Island.—A calf was fed from the 10th June, 1912, almost daily, till 18th October, 1912, with the leaves of this plant gathered fresh on the Hawkesbury River. The amount given varied from 12 to 24 oz. daily. The plant was cut up and given with other food. No ill effects at all were detected.

Comment.—The amount given daily to this calf is probably more than would be eaten by any animal under natural conditions. It seems certain that this plant does not cause redwater in cattle, and it is, therefore, unnecessary to continue further experiments.

ORDER LEGUMINOSÆ.

Indigofera australis—Native Indigo.

This plant has been suspected also as being the cause of South Coast redwater in cattle.

Experiment at Milson Island.—From 10th June, 1912, till 21st November a calf was fed almost daily with the leaves of this plant. The amount eaten daily varied from about 6 oz. to 30 oz., the usual amount eaten being about 12 to 16 oz. No ill effects at all were noticed.

Comment.—The amount of this plant eaten daily is probably more than would be taken by an animal under ordinary circumstances. It would seem certain that this plant does not cause redwater in cattle. Under the conditions of the experiment, also, it may be noted that fresh material was obtained almost daily in the Hawkesbury River district. The plant does not seem in any way injurious to stock. It may, of course, happen that the plant may contain hydrocyanic acid, or, when specially luxuriant, may give rise to a tendency to hoven; but it seems certain that it does not contain, in any amount sufficient to cause symptoms, any other definite poisonous body.

ORDER SANTALACEÆ.

Exocarpus cupressiformis, R.Br.—Native Cherry.

Maiden (" Agricultural Gazette " of New South Wales, Vol. 8, Part I., January, 1897, p. 20) quotes Woolls as saying that branches of this plant produce cerebral disease in horses on the Castlereagh.

Experiment at Milson Island.—A sheep was fed almost daily from 11th March, 1912, till 6th June, other food being given in addition to the branches of this plant. On 6th June the sheep was butted by a cow, and died the next day, death being entirely attributable to this accident. No ill effects were noticed from the feeding.

Comment.—It would seem from this experiment that this plant is not poisonous in any way to sheep, or probably to other animals as well. The evidence on which it has been incriminated seems hardly sufficient to require a repetition of this experiment.

ORDER CUCURBITACEÆ.

Cucumis myriocarpus—Small Wild Melon.

From time to time considerable suspicion has been attached to this plant. Unquestionably the stringy nature of its stems may tend to produce impaction. Apart from this, however, it has been suggested that some poisonous principle exists, especially in the fruit, and also that this poison may be responsible for the peculiar attacks of blindness in horses in the extreme western parts of New South Wales.

Experiment at Milson Island.—A bull calf was fed with twenty-five of the fruit cut up, and given as a drench, on 4th April; on 5th April he was drenched with fifty-five melons, on 6th April with 100 melons, on 30th April with 100 melons, on 1st May with 100 melons, and on 2nd May with 100 melons. No ill effects were noticed.

Comment.—It seems certain that, even in as large a dose as 100 melons, sufficient poison is not present to injure a calf.

ORDER LOBELIACEÆ.

Lobelia purpurascens.

This little Lobelia is common in places, and, though not being large in size, has a succulent leaf. As it belongs to a Natural Order containing amongst its members poisonous plants, it was subjected to investigation.

Experiment at Milson Island.—Three rabbits were fed daily with a small quantity of this plant. One died in thirteen days, but another experimental rabbit also died on the same day, and death was probably not due to the plant eaten. Another rabbit died on the sixth day after feeding started. The third rabbit was fed from 15th April till 28th June almost daily, the amount taken being on an average from 2 to 3 oz. It remained perfectly well.

Comment.—Though two of these rabbits died, the deaths cannot be certainly attributed to the Lobelia. The fact of the third rabbit eating the plant for a considerable period without showing ill effects seems to exclude this plant as being a definitely poisonous one.

ORDER CYCADEÆ.

Macrozamia spiralis.

Numerous references occur to a disease popularly called "rickets," attributable to feeding on the leaves of a species of Macrozamia, both in New South Wales and Western Australia. Professor Stewart, then an officer of the Veterinary Department of this State, was able some years ago to produce the disease on the twenty-third day by feeding cattle on an average of about 2 lb. a day.

Experiment at Milson Island.—A cow was fed with Macrozamia leaflets which were cut up into small pieces by means of scissors and mixed with chaff, from 13th June, almost daily to 4th December. The amount eaten was usually about 1 lb., varying occasionally up to 30 oz. During this period no ill effects at all were noticed. The animal was well fed after it had eaten the Macrozamia leaflets.

Comment.—It would seem from this experiment that an animal eating daily about 1 lb. of Macrozamia leaflets, supplemented by other nourishing food, does not develop "rickets." The amount given was less than the experimental amount of 2 lb. a day given by Professor Stewart. If, however, the Zamia contained any active poisonous constituent, one would think that a pound eaten daily for a period of five months would manifest some signs of its action. This, however, was not the case. It is probable that cattle in very poor country, being half-starved, will eat the plant, and I am inclined to think that manifestations of the disease are not so much due to any definite poisonous body in the plant as to the fact that the mixed food taken by these animals on such poor country, though sufficient to prevent them from dying, is lacking in some constituent necessary for the proper nourishment of the nervous system. My experiments seem to suggest that, as in scurvy and beri-beri in man these conditions are due to the absence of some body—vitamin—in small amount, so perhaps in these half-starved animals the absence of a similar constituent is the cause of the trouble. If such be the case, one would naturally not expect to produce the disease in animals receiving other abundant nourishing food.

This experiment might perhaps be repeated with advantage.

ORDER LILIACEÆ.

Xanthorrhœa sp.—Grass-tree.

"Cattle at Karuah said to become crampy. The cattle swell in the legs, fall off in condition, and continue unthrifty, even some of them dying. If removed to good, sound country, they do well."—"Agricultural Gazette," New South Wales, 1899, p. 859. In reference to this statement, Mr. Pottie, then Lecturer in Veterinary Science at the Hawkesbury Agricultural College, is reported as saying that conditions identical with those described are produced in cattle which eat the young shoots of the grass-tree after rain. He says that the shoots contain a resin, and the effects upon the animal's system are loss of appetite, condition, energy, and vitality, followed by weakening of the hindquarters, which eventually become paralysed, the animal dying of exhaustion and exposure.

Maiden ("Agricultural Gazette," New South Wales, Vol. 8, Part I., January, 1897, p. 22) quotes J. S. Allan as saying that the settlers in the vicinity of Jervis Bay had informed him that the shoots of the grass-tree, when in blossom and eaten by cattle, give them a complaint called "cripples." It appears to affect their joints, and doubles them up.

Experiment at Milson Island.—A calf was fed from 5th November, 1912, till 2nd May, 1913. It was given from 1 lb. up to 32 oz. almost daily for this period. During part of the time, at the beginning of the experiment, the young shoots were taken from flowering plants, and portion of the flowering stem was also used. Later, when the flowering was over, just the young leaves were cut up and given. The animal was also given lucerne hay in the morning, the grass-tree being cut up and mixed with chaff in the evening. The animal ate the grass-tree well. No ill effects were noticed at any time.

Comment.—This experiment does not support the view that the condition referred to was due to the eating of grass-tree leaves. It does not quite exclude the possibility under the special circumstances mentioned by the recorders, namely, young shoots in plants which are flowering, and young shoots after rain. It seems, however, hardly worth while to repeat experiments of this nature. It is probable that cattle only eat the leaves when there is a scarcity of other more natural fodder, and the symptoms are perhaps explainable on the fact that all necessary sustenance is not contained in the food they have access to under these circumstances.

BANANA JUICE AS A CURE FOR SNAKE-BITE.

The articles we lately published on this subject have attracted considerable attention in some tropical countries, especially in India, and we are much indebted to the courtesy of Mr. G. H. Krumbiegel, F.R.H.S., Economic Botanist of the Government Botanic Gardens, Lal-bagh, Bangalore, India, who has kindly forwarded us the following extracts from the "Madras Mail," one of the leading Indian dailies, on the subject of the banana-juice cure for snake-bite, in the hope that it will prove of some practical value to our readers:—

[Extract from the "Madras Mail," dated 11th October, 1913.]

BANANA JUICE AS A CURE FOR SNAKE-BITE.

"One of my tapping boys was bitten on the foot by a Russell's viper (*Bangarus Indica*) whilst collecting latex. After killing the snake the boy was made to bite the snake and to swallow a certain portion of its blood, a very prevalent custom amongst the Malayalees of this part of the world when bitten by a poisonous snake, the idea being that the poison goes back again into the snake, thus saving the patient's life. According to the Malayalee idea, I have seen this done several times out in the villages far away from medical aid, but in no case has the remedy been efficacious, as in all the instances that I know of where this custom has been practised the patient has succumbed. However, the boy and the snake were brought down to my factory, where he was treated by the 'Lauder Brunton' treatment by my conductor, who has been trained by me to use the lancet according to the directions given by Lauder Brunton and sent out with the lancet. From the time that the boy was bitten to the time that the treatment could be put into force some ten minutes had elapsed. A ligature was tied some few inches above the wound, and the wound well scarified by the lancet, after which a few grains of the crystals of permanganate of potash were well rubbed in, making the wound bleed a little. The patient was then placed on a stool, with the foot immersed in a pail containing a strong solution of the above potash. And as I had a day or two ago read in the 'Tropical Agriculturist,' September number, of the wonderful properties of banana juice as a remedy for snake-bite, I caused a plantain tree (banana) to be cut down and the juice from the excised trunk collected in a vessel, and the patient was given doses of the juice to drink at intervals of every ten minutes. The treatment was kept up for about two hours, the ligature removed, and the patient walked away as if nothing had happened to him. After the boy had been cured a Numbudri snake doctor arrived, and expressed his surprise at the cure effected. He examined the snake, and said that it was easier to cure a cobra bite than the bite of a Russell's viper. The juice of plantain trunk was known to him as being efficacious in cobra bite and the bites and stings of venomous reptiles which abound in these parts. In cases of Russell's viper's bites, he says that the juice of *Coleptera gigantea* is used by them with good results. This shrub is found all over India. The leaves are taken, bruised, and boiled in water; the solution from the same is given to patients bitten by Russell's viper, which, he says, has the effect of liquifying the blood, which in a patient bitten by a Russell's viper congeals, and is brought back into circulation by the decoction of the abovenamed shrub. However, I am pleased to be able to record that the remedies we applied were successful, as recorded above."

[Extract from the "Madras Mail," dated 17th October, 1913.]

BANANA JUICE AS A CURE FOR SNAKE-BITE.

"I have read with great interest the successful cure for 'snake-bite,' as practised by Mr. R. D. Roos Norman, of Trichur, on his tapping boy, in your issue of the 11th instant. I and probably many others would be very thankful if he would kindly inform us as to the quantity of banana juice to be administered in a dose at an interval of every ten minutes for a period of two hours, which is taken neat, I presume, and whether the solution of permanganate of potash, in which the bitten part is immersed, is of a very dark colour, and the duration of immersion."

[Extract from the "Madras Mail," dated 25th October, 1913.]

BANANA JUICE FOR SNAKE-BITE.

"In reply to 'F. D.,' in your impression dated the 17th instant, I have the pleasure to inform him that the banana juice should be administered neat in quantities of half a wine-glass full at an interval of every ten minutes, for a period of about two hours. The solution of permanganate of potash should be of a very dark colour, and the duration of immersion about one hour."

Dr. J. S. K. Elkington, Chief Quarantine Officer-General, Queensland, who has had large experience in India in connection with the collection of snake venom, confirms the statement of the deadly nature of the Russell's viper. He says that this snake, unlike all others, has a hollow tube through the venom fang, other venomous snakes having an external groove, from which the venom may be wiped off by the fang passing even through a silk stocking. This snake has also the terrible power of squirting its venom to some distance, and the snake men in India are very careful to turn the reptile's head away from them when extracting the venom.

HOME-CURED BACON.

Some time ago we referred to a bacon-curing demonstration, held at Bathurst, under the auspices of the local Agricultural, Horticultural, and Pastoral Association, the demonstrator being Mr. D. Hogarth, of that city. The process adopted is one that has been in vogue among certain families in the North of England for centuries, and may be considered one of those old family secrets, known only to a limited number, and highly profitable to the owners.

At the demonstration, eleven pigs of varying weight, breed, and feeding were treated. Some of them weighed under 200 lb., while a couple turned the scale at 340 lb. and 350 lb. respectively. All of the bacon has since been cut into, and in every case great satisfaction has been expressed as to the quality of the product. One of the owners has sold all that he could spare of the bacon at 1s. per lb., and would make a great favour of selling the hams at 1s. 6d. per lb. The other owners have so far refused to sell at any price.

Since the article appeared, Mr. Hogarth has been the recipient of numerous inquiries, by letter and otherwise, by persons struck with the manifest novelty of the process, and we are, therefore, encouraged to publish a brief recapitulation of the method adopted, for the benefit of such of our readers as may be interested in the matter, and with confidence that those who chose to try Mr. Hogarth's methods will be well satisfied.

For every 100 lb. of flesh the following ingredients are necessary:—8 lb. dry Black Horse Liverpool salt, 3 oz. saltpetre, 1 lb. good brown ration sugar, and 1¼ oz. allspice. For heavy pigs, especially when there is thick skin, as in the case of old, fat sows, a large quantity of salt is advisable. The process is one of dry-salting throughout, no brine-soaking being permissible. That part of the process which is most novel is the most necessary part—the cleaning of the flesh. After the carcass has been cut up it is allowed to cool for twenty-four hours, and the meat is then placed on a sloping surface, a portion of the salt being rubbed into the skin side with the aid of a stone until every inch of the skin is softened and presents a white, pasty appearance. Then the flesh side is salted by hand, the salt being thoroughly well rubbed in. The salted pork is then piled up and left to drain for forty-eight hours, the liquid drained from it being thrown away. The theory is that this liquid contains all the impurities voided from the flesh, and the result of the demonstration goes to prove that it is this cleaning process which is the most important, and the thorough observance of which ensures the keeping qualities of the finished article.

In forty-eight hours the cleaning should be complete, but if the flesh is still discharging it must not be treated for the next process until it has thoroughly given up all the deleterious matter, after which half of the salt remaining is mixed with half the saltpetre, and vigorously rubbed in, exactly as in the cleaning process. The balance of the salt and saltpetre is then mixed with the sugar and allspice, and applied with less vigour, but not less thoroughly. The liquid resulting at this stage must be as carefully collected and preserved as that from the cleaning is rejected. This second liquid is liberally poured over the rapidly curing flesh every day or two, care being taken that each piece gets its full quota. The liquid bathing is continued for nearly three weeks, when the bacon is hung up to dry, after which it is smoked, excepting in cases where owners prefer unsmoked bacon. In smoking, nothing but good hardwood sawdust should be used, ironbark or box dust being preferable. Corn cobs are considered useless, being deficient in creosote. The smoking is continued for seven days, and the bacon will then commence to ripen, and will keep for an indefinite time, though it should not be stored in a hot or variable temperature, and should always be kept hanging. It will be better in flavour if not cut into too soon.

CURING HAMS AND BACON.

Amongst the farm products of the old country on which the farmer and his wife pride themselves are the grand flitches of bacon and the well-cured hams which grace the beams of the kitchen or store-room. What bacon, what ham, was ever so good and tasty as that cured properly on the farm? We are now close upon the time when the cold weather will enable the farmer to renew his year's supply of these delicacies. There is little need to instruct well-informed farmers of old standing how to produce a really good article, but every day new men appear on the land—not only farmers' sons, but city men—who have very little knowledge of farming or pig-raising or dairying, but who are intelligent and willing to carry out any useful suggestions which may, by their adoption, add to their comfort or to their bank account. To these we offer the following remarks on bacon-curing:—

Do not attempt to make bacon or cure hams at any time between between September and May. They may say the factories do it successfully. So they do; but the farmer has not all the expensive appliances of the factory. All his appliances consist of a salting table and a couple of curing tubs, and these, although all-sufficient for the winter months, are of little value in the summer. Now, the first thing to bear in mind is, that the farm pig must be killed at the proper season of the year. On the cool Downs, that season may begin in May and end in September. On the coast, June will be the safest month to work in, and August the latest. Farther north the season is shorter still. In any case, the coldest months must be availed of. Especially does this advice relate to the curing of hams. If these are not thoroughly cooled they will not take the salt properly. Hams are worth 1s. per lb., so it will evidently pay to exercise great care in properly curing them. When the pig has got quite cool is the time to cut it up. The meat then should be hung up and left to cool further during the night, or even longer. We have given many recipes for the curing of bacon and hams, and now we give one which is the outcome of long experience of a South Australian farmer. This is his method, which he has found very successful:—

The first factor to success in this work is to kill the pigs at the proper season of the year. This must be in the cold season, as the hams must be thoroughly cooled, or they will not take the salt properly. His practice was to hang the meat out for one night, and if not sufficiently cold in the morning he put it out the second night. The hams should always be cut to nice shape. No rough edges, rags, or pieces only partly cut off should be left. For pickling he had two cases of solid wood made to hold the brine. One to hold the meat from one pig was 2 feet 4 inches by 1 foot 3 inches by 15 inches, and the other 4 feet 3 inches by 2 feet 3 inches by

18 inches; this latter is sufficient for two pigs. The case should be made watertight by soaking it thoroughly. He then mixed sufficient salt with about one-twentieth of its weight of saltpetre. A thin layer was sprinkled on the bottom of the case, the hams first rubbed well with the mixture, and then packed with flesh side upwards. Plenty of the mixture was packed on top, especially about the exposed bones. The sides and flitches are similarly treated, and packed in layers with flesh side upwards, except that the top layer is reversed. The sides and corners of the case are packed with pieces of pork, and then brine is added. He made the brine thick enough to float an egg; then, when it was quite cool, it was poured over the pork until it was just covered. The contents of the case should be turned over about once a week. The flitches of bacon should be left in pickle for two weeks, then taken out and immersed in fresh water for twelve hours, after which they should be hung up in the smoke-house. The hams should remain in pickle up to six weeks, and afterwards soaked in water for twenty-four hours. When taken out of the water the sides and hams should be laid on a table and the skin side rubbed with the hand to secure a soft surface free from wrinkles. They should then be hung in the smoke-house. If the smoke is regulated properly, two or three days will suffice. Each must judge for himself when the meat is smoked sufficiently. He preferred to have it a brownish-yellow tint. For smoking he used only moist chips from the woodheap, but care must be exercised that the chips only smoulder and do not burn brightly. He had followed this system of curing hams and bacon for many years, and the product always met with favour. He saw no necessity for the use of anything but salt and saltpetre for the pickle.

COMBATING FLIES AND MOSQUITOES.

The Under Secretary for Agriculture and Stock lately received from Mr. A. Hern, Noumea, a report of a discovery made by the Government Veterinary Surgeon, Mr. M. Lang, Noumea, of a remedy for the "Flat-fly" and mosquitoes. Mr. Lang's report states:—

"We all know with what persistency the well-known flat-fly, which has caused prohibitive measures to be taken by the Commonwealth of Australia to prevent its introduction into the States, return to the attack on stock, when attempts are made to drive them away. We also know that if one succeeds in catching them by hand, how difficult it is to kill them, owing to the elasticity of their teguments, and to the flattened shape of their body, which enable them to resist a certain degree of pressure. The only and the best method we have of disposing of them is to tear off their heads, since no known substance will effect their destruction. Cocoanut oil, or oil of juniper, or petrol will drive them away temporarily, but without producing any toxic effect.

"It therefore appeared to me that it would be interesting to publish the results of a series of experiments, which I have made on this subject, and which give promise of doing good service under certain conditions. I refer to cod liver oil, which has a specific toxic effect on all flies, mosquitoes, and ticks. If those parts of a horse most subject to the attacks of the fly are lubricated with this oil, the effect is to instantaneously kill even those flies which have only been lightly touched by it. It is possible to relieve a horse in a few minutes of all the flies with the hand, smeared with this oil, and there is no danger of any subsequent caustic action on the skin.

"The same toxic action takes place in the case of house-flies and mosquitoes, and even ticks, which are so hard to extract from the skin of a dog." [This presumably applies to our scrub ticks.—Ed.] "This is not the sole effect produced. It acts prophylactorily in driving the flies from all places treated with the oil, although the effect lasts only from thirty to forty-eight hours.

"Its action manifests itself, furthermore, very usefully in cases of sores, on which sun baths alone would act, were it not that the flies, always most numerous in the vicinity of sores, did not nullify this sun treatment. Smeared with cod liver oil and without any other treatment, such sores are rapidly healed. This result may, therefore, prove valuable in the case of contagious sores, since it suffices to paint them with cod liver oil, to remove all danger of possible transmission through the agency of flies and mosquitoes.

"Its one drawback as regards its use in houses is its strong odour. I may further state that, spread on the surface of water, it kills the larvæ of mosquitoes more quickly than petrol or kerosene, and that, in consequence of its slower evaporation, it keeps off the adult insects for a longer period. Vessels full of water receiving a very slight film of this oil *never contain any larvæ.* It would therefore appear that here we have a prophylactory superior to kerosene. In conclusion, I may state that cod liver oil alone possesses this property, other fish oils with which I am experimenting having a caustic effect on the skin.

PUBLICATION RECEIVED.

THE BANANA.

ITS CULTIVATION, DISTRIBUTION, AND COMMERCIAL USES.

We have received from Messrs. Duckworth and Co., publishers, London, a copy of a very interesting book on the above subject by W. Fawcett, B.Sc., F.L.S., late Director of Public Gardens and Plantations, Jamaica, in which the author has brought together a fund of information relating to bananas, which cannot but prove of great assistance to banana-growers in Queensland. The book, in addition to its value as a text-book on the subject, is well illustrated, and amongst the illustrations are some quaint drawings of the banana plant, reproduced from old engravings dating as far back as 1721 and 1750 A.D. The medicinal properties of the fruit and plant are described in a separate chapter, as well as the commercial products which can be obtained from small unsaleable bananas, in the shape of wine, whisky, and alcohol from the fruits, and fibre from the stems. The magnitude of the loss which would accrue to Jamaica alone from bananas which cannot be profitably exported is shown by the fact that over three million bunches come annually under that category, and in all exporting countries put together as many as eight millions of bunches annually fail to come up to the high standard insisted upon by the shippers. The value of these eight million bunches, reckoned at 6d. each, is a matter of £200,000 per annum, and this in Jamaica alone represents £80,000 a year.

The author devotes a chapter to banana cultivation in Queensland, quoting from the pamphlet on the subject issued by the Department of Agriculture and Stock, and refers to the considerable stimulus the important and profitable industry in our State has received by the importation of the Gros Michel variety from Jamaica. He also describes the methods of packing and shipping bananas from Innisfail and Cairns to the Southern States.

The book is the most complete work we have yet seen on the subject of banana-growing, and it should be in the hands of all engaged in the industry in this State. The London publishers are Messrs. Duckworth and Co., Henrietta street, Covent Garden, W.C.

CLOSE SEASON FOR OPOSSUMS AND BEARS.

A proclamation appeared in the "Government Gazette" of the 10th January extending the close season for opossums and native bears from the 1st May, 1914, to the 31st October, 1914. The effect of this proclamation, with the period specified in the Acts, is to totally protect opossums and bears to the 30th April, 1915.

EXPLOSIVES IN AGRICULTURE.

At a demonstration recently given at Pinnacle, near Mackay, of the use of explosives in agriculture, a farmer present stated that on his farm he had some stumps that he could not get men to grub at 10s. each, yet he was splintering those stumps to such an extent with a couple of pounds of dynamite that they were easily burned out of the ground, roots and all, at a cost of a little over 2s.

SUSCEPTIBILITY OF PLANTS TO DISEASE.

The "Journal of the Board of Agriculture" of British Guiana (October, 1913) takes the following interesting note on the above subject from the "Journal of Agricultural Science":—

Susceptibility to mildew and yellow rust in wheat, and to mildew in barley, is increased by providing the plants with large amounts of available nitrogen; ammonium sulphate and sodium nitrate seem to be equally effective in this direction.

Mineral manures, especially potash salts, on the contrary, decrease the susceptibility to disease but cannot counteract the effects of large quantities of nitrogenous manures.

Plants which are semi-starved as regards nitrogen exhibit a considerable degree of immunity, even if the phosphates and potash are also present only in small quantities.

Lithium salts are also effective in producing immunity, while nitrates of lead and zinc, particularly the latter, render plants extremely susceptible. Other salts of lead and zinc have very little effect on the susceptibility of plants.

A variety of wheat which is almost immune to a disease (such as Little Joss to yellow rust) tends to retain its immunity even when supplied with excess of nitrogenous food material.

Increased immunity does not appear to be due to a lack of food material available for the fungus in the host, as suggested by M. Ward, because the plants rendered relatively immune by adding phosphates or potash to their food supply were as healthy and well-grown as those receiving no such additions.

It yet remains to be seen what physiological explanation can be found to account for the changes in susceptibility which can be produced in plants by the above means.—G. T. SPINKS in the "Journal of Agricultural Science."

TO KEEP ANTS AWAY.

During summer ants make their unwelcome appearance in many homes, and raid supplies of jams and preserves and other sweet concoctions. Where it is possible of distribution insectibane generally serves effectively to rout small sugar ants. To prevent them from making their way on to shelves, safes, and tables, a bulletin issued by the United States Department of Agriculture recommends soaking cotton tape an inch wide in a saturated solution of corrosive sublimate, allowing it to dry, and then fastening it around the legs of the furniture or shelves. If the tape remains dry (it is asserted) it will repel all ant invasions for months.

TO CURE HICCOUGHS.

The "Wealth of India" gives the following remarkable cure for this annoying trouble:—"Fill a glass tumbler with clear, cold water, and place on a table. Then have the patient stand where he or she can look directly into the glass, and fix the attention about the centre of the bottom of the glass for about a minute, when the patient will find the hiccoughs have entirely disappeared. This has been known to cure the most violent cases of this disorder when all other remedies have failed."

POISONING TREES.

We are constantly being asked for some method of preventing stumps from throwing out suckers, or of killing standing timber, and several suggestions have been made by our readers. Of these suggestions, the only cheap and practical methods are one in which saltpetre is placed in holes bored into the tree and plugged; and another where arsenic and washing soda are employed. Still, neither of them appears likely to succeed in the case of dead stumps, since the destructive power of the agents used requires to be carried through trunk, roots, and branches of the living tree by means of the circulation of the sap.

A settler at Beerburrum described his success with the saltpetre method in the January issue of this Journal, and as far back as October, 1910, we published an account of the complete destruction of trees in the Taroom district as noted by the then Minister for Agriculture, Mr. Paget (now Minister for Railways). The success of this latter method is

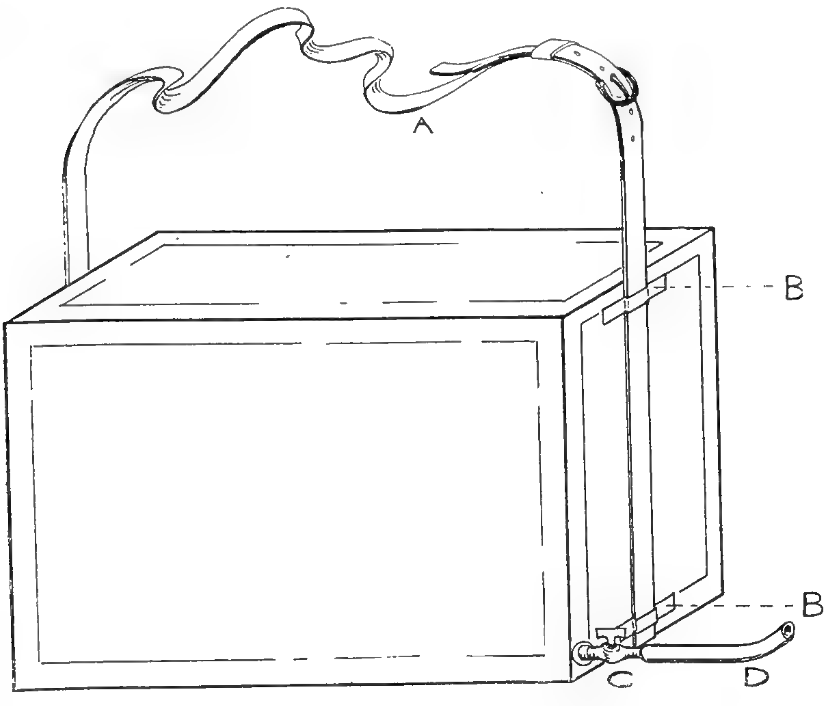

PLATE 30.—BENZINE TIN ADAPTED AS A RECEPTACLE FOR ARSENICAL SOLUTION FOR POISONING TREES.

(A) Shoulder-strap. (B) D's soldered on at each end and underneath to hold the strap firmly in position. (C) $\frac{1}{4}$-inch tap. (D) 2-ft. length of rubber hose.

further vouched for by many who have tried it. An Inglewood farmer, Mr. G. E. Burns, contributes his evidence to the "Farm Bulletin" for February, 1914, as follows:—

"Noticing a paragraph in your December issue *re* poisoning trees, I have tried the arsenic and soda method. I poisoned about 10 acres about two years ago in a dry time, but the biggest part of them suckered, but they burnt off very well. I poisoned 5 acres of big ironbark trees twelve months ago, after a good fall of rain, and they all died right out. I rung as close to the ground as possible, and bought the arsenic by the pound in tins, as the bulk arsenic isn't pure. I used 3 lb. arsenic to 7 lb. washing soda to 5 gallons of water. My advice to those about to poison trees is to see that the arsenic is pure and the sap is running well in the trees, and ring low. I might say the addition of saltpetre is a great help for burning off."

Mr. Quodling, Inspector of Agriculture, supplies the accompanying sketch of a handy receptacle for the arsenical solution for poisoning trees, made of a benzine tin. The tin is dented in so that it rests comfortably on the hip. It is necessary to cut a hole temporarily on the top of the tin to allow of fixing the tap in position, after which the hole is re-

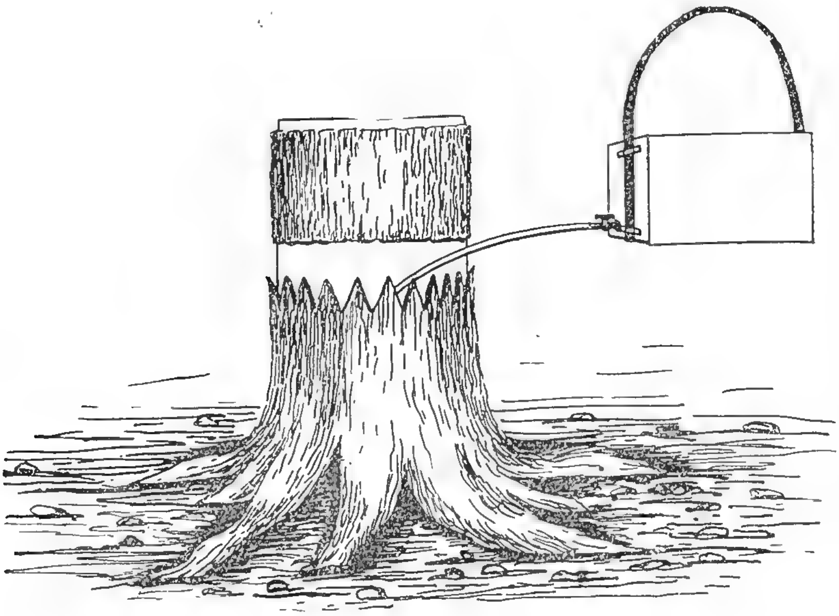

PLATE 31.—METHOD OF "FRILL-RINGING" A TREE AND APPLYING THE POISON.

soldered. Filling is effected through the ordinary screw-cap, a funnel being inserted. The arsenical solution is injurious to the hands, which should therefore be protected by wearing a glove on the hand used for directing the hose length.

1. Shoulder-straps. 2. D's soldered on at each end and underneath to hold the strap firmly in position. 3. ¼-in. tap. 4. Length of rubber hose.

Answers to Correspondents.

SELECTING SEED CORN.

"CORNGROWER," Manyung—

If your farm is in proximity to others where a different type, or a more uniform class of maize is grown, there will be difficulty in keeping up your standard. There is always satisfaction in knowing that seed carefully selected with due regard to the maintenance of "quality" will give more satisfactory results than the average seed maize retailed as such. When diminished yield and signs of deterioration are noticeable in your field and in the maize itself, it is time to effect a change. On the other hand, if you have worked up a good standard type of grain, and it suits your soil and conditions, there is no reason to bring seed from an outside source, unless you are satisfied as to its being an improvement on your own. Seed selection is an important factor in the improvement of any grain, and if the methods of selection, as directed in the pamphlet sent to you from this Department, are carefully followed, you may expect considerable improvement. A writer in one of our exchanges says, on the subject:—

"The power of heredity in corn is more marked than in any other plant. Strong, healthy, purebred seed produces its kind, and weak, emaciated seed of poor heredity is reflected in the harvest. Inbred corn produces defective and deformed ears. Corn fertilised by pollen from barren stalks is apt to yield barren stalks. The hereditary tendency is so sensitive that the location of the ear on the stalk is transmitted.

"It has been demonstrated that corn planted from ears located near the ground will mature from ten to fifteen days earlier than those high on the stalk.

"It should be remembered that a kernel should possess vitality strong enough to give out roots and push a stem far enough above ground to receive carbon dioxide from the air before the roots can take plant food from the soil. A rapid growth at the beginning is pronounced throughout the entire life of the plant. Primarily, the seed should be of a strain adapted to the locality, and the seed should be from the locality where it is planted. Corn grown in a humid climate may not do well in a semi-arid section. Corn can, however, become acclimatised in two or three or three years. Again, inbred seed corn, or corn that has been fertilised from barren or scrubby stalks, should not be planted."

LUCERNE.

"LUCERNE," Mondure Estate, Wondai—

Quantities of lucerne seed have been imported at times from European sources, and it seems likely that some of the crops raised from this seed may be found growing on the Downs. The strain known as

Hunter River Broad Leaf Lucerne is regarded as the most suitable for Queensland conditions, and is more largely grown than any other kind. It may be noted that there are several different strains of lucerne. The "Turkestan" is a narrow-leafed variety, of which seed was introduced on the Downs, as it was said to be drought and heat resistent, but it did not prove more so than others. The variety known as "Peruvian," on the other hand, is broader and larger in the leaf, and varies slightly from the Hunter River type. It is said to be suitable as a winter crop, but this feature has not yet been satisfactorily proved.

INOCULATING THE SOIL FOR LUCERNE-SEED MAIZE.

H. BOYLE, Goondoon—

1. *Re* inoculating scrub soils: This may not be required, but the resulting crop will be a guide in this respect. If found to be required later on, soil should be procured from successful lucerne fields, and applied simultaneously with the seed, the soil being previously sifted and put through the fertiliser box at the rate of from 300 to 500 lb. per acre, or else broadcasted.

2. March and April are the best months to sow. Good crops of lucerne have been raised on the Downs (a colder district than yours in a favourable winter), but the young lucerne must be inured to cold and light frost from the start. If it reaches the rough leaf or more forward stage in a sappy condition without experiencing any frost, then there is no danger from the expansive action of the water freezing in the plant cells.

3. *Re* number of small cobs on stalk, &c.: This is an abnormal condition which may be due to an inherent defect in the "strain" of maize you imported, or else it has been brought about by some untoward circumstance which happened during the growth of the crop. When acclimatised, the maize may improve in this respect, but in the face of its present showing it would be inadvisable to save a large quantity for seed purposes. In selecting seed, it is better to adopt the recognised lines for selection laid down in the accompanying "Maize Pamphlet," and reject stalks showing an abnormal number of poorly developed ears.

4. *Re* breaking off cobs: See reply to No. 3. For obvious reasons there is little to be expected from this process of seed selection.

5. Ordinarily, a plant showing two well-developed ears is preferable; but, if there is any tendency towards degeneration in size and type, the stalk carrying a single ear would be preferable. Consideration should be given and judgment exercised in regard to the kind of season experienced during the growth and development of the crop.

TANGERINES.

Our correspondent's letter has been mislaid. We are informed that Tangerines, up to 500, can be obtained from Mr. J. Williams, Sunnybank Nursery, Sunnybank, Brisbane.

RISE AND FALL OF SAP IN TREES.

A.H., Mooloolah—

The best season for ring-barking is generally considered to be that during which the flow of the sap is most active, and growth is taking place. Generally speaking, for the Mooloolah District, this would be in February and March, but this season it is later. Sap does not fall in the ordinary sense, though it may remain stationery during the season when no growth is taking place.

Suckering.—It is said that suckering may be prevented by " Frill-ringing—*i.e.*, not taking the chip out of the trunk—and pouring in an arsenical poison, as described and illustrated in this issue of the Journal.

HOME-CURED BACON.

"YARWUN," Yarwun—

In reply to your request for information on the best means to cure bacon and hams, so as to avoid the drying and hardening of the fleshy parts, Mr. J. Brown, Principal of the Queensland Agricultural College, advises as follows:—

"The method outlined by your correspondent is good, but the sides should not be treated for longer than a fortnight, if mild-cured bacon is required for immediate consumption. After 10 to 14 days in the salt, &c., they should be well washed in lukewarm water and removed to a cool, dry place.

"The hardness, dryness, and extreme saltness of the lean of bacon is caused in this way: The principle underlying the process of curing is one of osmotic* diffusion through the animal membranes. The soluble albuminoids in the meat diffuse outwards, and the pickle inwards, until only hard insoluble fibrinoids remain. On the latter, both salt and saltpetre have a hardening effect. Where a good deal of sugar is used, it is less noticeable, but sugar can only be used freely in cold weather, or it sets up decomposition changes. In summer curing the pickle must be strong, to ensure thorough penetration, otherwise bad, discoloured meat will result in the inside portion. In home-curing, the difficulty can only be overcome by selecting rather fat pigs, using mild pickle with sugar, restricting the curing period, curing only in winter, and consuming without delay."

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* Osmotic pressure may be thus described :—Let a solution and a solvent be separated by a permeable partition which permits the passage of the solvent but not of the dissolved substance. The solvent will pass through it until it exerts equal pressure on both sides of the partition ; the total pressure exerted by the solution will then exceed that exerted by the solvent by an amount equal to that exerted by the dissolved substance alone. This amount is called the " Osmotic Pressure" of the dissolved substance.

The process of Osmosis is this: Let a solution of copper sulphate in water be separated by pure water by a partition consisting of a sheet of parchment ; the water will pass through in one direction, and the dissolved substance in the other, as above described by Mr. Brown, in the case of the curing pickle.—[Ed. " Q.A.J."]

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR FEBRUARY, 1914.

Article.		FEBRUARY. Prices.
Bacon (Pineapple)	lb.	7½d. to 10½d.
Bran	ton	£5 5s.
Butter	cwt.	104s.
Chaff, Mixed	ton	£5
Chaff, Oaten (Victorian)	"	£6 to £7
Chaff, Lucerne	"	£5 5s. to £7 10s.
Chaff, Wheaten	"	£4 to £4 10s.
Cheese	lb.	6d. to 6½d.
Flour	ton	£9
Hams	lb.	1s. 2d.
Hay, Oaten (Victorian)	ton	£6 to £6 10s.
Hay, Lucerne (Prime)	"	£3 10s. to £4 15s.
Honey	lb.	1¾d. to 2¼d.
Maize	bush.	4s. 2d. to 4s. 3d.
Oats	"	3s. 9d. to 4s. 6d.
Onions	ton	£7 to £10
Pollard	"	£5 5s.
Potatoes	"	£6 10s. to £10 10s.
Potatoes (Sweet)	cwt.	4s. to 4s. 3d.
Pumpkins	ton	£4 10s. to £5 15s.
Wheat, Milling	bush.	3s. 7d.
Eggs	doz.	8d. to 1s. 7d.
Fowls	pair	2s. to 4s.
Geese	"	4s. 9d. to 5s. 6d.
Ducks, English	"	2s. to 2s. 6d.
Ducks, Muscovy	"	4s. to 5s.
Turkeys (Hens)	"	7s. 6d. to 8s.
Turkeys (Gobblers)	"	12s. to 16s.

SOUTHERN FRUIT MARKETS.

Article.	FEBRUARY. Prices.
Bananas (Fiji), G.M., per case	14s. to 15s.
Bananas (Fiji), per bunch	4s. 6d. to 13s.
Bananas (Queensland), per case	6s. to 10s.
Mangoes, per bushel-case	5s. to 10s.
Passion Fruit, per half-case	4s. to 7s.
Pineapples (Queensland), (common), per case	5s. to 6s.
Pineapples (Queensland), (Ripleys), per case	5s. to 6s.
Pineapples (Queens), per case	6s. to 7s.
Tomatoes, per quarter-case	1s. 6d. to 3s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	FEBRUARY. Prices.
Apples, Eating (American), per case	8s. to 13s.
Apples, Eating (Stanthorpe), per case	6s. to 8s.
Apples, Cooking (Victorian), per case	6s. to 7s.
Apples, Cooking (Stanthorpe), per case	4s. 6d. to 6s.
Apricots, per quarter-case	...
Bananas (Cavendish), per dozen	$1\frac{1}{2}$d. to 3d.
Bananas (Sugar), per dozen	$1\frac{3}{4}$d. to $2\frac{3}{4}$d.
Cape Gooseberries, per quarter-case	...
Cherries (Local), per quarter-case	...
Citrons, per cwt.	...
Cocoanuts, per sack	13s. to 14s.
Custard Apples, per case	...
Figs, per box	6s. to 8s. 6d.
Grapes (Local), per pound	2d. to 6d.
Lemons (Local), per case	6s. to 8s.
Lemons (Italian), 150 Fruits, per half-box	14s.
Limes, per case	...
Mandarins, per case	...
Mangoes, per case	9d. to 1s. 6d.
Nectarines, per quarter-case	1s. to 4s.
Oranges (Italian), per case	10s. to 12s.
Oranges (other), per case	...
Papaw Apples, per quarter-case	2s. to 3s.
Passion Fruit, per case	4s. to 6s.
Peaches, per quarter-case	2s. to 5s.
Pears, per bushel-case	9s.
Persimmons, per case	1s. 6d. to 2s.
Pineapples (Ripley), per dozen	1s. to 1s. 6d.
Pineapples (Rough), per dozen	1s.
Pineapples (Smooth), per dozen	1s. to 2s.
Plums, per quarter-case	2s. to 3s.
Rockmelons, per dozen	1s. to 4s. 3d.
Strawberries, per dozen pints	...
Tomatoes, per quarter-case	1s. 6d. to 3s. 6d.
Watermelons, per dozen	2s. to 8s.

TOP PRICES, ENOGGERA YARDS, JANUARY, 1914.

Animal.	JANUARY. Prices.
Bullocks	£13 to £16
Cows	£7 12s. 6d. to £9 12s. 6d.
Merino Wethers	24s. 3d.
Crossbred Wethers...	24s. 3d.
Merino Ewes	17s. 6d.
Crossbred Ewes	20s.
Lambs	17s. 3d.
Pigs (Porkers)	...

PRODUCE MARKETS.

Fenwick and Co., salesmen, Brisbane, report under date 16th February:—

Hides.—Only fair supplies were offered, the total number catalogued being 5,499. Competition ruled keen for all descriptions at values equal to the best of last sale's rates. Stout hides sold exceptionally well, and we topped the market at 13d. secured for two hides. Also 350 picked heavy hides were sold from 10d. to $12\frac{7}{8}$d. We sold 2,254.

Calfskins and Yearlings.—Both descriptions were in good demand at about late rates. Best calfskins sold at $11\frac{1}{2}$d. per lb., and yearlings to $7\frac{1}{2}$d. Well flayed small calfskins realised to $10\frac{1}{2}$d. per lb.; large, $7\frac{1}{2}$d. to $8\frac{1}{2}$d. per lb.; faulty, 6d. to $7\frac{1}{2}$d. per lb.; cuts, 6d. to 9d. per lb.; damaged, faulty and soakers, 1s. to 2s. 3d. each. Dry salted skins, best, 3s. 3d. to 3s. 6d.; seconds and cut, 1s. 6d. to 2s. 6d.; sundried, best, to 2s. 6d.; cut, 2s. Yearlings, ordinary and cut, $6\frac{1}{2}$d. to 7d.; faulty and rough, $5\frac{1}{2}$d. to 6d. per lb. We sold 1,478.

Sheepskins.—All descriptions were in good demand, and though the market at times was irregular values were practically unchanged. Full wool merinos, light condition, $7\frac{3}{4}$d. to 8d. per lb; short woolled merinos, light condition, $6\frac{1}{4}$d. per lb.; pelts and very short wools, $4\frac{1}{2}$d. to $5\frac{3}{4}$d.; crossbreds, fine full, to $7\frac{1}{2}$d. per lb.; crossbreds, three-quarter woolled, 6d. to $6\frac{3}{4}$d., according to quality; pelts, $3\frac{3}{4}$d. to $4\frac{1}{2}$d. We sold 3,756.

Tallow.—Although prime tallow was in good demand, values declined 10s, top price being £29. Second grades were fully 15s. to 20s. per ton lower. We sold 64 tierces and 6 quarter-casks.

Marsupial Skins.—Only small catalogues were submitted, but a keen demand prevailed, and values were very firm. Scrub wallabies showed a slight advance and realised 2s. 6d. to 4s. 6d. per dozen for small skins, 7s. to 9s. 9d. for medium, and 12s. to 18s. 6d. for large skins. Swamp wallabies realised from 1s. to 12s. per dozen, according to size. Rock wallabies and padda-melons sold from 2s. to 6s. per dozen. Coast wallabies realised 1s. 9d. per lb. for sound skins averaging over 5 lb. per dozen, and 1s. 5d. for seconds; while sound large scrubs made to 1s. 11d. for firsts and 1s. 9d. for seconds. Kangaroos, wallaroos, and whiptails realised late rates; while goatskins showed a decided advance. We sold 7,102. Red kangaroos, 1st large and medium size, made 2s. 6d. to 2s. 10d. per lb.; under 6 lb. and over 24 lb., average to 2s. 5d.; seconds are worth from 2s. to 2s. 6d. per lb. Wallaroos, first, 1s. 6d. to 1s. 9d. per lb.; seconds, 1s. 3d. to 1s. 6d. per lb., according to weight. Whiptails, first, over 5 lb. average, are selling at 1s. 11d. per lb.; and seconds to 1s. 9d. per lb. Goatskins, first quality, averaging from 10 to 20 lb., to 1s. 9d. per lb.; over 20 lb., 1s. 2d. to 1s. 7d. per lb.; seconds are worth 1s. to 1s. 2d. per lb.

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 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, penstemons, &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. I. APRIL, 1914. PART 4.

Agriculture.

THE PHILOSOPHY OF SOIL.

INOCULATION FOR LUCERNE.

It is a simple proposition, and yet to a great many farmers it looks so remote and mysterious that they do not clearly understand it, and so they cast it aside as some crank notion or humbug. Yet, it is the absolute keystone that holds the arch. The principle is this: All of those plants that are called legumes, like all of the clovers and lucerne, including peas, beans, and vetches, require the deposit on their roots of certain bacteria. These deposits are in the form of small colonies and are called "nodules."

Dig up a healthy clover or lucerne plant, and shake the dirt gently from the roots, you will see these nodules clustering on the finer roots about as big as a small pin head. The microscope discloses that these nodules are filled with certain bacteria that have the power to absorb the free nitrogen of the air, and change it over into plant nitrogen. What makes lucerne or clover valuable as a feed is its percentage of protein, which is another name for nitrogen. Milk and meat and the bodies of all animals require a great deal of nitrogen.

So we see that the soil must be in that condition to create and make a home for these bacteria, or else the clovers and lucerne will not live and flourish well.

Go into some fields of lucerne, and you will note spots where the plants look unhealthy, yellow, and starved out. Dig down to the roots, and you will find no nodules there. Why? Possibly, and very probably, it is because the soil is too acid for the bacteria to exist. Exist they must, or the clover and lucerne will fail. Each one of the legume plants has its own kind of bacteria. Those on the lucerne are unlike those that inhabit the clover.

There are three prime lessons to be learned by the farmer in the consideration of this subject:—

(1) He must take the word of those scientists who have investigated the matter. Because he cannot understand it is no reason that it is not true. We have heard scores of farmers say that all this talk about bacteria was a humbug. But they spoke the words of ignorance, not wisdom.

(2) When a farmer is introducing lucerne upon his farm, it is fair to suppose that there are no bacteria in his soil that belongs to that plant. It is a simple matter for him to take some bags and go over to a farm where lucerne does well, and get a few hundred pounds of soil from the old lucerne field. This should be done on a cloudy day or just at nightfall, when the sun is not shining brightly, for, true to its purpose, the sunlight will kill the bacteria if they are exposed to its rays.

Keep the dirt in the dark, and apply it to the surface of the newly-sown lucerne field at the rate of about 500 lb. to the acre. Do this just at nightfall also. Now the effect will be to inoculate the soil with these bacteria. They make their way at once to the young lucerne roots, and there is altogether a different growth.

Or in place of soil from a lucerne field, if more convenient, get some of the commercial inoculating material called Nitragin, which is applied to the seed, and with its multitude of bacteria is carried to the soil with the seed. It has been noticed that lucerne, as well as clover, is a great deal more hardy, stands severe cold weather and all sorts of discouragements better, when there are plenty of its favourite bacteria in the soil.

The third lesson is an important one. If the soil is too sour, it must be sweetened. When clover does not grow well and is easily winter killed or summer killed, it is a pretty sure sign that the soil is in a bad condition for it. It is quite apt to need two things—lime and phosphate. The same is true of lucerne. The bottom reason for this is, that the bacteria, necessary for the health of the plant, cannot live in that soil because of a lack of lime. The phosphate is also necessary to the growth of the plant.

The more we look into these things the more do we see the need of using the mind in a study of the real meaning of the facts as they exist. Very often it takes ten times as long to know what to do as it does to do it when we know. A large proportion of men weary of study a great deal quicker than they do of hard work. But we have noticed that the richest rewards come to the men who think and study. Blind, unthinking labour never made anybody prosperous.—"Farm Bulletin."

TEFF GRASS—*"Erogristis Abyssinica."*

BY G. B. BROOKS, Instructor in Agriculture.

A short time ago a quantity of Teff seed was introduced by the Department of Agriculture, and is being tested at the various agricultural institutions, samples also being sent to selected farmers in other districts. It is expected that the results from these tests will be known shortly, and will be published in this Journal.

Frequent mention of this grass has been made recently in agricultural and other publications, which have also in several instances advertised it for sale. The result is, that in my travels amongst farmers it has been found that many have been induced to purchase seed for the purpose of giving it a trial as a pasture grass.

It may be pointed out that this grass is not claimed to be of any great value for grazing purposes. It is essentially a hay crop and, moreover, practically an annual, which fact renders it useless as a permanent pasture grass.

It is a heavy and free seeder, and will undoubtedly reproduce itself by "shedding," if allowed to stand over or ripen before harvesting. Some caution should, therefore, be exercised if planted as a hay crop previous to lucerne, maize, or sugar-cane, to see that it is cut down before seeding. It is a very rapid grower, coming to maturity in a few weeks, so that if a spell of wet weather were experienced to prevent cultivation, it would be likely to choke out these crops.

Teff grass is a native of North-east Africa, grown principally for food, the small grains being made into bread.

The stem is fine in texture, attaining a height of from 2 to 4 ft. As it is a warm weather crop, planting should be carried out from September to February, the amount of seed necessary to sow an acre being from 3 to 7 lb.

The land should be put into good tilth previous to planting. The seed, being small, should be covered lightly either with lever or brush harrows and then rolled.

COMPOSITION OF REGISTERED FERTILISERS.

BY J. C. BRÜNNICH, Agricultural Chemist.

Under the Fertiliser Act of 1905 every dealer—that is, any person who carries on business as manufacturer, importer, seller, or dealer in fertilisers—shall deliver before the 31st of January in each year a certificate stating the specific ingredients of each brand of fertiliser.

The following list comprises the fertilisers registered by the various dealers for the year 1914:—

DEALER OR MANUFACTURER.		Name of Fertiliser.	Nitrogen.	PHOSPHORIC ACID.			Potash.	Remarks.
Name.	Address.			Water Soluble.	Citrate Soluble.	Citrate Insoluble.		
			%	%	%	%	%	
A. E. Bateman	Stanthorpe	Hassel's Onion Manure	15·0	3·1	5·4	...	13·0	
Ditto	Ditto	Ditto Tomato Manure	6·0	7·3	0·2	...	13·0	N. as nitrate
Ditto	Ditto	Ditto Grass and Top Dressing	1·1	4·5	...	17·0	1·25	
Ditto	Ditto	Ditto Maize and Cabbage Manure	2·25	15·75	...	1·0	1.75	
Ditto	Ditto	Ditto Pea and Bean Manure	...	9·5	...	3·0	6·5	
Ditto	Ditto	Ditto Potato Manure No. 1	3·5	11·25	...	...	5·5	
H. Baxter	Brisbane	Runcorn Bone Dust	3·0	...	...	19·1	...	35 % fine
Ditto	Maryborough	Baxter's Bone Dust	2·8	...	...	20·5	...	25 % fine
Baynes Bros.	Brisbane	Baynes Bros.' Fertiliser	4·3	...	...	19·3	...	
T. S. Beatty	Mackay	Mackay Mixture	4·5	8·0	...	...	15·0	
Ditto	Ditto	Webster and Co.'s Manures	...	...	...	...	...	
Bergl Australia, Ltd.	Bowen	Hashmagandy	3·5	...	...	23·4	...	
Ditto	Ditto	Blood Manure	12·8	...	...	...	...	
Birt and Co., Ltd.	Brisbane	Phœnix Fertiliser	4·5	...	...	18·0	...	
Ditto	Ditto	Ditto Dried Blood	12·0	...	...	...	...	
T. Borthwick and Sons	Ditto	Moreton Dried Blood	11·0	...	...	1·5	...	
Ditto	Ditto	Ditto Bone and Offal	6·0	...	...	12·0	...	
Brisbane Gas Co.	Ditto	Sulphate of Ammonia	20·8	...	...	...	...	
Burdekin River M. P. Co.	Burdekin	Burdekin Fertiliser	3·8	...	...	17·9	...	
Ditto ditto	Ditto	Ditto Dried Blood	10·0	...	...	0·4	...	
Burns and Twigg, Ltd.	Rockhampton	Yates' Plant Food	3·3	12·0	...	...	12·9	
Campbell and Amos, Ltd	Bundaberg	Baynes Bros.' Fertiliser	4·5	...	...	14·4	...	50 % fine
Ditto ditto	Ditto	Q.M.E. Fertiliser	6·0	...	...	15·7	...	
Ditto ditto	Ditto	Baxter's Bone Dust	2·8	...	...	20·5	...	25 % fine
Ditto ditto	Ditto	Runcorn Bone Dust	3·7	...	...	31·8	...	52 % fine
Ditto ditto	Ditto	Shirley's Superphosphate	...	17·0	...	...	...	
Ditto ditto	Ditto	Ditto Nitrate of Soda	15·5	...	...	...	...	
Ditto ditto	Ditto	Ditto Sulphate of Ammonia	20·0	...	...	...	...	
Ditto ditto	Ditto	Ditto Sulphate of Potash	...	...	...	...	52·0	
Ditto ditto	Ditto	Ditto R. Mixture	5·0	6·0	...	...	12·0	
Ditto ditto	Ditto	Ditto No. 3	3·3	13·0	...	...	2·0	
Ditto ditto	Ditto	Ditto No. 5	3·3	12·0	...	...	7·0	
Ditto ditto	Ditto	Ditto L. S. D. Cane Fertiliser	7·7	7·0	...	...	7·7	
Ditto ditto	Ditto	Ditto No. 11	...	11·4	...	...	7·0	
Central Queens'and M. W.	Lake's Creek	Fitzroy Fertiliser	5·7	15·3	...	...	0·1	

Corser and Co., Ltd.	Maryborough	Shirley's A Bone Phosphate	0·5	...	...	29·8	...	
Ditto	Ditto	Ditto L. S. D. Cane Fertiliser	7·7	7·0	...	...	7·7	
Ditto	Ditto	Ditto Superphosphate	...	17·0	...	..	...	
Ditto	Ditto	Ditto No. 11	...	11·4	...	...	7·0	
Ditto	Ditto	Ditto No. 9	4·1	6·5	...	...	4·0	
Ditto	Ditto	Ditto No. 5	3·3	12·0	...	...	7·0	
Ditto	Ditto	Ditto No. 3	3·3	13·0	...	...	2·0	
J. Croker	Mackay	Ditto L. S. D. Cane Fertiliser	7·7	7·0	...	...	7·7	
Ditto	Ditto	Ditto Sulphate of Potash	...	...	...	...	52·0	
Ditto	Ditto	M. G. C. Sulphate of Ammonia	20·5	..	..	...	...	
Ditto	Ditto	Nitrate of Soda	15·5	...	...	..	...	
Ditto	Ditto	Ross River Fertiliser	6·0	...	...	16·0	...	
Ditto	Ditto	Alligator Creek Mix. Fertiliser	5·5	...	...	18·5	...	
J. Francis and Co.	Ipswich	*Bone Dust	2·7	...	...	25·8	...	30 °/。 fine
Ditto	Ditto	*Dried Blood	11·4	...	...	0·5	...	
Gladstone M. W.	Gladstone	G. M. W., Q., Blood and Bone	6·9	...	...	11·7	...	Cattle Fertiliser
Ditto	Ditto	Ditto ditto	6·7	...	..	9·3	...	Sheep Fertiliser
E. Gleeson	Stanthorpe	Baynes Bros.' Fertiliser	4·5	...	...	14·4	...	50 °/。 fine
W. E. Hamwood	Toowoomba	Wattle Bone Meal	2·8	...	...	19·0	...	35 °/。 fine
Headrick, Ltd.	Cairns	B. M. E. C. Manure	5·2	...	...	6·7	...	
J. L. Holmes and Co.	Toowoomba	Runcorn Bone Dust	3·5	...	...	22·0	...	45 °/。 fine
J. C. Hutton Prop.	Brisbane	Hutton's Mix. Fertiliser	6·0	2·8	...	8·3	...	
C. F. Jordan	Zillmere	Normanby Bone Dust	3·8	...	...	24·2	..	59 °/。 fine
R. B. Lawson and Co.	Stanthorpe	Blood and Bone	6·5	...	...	11·0	...	
Ditto ditto	Ditto	Nitrate of Soda	15·5	...	...	...	...	
Ditto ditto	Ditto	Sulphate of Potash	...	...	...	...	52·0	
Ditto ditto	Ditto	Kainit	..	..	..	...	12·5	
Ditto ditto	Ditto	Shirley's A	0·5	...	8·8	21·0	...	
Ditto ditto	Ditto	Ditto M	1·6	...	4·6	11·4	1·0	
Ditto ditto	Ditto	Ditto N	1·6	...	4·6	11·4	4·0	
Ditto ditto	Ditto	Ditto O	2·5	...	4·2	9·5	6·0	
Ditto ditto	Ditto	Ditto 36/38, No. 1	...	16·5	...	...	...	
Ditto ditto	Ditto	Ditto No. 2	1·6	15·0	...	...	1·0	
Ditto ditto	Ditto	Ditto No. 3	3·3	13·0	...	...	2·0	
Ditto ditto	Ditto	Ditto No. 4	4·9	11·0	...	...	4·0	
Ditto ditto	Ditto	Ditto No. 5	3·3	12·0	...	...	7·0	
Ditto ditto	Ditto	Ditto No. 7	1·6	11·4	...	...	1·0	
Ditto ditto	Ditto	Ditto No. 9	4·1	6·5	...	...	4·0	
Ditto ditto	Ditto	Ditto No. 11	...	11·4	...	...	7·0	
Ditto ditto	Ditto	Ditto No. 14	2·5	5·5	...	8·8	6·0	
T. Leonard	Mackay	Fitzroy Fertiliser	5·3	0·2	4·1	12·6	...	57 °/。 fine.
Marsh and Webster Ltd.	Ditto	Q.M.E. Dried Blood	11·7	...	...	1·9	...	
Ditto ditto	Ditto	Ross River Dried Blood	13·0	...	...	1·0	...	
Millaquin Sugar Co.	Bundaberg	B.O. and B.I. Bone Dust	3·8	...	...	23·0	...	5 °/。 fine.
Mourilyan Syndicate	Mourilyan	Ross River Fertiliser	6·0	...	...	16·0	...	

Dealer or Manufacturer. Name.	Address.	Name of Fertiliser.	Nitrogen.	Phosphoric Acid. Water Soluble.	Citrate Soluble.	Citrate Insoluble.	Potash.	Remarks.
			%	%	%	%	%	
Mourilyan Syndicate	Mourilyan	Alligator Creek Mixed Fertiliser	5·5	...	...	18·5	...	
T. Nisbet	Innisfail	Sulphate of Potash	...	...	...	...	52·0	
Ditto	Ditto	Sulphate of Ammonia	20·0	...	...	...	...	
Ditto	Ditto	Shirley's L. S. D. Fertiliser	7·7	7·0	...	...	7·7	
Ditto	Ditto	Ditto R. Fertiliser	5·0	6·0	...	...	12·0	
M. O'Donohue	Ditto	Hanel's A1 Cane Fertiliser	11·0	4·0	...	...	9·0	
Paul and Gray Ltd.	Brisbane	Shirley's Superphosphate	...	17·0	...	...	...	
Ditto ditto	Ditto	Ditto No. 3	3·3	13·0	...	...	2·0	
Ditto ditto	Ditto	Ditto No. 5	3·3	12·0	...	...	7·0	
Ditto ditto	Ditto	Ditto No. 7	1·6	11·4	...	...	...	
Ditto ditto	Ditto	Ditto No. 9	4·1	6·5	...	...	4·0	
Ditto ditto	Ditto	Ditto No. 14	2·5	5·5	...	8·5	6·0	
Ditto ditto	Ditto	Ditto No. 19	4·0	4·1	...	7·3	2·0	
Ditto ditto	Ditto	Ditto L. S. D. Cane Fertiliser	7·7	7·0	...	...	7·7	
Ditto ditto	Ditto	Sulphate of Potash	...	...	...	...	52·0	
J. W. Pohlmann	Doolbi, Isis	Bone Dust	3·0	...	...	24·6	...	60 % fine.
Queensland Fruitgrowers' Indust. Trading Society	Brisbane	Q.M.E. Dried Blood	11·7	...	...	1·9	...	
Ditto ditto	Ditto	Q.M.E. Fertiliser	6·0	...	...	15·7	...	
Ditto ditto	Ditto	Sulphate of Potash	...	...	...	...	51·0	
Ditto ditto	Ditto	Superphosphate	...	16·0	...	...	...	
Ditto ditto	Ditto	Sulphate of Ammonia	20·0	...	...	...	...	
Ditto ditto	Ditto	Nitrate of Lime	12·7	...	...	...	...	
Ditto ditto	Ditto	Nitrolim	18·0	...	...	...	...	
Ditto ditto	Ditto	Baynes' Fertiliser	4·3	...	...	19·3	...	
Ditto ditto	Ditto	Runcorn Bone Dust	3·7	...	...	21·8	...	52 % fine.
Ditto ditto	Ditto	Shirley's No. 3	3·3	13·0	...	...	2·0	
Ditto ditto	Ditto	Shirley's No. 5	3·3	12·0	...	...	7·0	
Ditto ditto	Ditto	Foggitt, Jones, Fertiliser	6·8	...	...	11·3	...	
Ditto ditto	Ditto	Hutton's Mixed Fertiliser	6·0	2·3	...	8·3	...	
Ditto ditto	Ditto	Organic Manure	3·8	...	...	13·0	...	
Queensland Meat Export and Agency, Ltd.	Ditto	Eagle Farm Dried Blood	13·3	...	...	0·8	...	
Ditto ditto	Ditto	Ditto Fertiliser	6·0	...	...	13·9	...	
Ditto ditto	Ditto	Ross River Fertiliser	5·8	...	...	17·3	...	
Ditto ditto	Ditto	Ditto Dried Blood	13·1	...	...	0·5	...	

Redbank Freezing Works (John Cooke and Co.)	Ditto	Redbank J.C. Fertiliser	6·4	..	...	13·0	...	
C. F. W. Rehfeldt	Alberton	Redbank Fertiliser	5·9	...	...	16·4	...	42 °/。 fine.
G. Searle and Sons	Toowoomba	Baynes' B. Fertiliser	4·4	...	...	14·4	...	50 °/。 fine.
Ditto ditto	Ditto	Runcorn Bone Dust	4·2	...	...	21·8	...	52 °/。 fine.
C. Taylor	Brisbane	Redbank Fertiliser	5·9	...	...	16·3	...	42 °/。 fine.
Ditto	Ditto	Shirley's No. 3	3·3	13·0	...	...	2·0	
Ditto	Ditto	Ditto No. 5	3·3	12·0	...	...	7·0	
Walsh and Company	Toowoomba	Hutton's Mixed Fertiliser	6·0	2·8	...	8·4	...	
Ditto ditto	Ditto	Shirley's No. 1 Super	...	17·0	...	...	...	
Ditto ditto	Ditto	Ditto No. 2	1·6	15·0	...	...	1·0	
Ditto ditto	Ditto	Ditto No. 3	3·3	13·0	...	...	2·0	
Ditto ditto	Ditto	Ditto No. 5	3·3	12·0	...	...	7·0	
Ditto ditto	Ditto	Ditto No. 9	4·1	6·5	...	...	4·0	
Webster and Co., Ltd.	Brisbane	Crown Superphosphate	...	16·0	...	...	...	
Ditto	Ditto	Ditto Nitrate of Soda	16·0	...	...	...	...	
Ditto	Ditto	Ditto Sulphate of Potash	...	...	...	...	51·0	
Ditto	Ditto	Ditto ditto of Ammonia	20·0	...	...	..	...	
D. Whiteley	Emu Park	Shirley's Sulphate of Potash	...	...	...	...	52·0	
Ditto	Ditto	Ditto Nitrate of Soda	15·5	...	...	...	...	
Ditto	Ditto	Ditto No. 3	3·3	13·0	...	...	2·0	
Ditto	Ditto	Ditto No. 5	3·3	12·0	...	...	7·0	
Ditto	Ditto	Ditto No. 11	...	11·4	...	...	12·9	
W. G. Winnett	Kingston	Runcorn Bone Dust	3·7	...	...	21·8	...	52 °/。 fine
Thos. Wood	Brisbane	Shirley's No. 5	3·3	12·0	...	...	7·0	
Ditto	Ditto	B. S. A. Sulphate of Ammonia	20·8	...	...	...	...	
Ditto	Ditto	Bone Meal	4·0	...	...	24·2	...	50 °/。 fine
Trackson Bros., Ltd.	Brisbane	Nitrate of Lime	13·0	...	...	...	...	
Ditto	Ditto	Nitrolim	18·0	...	...	...	...	
Associated Farmers of Queensland, Ltd., agents for Australian Phosphates Ltd.	Brisbane	AP1 Stone Fruit Fertiliser	4·0	...	8·0	3·0	5·0	
	Ditto	AP2 Citrus Fruit Fertiliser	3·75	...	8·0	3·0	7·0	
	Etna	AP3 Potato Manure No. 1	3·25	...	9·0	3·5	4·0	
		AP4 Potato Spec. Manure	5·0	...	8·0	2·5	8·0	
		AP5 Bean and Peas Manure	0·5	...	7·5	3·0	6·0	
		AP6 Cabbage, Maize, Hay	4·1	...	8·5	3·5	2·5	
		AP7 Cereals for Grain	3·5	...	9·0	3·0	2·5	
		AP8 Pumpkins and Melons	4·1	...	8·5	3·5	2·5	
		AP9 Tomato and Onions	3·5	...	8·0	3·0	4·0	
		AP10 Strawberry Fertiliser	5·0	...	7·0	2·5	8·0	
		AP11 Banana and Pineapple	4·5	...	8·0	3·0	5·0	
		AP12 Wheat Fertiliser	0·75	...	10·5	6·5	2·0	
		AP13 Pineapple Fertiliser	3·5	...	8·0	3·0	8·0	
		AP14 Sugar Beet Fertiliser	3·25	...	9·0	3·0	5·0	
		AP15 Asparagus Fertiliser	3·25	...	7·0	2·5	5·0	
		AP16 Oats Fertiliser	1·0	...	8·0	3·0	8·0	
		AP17 Sorghum Fertiliser	3·0	...	9·0	3·0	5·0	

AN EXHAUSTED SOIL.

Each time a crop is taken off the land, it takes with it all the ingredients which have built up the plants. If these materials are not replaced in some way or other, it is clear that, after a time, longer or shorter, according to the natural fertility of the soil, the whole of the plant-food which the roots can reach will be carried away, and the land becomes unproductive; but, in reality, there is no such a thing as an exhausted soil. The plant-food is there, but it is out of the reach of the roots of the plants, and requires to be brought up in some way or another to become available. Constant cropping has certainly removed the fertilising matter from the surface, and, such being the case, good crops cannot be produced, and in this sense, too, land is said to be exhausted.

In China, the production of crops has been carried on for thousands of years, as far as records can be traced, and conducted in an extensive manner. The soil, after these thousands of years of cultivation, is as productive as ever. The Chinese have always understood the necessity of restoring to the land the supply of nourishment extracted from it. They may not understand the chemistry of the subject, but long experience has been a good master. Lands in Europe which have been cropped for hundreds of years still continue to yield heavy crops.

Some six or seven years ago the Bureau of Soils of the United States Department of Agriculture put forth an entirely new theory on the subject of the so-called exhausted soils. As a matter of fact, the Bureau declared that a soil does not become exhausted by constant cropping, that the mineral plant food is always there, being reproduced as fast as it is absorbed by the crops. The cause of the failure of the soil to produce good crops is the formation of some chemical poison when one kind of crop is being continually grown. This idea naturally causes one's mind to consider lucerne-sick and clover-sick soils as containing such poisonous elements. To obtain confirmation of the new theory, Professor Whitney made systematic experiments, of which the following is a summary:—

"In order to test the idea, and find out if we were safe in announcing such a fact as this, so revolutionary as regards our former ideas, the Bureau of Soils has had parties in all parts of the State equipped with the most sensible methods for making these determinations in the field. We have taken out of the soil its own moisture, and have actually found similar quantities of phosphates of potash, of nitrates, and of lime, in the sandy soils of our truck region, in the 'worn out' soils of Virginia, in the fertile limestone soils of Pennsylvania, and in the black prairie soils of the West.

"We then went into the question of how much plant food is necessary; how strong a concentration the solution must have to support a growth of plants, and I may tell you investigators are not able to say how small the amount of phosphoric acid or of potash in the solution must become, if other conditions be maintained perfectly, before the plant will suffer. Plants have an extraordinary power for absorbing material from solutions. Take the case of the seaweed, from which iodine is extracted. Sea water has so little iodine that, although we have an exceedingly delicate method for the detection of iodine, we cannot discover it, even if we concentrate the water to a very small part of the original bulk; but the seaweed can get it and store it up in its tissues from that very diluted solution."

Other experiments were made, and all of them pointed to the same conclusion: The difference of yields between fertile and what was popularly regarded as "exhausted" soil was not due to a difference in the supply of available plant nutrients. The suspicion was born that the unproductiveness of so-called worn-out soils was due, not to the absence of anything necessary to the plant's growth, but to the presence of something deleterious to its growth.

Several experiments were begun to test this suspicion. It was found at the outset that young seedlings would grow better in pure water, containing no plant nutrients whatever, than in the extract of soil which, though unproductive, lacked in none of the nutrient substances. This result again forced the bureau back to the conclusion that the unproductivity of the soil was due to the presence of a poison. To determine whether the soil was poisoned, lampblack was mixed with soil extract and filtered off. Wheat seedlings planted in it then grew lustily, though in the same soil previously they had done nothing. Both their top and their root developments were improved astonishingly. The lampblack added no nutrient to the soil; its sole service was to disinfect.

That these poisons render the soil unproductive, or, to speak more accurately, prevent the full and healthy germination of a seed, the bureau found out, determined their qualities, and identified them. Tyrosin, which is a substance found in green manure, is the name of one of them, and cumarin that of another. It was found that pure water, when impregnated with tyrosin, even to the small degree of 50 parts to a million of water, killed wheat seedlings outright, and that they thrived in the ratio that the quantity of tyrosin was diminished.

The question whether the soil can be cleansed from these poisons in some other way than the use of fertilisers is answered by the American scientists in the affirmative. It can be met by a systematic rotation of crops, and this, they think, is the true remedy.

COTTON.

Texas, in the United States of America, is the greatest cotton-growing State in that country, and this is the way in which "The Cotton and Cotton Oil News," of Dallas, Texas, and Memphis, writes of the cotton plant:—

"What a royal plant it is! The world waits in attendance on its growth. The shower that falls whispering on its leaves is heard around the earth. The sun that shines on it is tempered by the prayers of all people. The frost that chills it and the dew that descends from the stars is noted, and the trespass of a little worm on its green leaf is more to England than the advance of the Russian army on her Asiatic outposts. It is gold from the instant it puts forth its tiny shoot. Its fibre is current in every bank, and when loosing its fleeces to the sun, it floats a sunny banner than glorifies the field of the humble farmer; that man is marshalled under a flag that will compel its allegiance of the world, and wring a subsidy from every nation on earth. It is the heritage that God gave to his people for ever as their own when He arched our skies, established our mountains, girt us about with the ocean, loosed the breezes, tempered the sunshine, and measured the rain. Ours and our children for ever. As princely a talent as ever came from His hand to mortal stewardship."

In connection with the cotton industry, Mr. E. E. Wood, of Childress, Texas, who is now visiting Queensland in the interest of manufacturers of cotton and other machinery, himself an expert in cotton culture, &c., says that we have in Queensland soil and climate equal to, if not better than, any like conditions in Texas or anywhere else in the States, and he reasonably wonders why Queensland farmers, as a body, do not take up an industry (which is purely a white labour industry), which would pay them better than wheat, maize, or potato-growing, and even better than dairying.

NAPHTHALENE *v.* CARBON-BISULPHIDE FOR PROTECTING MAIZE FROM WEEVILS.

Some very interesting and conclusive experiments in preserving maize in bins were made in October, 1912, on the Pusa Farm, Behar, India, by Mr. A. J. Grove, M.Sc., Officiating Imperial Entomologist, at the instance of the Imperial Agriculturist. The full account of the experiments was published in the "Agricultural Journal of India," as follows:—

The maize was stored in large cylindrical bins 6 ft. high and 3 ft. in diameter, with a closely fitting lid, and holding between twenty-five and thirty maunds (625 and 750 lb.) of maize each. In all, nine bins were used, eight of which A_1, A_2—D_1, D_2, were carefully fumigated with carbon bisulphide and the last (E) left unfumigated. The bins were charged in the following way, the tests being made in duplicate, except the last:—

Bins A_1, A_2—Unfumigated Maize.

Bins B_1, B_2—Unfumigated Maize with Naphthalene.

Bins C_1, C_2—Fumigated Maize.

Bins D_1, D_2—Fumigated Maize with Naphthalene.

Bins E—Unfumigated Maize in an unfumigated bin.

Bins A would act as a control to B, C, and D, and bin E to all the others.

The fumigation was in each case done with carbon bisulphide at the rate of 5 lb. per 1,000 cubic ft. The naphthalene was put in at the rate of 1 lb. of flake naphthalene per bin; this quantity being divided into four equal parts and wrapped up in fine muslin, and one package placed in one-quarter of the way up the bin, one half-way, one three-quarters of the way, and one at the top.

The bins were all carefully sealed around the lid and down the seams with a mixture of white wax (1 part), fat (1 part), resin (6 parts), melted together and applied hot, and were stored in the farm godown.

In addition to these bins a complementary experiment was started in the laboratory, glass stoppered bottles, each holding 300 grms. of maize, being used and 3 grms. of naphthalene tied up in muslin for those bottles which were charged with naphthalene.

The bins were then left undisturbed until March, 1913, when some of the maize was required for feeding cattle, and consequently bins A_1, B_1, C_1, D_1, and E were opened and examined, and bins A_1—D_1 emptied, but bin E again closed and sealed. At that time not much damage was noticeable, as during the cold weather the insects are not very active. A few moths (*Sitotroga*) were found at the top of bin A and a large number in bin E, but examination of samples taken from bins A—D failed to reveal any of the beetles which are generally lumped together under the name "weevil." The remainder of the bins were left undisturbed until 24th July, when 100 grains were taken out for a germination test, the bins afterwards being closed and sealed.

About this time also the bottles kept in the laboratory began to show results. The bottles corresponding with bins A_1, A_2 showed that insects were active inside them. Numbers of specimens of moths (*Sitotroga*) could be seen and quantities of dust and frass had collected at the bottom. The bottles corresponding to bins B_1, B_2, C_1, C_2, D_1, D_2, showed that the grain was being preserved successfully, no signs of insect attack being visible.

The final examination of the bins was made on 29th September, 1913. Bin A was found to be badly affected with "weevils" at the top and also a few moths. In Bins B, C, and D the grain looked quite good. Bin E was, as one would naturally expect, badly attacked. Samples were taken from the top, middle, and the bottom of each bin, and 100 grains cut open and examined, with the following result:—

Sample.	Bin. No.	Insects Found.
Upper sample	A_2	15 *Rhizopertha dominica.* 2 *Tribolium ferrugineum*
Middle sample	A_2	6 *R. dominica*
Bottom sample	A_2	2 *R. dominica.* 1 *T. ferrugineum*
Upper sample	B_2	1 *T. ferrugineum* dead
Middle sample	B_2	2 *T. ferrugineum*
Bottom sample	B_2	1 *R. dominica*
Upper sample	C_2	1 *Calandra oryzæ* dead
Middle sample	C_2	2 *T. ferrugineum*
Bottom sample	C_2	7 *T. ferrugineum*
Upper sample	D_2	Nil
Middle sample	D_2	Nil
Bottom sample	D_2	2 *T. ferrugineum* dead
Upper sample	E	13 *T. ferrugineum.* 2 *C. oryzæ.* 3 *R. dominica*
Middle sample	E	3 *C. oryzæ*
Bottom sample	E	1 *C. oryzæ.* 4 *R. dominica*

Of the beetles found it must be remembered that only *Rhizopertha dominica* and *Calandra oryzæ* actually damage the grains. *Tribolium ferrugineum* lives merely in the dust which is always to be found amongst grain. From the table it will be seen that the bin B_2, which contained ordinary maize and naphthalene, compares very favourably with the bin C_2, which contained maize fumigated with carbon bisulphide, the condition of both lots being very good.

It then remained to be seen whether the naphthalene had any effect upon the maize which would render it unsuitable as food for cattle. When the bins were opened in March, maize, which had been stored with naphathalene, was spread in the sun for four hours, crushed, and fed to one bullock. [It has been found, however, that a little naphthalene is left behind, and it is probably better to expose the grain for from six to twelve hours.] The animal ate up the whole quantity, and was not affected in any way. This was repeated when the remainder of the bins were opened in September, with the same result. It is therefore clear that if the naphthalene is allowed to evaporate, it has no deleterious effect upon the grain from the point of view of fodder.

The bottles kept in the laboratory were also examined, with the following result:—

Bottle.	Contents.	Insects Found.
A_1	300 grms. unfumigated maize	191 specimens *Calandra oryzæ*
A_2	Ditto ditto	126 moths
B_1	300 grms. unfumigated maize and 3 grms. naphthalene	Nil
B_2	Ditto ditto ...	Nil
C_1	300 grms. fumigated maize	Nil
C_2	Ditto ditto	Nil
D_1	300 grms. fumigated maize and 3 grms. naphthalene	Nil
D_2	Ditto ditto ...	Nil
E	300 grms. unfumigated maize	164 moths

It seemed also desirable to test whether storing with naphthalene would have any effect on the germinative capacity of the grain. Accordingly, germination tests in dishes were made, with grain from the bins and also from the bottles, the results being as follows:—

Sample.		No. of Grains Taken.	No. of Grains Germinated.	Percentage.
Bin A_2	Upper	200	27	13·5
	Middle	200	169	84·5
	Lower	200	166	83
Bin B_2	Upper	200	178	89
	Middle	200	183	91·5
	Lower	200	174	87
Bin C_2	Upper	200	185	92·5
	Middle	200	178	89
	Lower	200	186	93
Bin D_2	Upper	200	174	87
	Middle	200	182	91
	Lower	200	179	89·5
Bin E	Upper	200	2	1
	Middle	200	Nil	Nil
	Lower	200	Nil	Nil

Sample.	No. of Grains Taken.	No. of Grains Germinated.	Percentage.
Bottle A_1	200	141	70·5
,, A_2	200	Nil	Nil
,, B_1	200	184	92
,, B_2	200	166	83
,, C_1	200	191	95·5
,, C_2	200	192	96
,, D_1	200	188	94
,, D_2	200	189	94·5
,, E	200	1	·5

The grains which were taken from the bins on 24th July were sown in the Insectary compound, and the number of plants which appeared counted. The result is as follows:—

Out of 100 grains from bin A_2 85 grains germinated
,, ,, ,, B_2 83 ,, ,,
,, ,, ,, C_2 92 ,, ,,
,, ,, ,, D_2 91 ,, ,,
,, ,, ,, E 80 ,, ,,

The sowing was too late, however, for the plants to mature properly.

A comparison of all the results recorded above shows that storing with naphthalene is practically as effective as fumigation with carbon bisulphide, that it has no bad effect on the grain from the point of view of its suitability as food for cattle, and also does not alter the germinative capacity to any appreciable extent. It is therefore a much more suitable compound to use for preserving grain than carbon bisulphide, its advantages over that insecticide being:—

(1) It is quite easy to use. Carbon bisulphide is an extremely volatile liquid, and the vapour when mixed with air forms a very explosive gas. This necessitates extremely careful use, as in inexperienced hands it may prove dangerous.

(2) No special apparatus is required, the only precaution necessary is that the naphthalene should be enclosed in muslin or some such porous material to prevent it becoming mixed up with the grain. With carbon bisulphide a special fumigating house is essential, and this is costly to build.

(3) The cost is much less. This is very important. Flaked naphthalene costs Rs. 16s. a cwt., or, says, 3 annas a lb. The charge used was 1 lb. per bin holding twenty-five maunds (1 maund = 25 lb.), and of this after eleven months only about a half had evaporated (in bin B 23¼ tolas (80 tolas=2 1/7 lb.) were left, and in bin D_2 23 tolas). For the fumigation of the maize used in this experiment—that is to say, roughly, 100 maunds—7 lb. of carbon bisulphide were required, the fumigating house only accommodating about sixty maunds at a time, and the charge for the house at 5 lb. per 1,000 cubic ft. being 3½ lb. The cost of this alone, exclusive of the additional cost of labour required to cart the grain to the fumigating house and then back to the store, was about Rs. 7s., the cost of carbon bisulphide being Rs. 12s. a gallon. The charge of naphthalene for a similar quantity of maize would be 4 lb., of which only a half would be expended, and the cost of which would be 12 annas.

(4) The effect is continuous, as the naphthalene is stored along with the grain. The effect of fumigating with carbon bisulphide is to kill all the insects, larvæ, and eggs in the grain at the time, but after fumigating the carbon bisulphide must be allowed to evaporate, and any insects which found access to the grain could breed unchecked. The effect of the naphthalene is constantly to keep the insects in check. This is proved from a comparison of bins or bottles A and B, which contained exactly similar grain, and, from the condition of A at the end of the experiment, must have contained insects at the time of storing. The insects in A bred unchecked, whereas in B they were not able to do so, with the result that the grain in B was as good as that in C, in which the insects were all killed by the carbon bisulphide, and insects prevented as far as possible from gaining access to the grain.

The use of naphthalene, then, is a simple way in which grain kept for fodder and for other purposes may be preserved from damage by insects, the only things to be remembered being that the naphthalene should be prevented from becoming mixed with the grain,* by enclosing it in muslin, and that the grain should be exposed in the sun for from six to twelve hours before feeding to the cattle.

PICKLING WHEAT.

There are three methods of pickling wheat to destroy or prevent the germination of the spores of smut. The most commonly used pickles are:—(1) A solution of formalin; (2) Sulphate of copper (bluestone); (3) Plain hot water. The solutions are:—Bluestone at the rate of 1 lb. in 5 gallons of water, or formalin at the rate of 1 lb. in 40 gallons of water.

The seed, in either case, may be spread on a wooden floor, and the solution sprinkled over it, turning the grain over and over, either by shovelling or raking, so that all the grains become thoroughly wetted. The seed is then spread out to dry, and if left in a thin layer over night, it is ready for sowing in the morning. Instead of sprinkling, which is wasteful, dipping may be resorted to. A bushel or so is placed in a bag and dipped in the solution, taking care that all the grains are thoroughly wetted by shaking the bag and plunging it in and out. In the case of bluestone, only a minute or two is necessary for the dipping process, on account of its corrosive action; but, in the case of formalin, five minutes may be allowed and it is less injurious to the grain, the cost being about the same as for the bluestone process. Both processes are equally effective in destroying the smut germs. The bluestone solution may be used again and again, but formalin is volatile, and it follows, therefore, that only the amount of formalin should be prepared that is required for immediate use, and sprinkling, in this case, should be preferred to dipping. Formalin is poisonous and must be kept where there is no

* In this connection the use of naphthalene balls may suggest itself, but flaked naphthalene is cheaper, gives off vapour more easily, and above all, it is much easier to take out a package of muslin than to search for a number of loose balls which might easily be overlooked or broken up.

chance of children or others obtaining it in ignorance of its nature. One gallon of formalin solution is sufficient for 4 bushels of seed. For the hot water treatment, two boilers are needed, containing water at 120 deg. F. and 135 deg. F. respectively. A smaller vessel containing boiling water and an abundant supply of cold water should be at hand. The seed to be treated may be placed in a gunny bag or in a perforated kerosene tin. Plunge the vessel containing the grain into the first boiler (120 deg. F.) and move it about for a minute or two till the grain has all been warmed. Take care to keep up the temperature. Then plunge it into the second boiler (135 deg. F.). Leave it there for ten minutes, moving it about and agitating the grain. Then take it out and plunge it into cold water and then spread it out to dry, after which it is ready for sowing.

A leaflet on Pickling Wheat may be obtained from the Department of Agriculture and Stock.

LIME WATER.

Mr. H. Ross, in an article on the "Treatment of Seed Wheat for the Prevention of Bunt or Stinking Smut," in the "Agricultural Gazette of New South Wales" (2nd March, 1914), advises:—

"The action of the bluestone during the process of pickling is that it kills the tiny spores or seed of the bunt which adhere to the outside of the grain. Now, while bluestone has the power to kill these spores it has also the power to impair the vitality of the grain, and even to kill the germ. To guard against this the following measures should be observed. If there is no prospect of immediate germination—that is, if a "dry" sowing is made, the bluestoned wheat should, after having been allowed to drain for from ten to fifteen minutes, be dipped into a solution of lime water, which is made by stirring *½ lb. of freshly burnt lime into 10 gallons of water. This mixture is allowed to settle; then the clear lime water is decanted, and into this the bluestone-treated seed is dipped for from two to three minutes. The lime neutralises the effects of the bluestone, and so preserves the full vitality of the wheat germ. If, on the other hand, a "wet" sowing is made and an immediate germination of the seed is likely to follow, then there is little need to dip the bluestoned wheat into lime water.

"When using lime water care should be taken to make a fresh mixture now and again, as the constant dipping of the bluestone-saturated butts of wheat into the lime water will change this eventually from an alkaline into an acid solution, in which case it would be useless; and for that very reason bluestone and lime should never be mixed together in a solution used for pickling wheat.

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* Should it be found impossible to obtain freshly burnt lime, it is recommended that ½-lb. of slaked lime be mixed with 10 gallons of water, thus making milk of lime, into which the butts of the bluestoned wheat should be dipped for a period of from two to three minutes.

Milk of lime differs from lime water in so far that in the former the particles of lime are not dissolved but held in suspension, whereas in the case of clear lime water the particles are dissolved.

"The chief advantages gained from using lime water, in addition to bluestone, are: firstly, that a farmer following this practice is in a position to pickle all his seed wheat, say, in March, ready for sowing in April and May, without running any risk of the germination being affected; secondly, that a better germination will be obtained if the sown seed should lie in the ground for some time before rain falls and germination takes place.

"Little extra trouble is involved in the bluestone-lime treatment, and farmers are strongly advised to adopt this method in preference to the bluestone treatment only."

TOMATO SOILS.

Although the tomato can be and is largely grown on many different types of soil from heavy clay to light sand, there is no doubt that the soil which provide the best conditions for the culture of this fruit is a deep, fertile, sandy loam with a well-drained clay subsoil. An Indiana (U.S.A.) State Bulletin says that the highest yields are secured on sandy loam soils, well drained, and comparatively rich in plant food. On the heavier soils, the yields have not been so large as on the lighter types, although the tomatoes are usually more firm and meaty, which makes them better for canning. On lighter soils, as a rule, the fruits are more juicy and the meat is less solid. Then, again, the fruits of many varieties, especially the early ones, are smoother and more symmetrical when grown on sandy soils.

VEGETABLE GARDENING.

PURE SEEDS AND SEED-GROWING.

Complete success in vegetable gardening is not possible without good seed. Expert gardeners have always exercised great care in procuring good seed, although the significance of the subject has not been fully appreciated until recently, when the Pure Seeds Bill was introduced by the present Minister for Agriculture. "If," as Henderson states in "Gardening for Profit," "there is one thing of paramount importance in vegetable gardening, it is—purity of seed." And he spoke from his experience of a long and active life as a commercial grower.

Good seed must meet five requirements:—1. It must be true to name and not mixed. 2. The seed must produce the best type of the variety in question. The strain is by far the most important factor for consideration in obtaining seeds, although it has received comparatively little attention. 3. The seeds must be viable. That is, a high percentage should be able to grow under favourable conditions. 4. They must be free from weed seeds. 5. They must be free from impurities such as grit, sticks, or other foreign materials.

In the United States, seed supply houses were established in 1820, and these have since grown to mammoth establishments. The seed business is highly specialised, requiring the services of experts who understand the principles of plant breeding. The most reliable firms maintain extensive trial grounds where the seeds are tested before being sold. It is a means of protecting both the dealer and the buyer.

With respect to seed guarantees, several States in America have enacted laws to regulate the seed trade. Such laws have undoubtedly proved very valuable, but it is a very difficult matter to control by law. Legislation is imperatively needed more for farm seeds than for garden seeds, as impurities are seldom found in the latter. The difficulty with the former, even with reputable firms, is that errors in labelling may occur, and inclement weather may affect the vitality of the seeds, and unjust penalties might be imposed if legislation were too severe in this matter, as even the most reliable dealers may unintentionally make mistakes. Rules and regulations for official seed testing have been adopted by the Association of American Colleges and Experiment Stations.

The life of seeds depends upon: 1. The kind of vegetables. 2. The conditions under which they are grown. 3. Thoroughness of curing. 4. Storage conditions. In some years seeds lose their vitality more rapidly than in others. The figures in the following table relative to the longevity of vegetable seeds are conservative, for it is not best to place too much reliance upon tables of this character; the only certain means of determining the vitality of seeds is to make germination tests.

Professor Watts then supplies the following table showing the maximum ages of properly cured and stored vegetable seeds when they will be likely to germinate satisfactorily:—

	Years.		Years.		Years.		Years.
Artichoke ...	2	Celery ...	2	Lettuce ...	4	Pepper ...	3
Asparagus ...	2	Cucumber ...	5	Muskmelon ...	5	Radish ...	2
Bean ...	3	Eggplant ...	5	Okra ...	4	Salsify ...	2
Beet ...	4	Endive ...	2	Onion ...	1	Squash ...	3
Cabbage ...	3	Kale ...	2	Parsley ...	1	Tomato ...	5
Carrot ...	1	Kohlrabi ...	3	Parsnip ...	1	Turnip ...	4
Cauliflower ...	4	Leek ...	3	Pea ...	3	Watermelon ...	5

The following table, showing the average percentages of germination of one-year-old seed when planted under proper conditions, is given by Ralph L. Watts, Professor of Horticulture in the Pennsylvania State College, in his book on "Vegetable Gardening," 1912:—

	Per cent.		Per cent.		Per cent.		Per cent.
Asparagus ...	90	Celery ...	60	Okra ...	80	Salsify ...	75
Bean ...	90	Corn, Sweet ...	85	Onion ...	80	Spinach ...	80
*Beet ...	140	Cucumber ...	85	Parsley ...	70	Squash ...	85
Cabbage ...	90	Egg Plant ...	75	Parsnip ...	70	Tomato ...	85
Carrot ...	80	Lettuce ...	85	Pea ...	90	Watermelon ...	85
Cauliflower ...	80	Muskmelon ...	85	Radish ...	90		

* Botanically a fruit, often containing more than one seed.

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Pastoral.

SHEEP ON THE COASTAL AREAS.

LECTURE by MR. W. G. BROWN, Sheep and Wool Expert, at Beaudesert, 18th February, 1914.

For some years it has been thought that sheep have never had a fair trial on the coastal lands.

I am, of course, aware that they were tried many years ago and were found unsuitable. Since I have been appointed to my present position I have made close inquiry into the matter, and have concluded that under certain circumstances there is no reason why sheep should not do as well here as in any other part of Queensland.

My lecture to-night is to give these circumstances, and also reasons why sheep on the coast have failed in the past.

I was a witness on the Meat Commission two years ago, and was asked then if I thought that sheep would do well below the Range. I replied that I was not sufficiently acquainted with the conditions obtaining to give an answer either way. Since then I have, by observation and inquiry, learned a good deal of these conditions. Consequently, if I inform you why sheep have failed in the past, and further show that the factors which caused that failure need be taken little account of now, I shall have covered the whole ground in a general lecture such as this is to be.

If my conclusions are accepted as correct, and any of you present should be induced by them to try sheep, then I am at your service to give particular instruction at some future date.

I shall divide the lecture into two parts:—

First, a short statement of the reasons why I believe sheep farming failed in the past, and, secondly, my reasons for believing sheep will do very well under the altered conditions now obtaining on the coastal belt as far as Rockhampton.

Taking the first section of the lecture, it seems plain to me that one of the chief factors which caused the failure was the nature of the natural grasses which prevail over the whole of the coastal belt.

To begin with, these grasses grow, as a general rule, rank and coarse, and as it is well known that sheep thrive best on a "short bite," and prefer the fine grasses which in the early days were comparatively rare, they did ill for that reason. Then there is the spear-grass. When that grass is plentiful and in seed, it is impossible to keep sheep on it.

In the course of my inquiries as to the failure or otherwise of sheep on the coast, Major Boyd, Editor of the "Queensland Agricultural

Journal," informed me: "In 1880 William Landsborough, the celebrated explorer, against the advice of many practical men, put sheep on 2,000 acres of land at Caloundra. Within two years every sheep was dead, and the causes were spear-grass seed, stomach worms, and foot scald." These sheep too, were of Merino blood, an important thing to remember, as I shall show later on.

Another factor, and an important one, was the presence of stomach parasites—the wire worm (*Strongylus contortus*) and the bowel worm (*Oesophagostoma columbianum*). These were very prevalent, and probably are still, for they are often found in calves and other ruminants. These parasites, when food failed, caused very great losses, and mainly because in the early days little was known of the life history of these pests, and less was known of successful treatment. Another cause of failure, too, was the fact that the country was in a virgin state, and, on the whole, very ill-drained on the flats. For this reason, sheep running there were afflicted with "scald foot," misnamed "foot-rot." The latter disease does not exist in Queensland. Then there was scab, which caused a good deal of loss and trouble. That was a contributing cause of failure. This ends the list of causes which existed in the early days, and little wonder that sheep-masters then gave up the hopeless struggle, more especially when we remember how the cheap, healthy Western lands were discovered and stocked, and found to be admirably adapted to wool-growing. You are in a much better position for growing mutton and lamb, as I hope to show.

Having mentioned what I believe to be the chief causes of failure in the past, we come now to discuss whether they are operating now, or are likely to operate.

I shall take them in the order I have just given them, but before I do so I would like to point out that if you can successfully grow mutton and lamb on coastal areas (and I firmly believe you can), then you are in a very good position to supply much of the big demand (and which is a growing world's demand) for sheep and lambs, as compared with your brother farmers inland of the Great Dividing Range.

For one thing, you are very much nearer the ports where the big meat exporters have seen fit to place their works, and can thus send in your products within a very few hours. This is a very important advantage, for, aside from the waste in condition which a long railway journey entails, the animals can be delivered fresh from the pasture, in full bloom, so to speak, and are consequently more valuable. For another thing, your rainfall is more regular and abundant than that of the interior, starting from the foot-hills of the Range westward.

In the year ending 30th June, 1913, for instance, an average of about 49 in. fell in coastal areas right up to the Range, and every month gave its quota of from 1½ to 10 in. of rain. If you scan the tables of rainfall you will find that such an average is pretty nearly normal.

Now, then, we have seen that five causes operated in the past against the successful keeping of sheep on these areas on the coast side of the Great Dividing Range. They were:—

1. Unsuitability of natural grasses.
2. Parasitic diseases.
3. Scald-foot, misnamed "foot-rot."
4. Unsuitable sheep.
5. Low prices for wool, and a very limited market for mutton.

To these might be added the stocking up of the Western country.

In regard to the natural grasses of this area, there are grave objections against their use as sheep feed. First, they are rank and coarse, as a rule, and, as I said before, sheep love a "short bite." They do not willingly go into long grass, especially where it is wet. Then there is grass seed. All grasses, of course, have seed, but when I mention grass seed in connection with sheep, I mean those seeds which destroy the fleece or interfere with the wellbeing of the animal. There are several species which grow profusely on the coastal areas, which have seed deleterious to sheep. Chief amongst them are two varieties of spear-grass.

These grasses, when young, are excellent food, but when the seed comes there is nothing, excepting poisonous weeds, which will kill sheep more certainly. I have seen a pelt stripped from a newly-killed animal which was one mass of black, sharp-pointed grass seed. On the flesh side, the points of hundreds of these were protruding at least one-third of an inch, and the flesh of the poor brute had seeds sticking out, which had gone right through the skin into the body.

I was shearing a large number of sheep once with machines, and the flesh came away in pieces the size of half-a-crown, with the wool all over the bodies.

Therefore I say again that I believe that the natural grasses of the coast are unsuited to the keeping of sheep. Certainly, I have seen cases in the Emerald district where stocking heavily with sheep for two or three years eradicated this grass, but there were heavy losses in the meantime. The land was cheap. Even supposing, however, that the coastal grasses were as good for sheep as any of the Western grasses, the price of land has so risen that it will not pay to simply graze the land in its natural condition. The problem is a simple one, and can be solved by a boy of fourth class in school.

It is laid down as true that when land has risen above £2 10s. per acre in value, it cannot, in a series of years, be grazed successfully if it is only natural pasture, for this reason: There is not a great deal of land in Queensland or elsewhere which will feed one sheep on 1 acre of natural grass over a series of years. Even on such land, in its natural state, fat lamb-raising would be a precarious business, therefore the land would be used for wool-growing and the production of fairly good mutton.

On the average, a sheep will produce 6s. worth of wool per annum, and a possible 5s. worth of mutton, a gross return of 11s. per acre.

Supposing, then, that you have land worth, say, £5 per acre, and you are using it as grass land, then you are getting a gross return of 11 per cent. per annum, out of which has to come taxes, a living for yourself and family, interest on capital expended in the purchase of sheep, and a possible failure now and again when you have not made 5s. for mutton (the wool return would be fairly constant at 6s. per head), and all this on the best of land. The return would be too poor for a business man to consider. Thus, if you intend your land to be kept as grass land, you may certainly expect that the price will recede to grass land values—that is, not more than £2 10s. per acre.

The alternative is, I need hardly say, cultivation and mixed farming, and especially the feeding of sheep.

Now, what may you reasonably expect from sheep if you cultivate? All countries have, at one time or another, been faced with the problem of dealing with land which has become too dear for merely pastoral purposes.

The question is not whether you can afford to keep sheep on high-priced land, but whether you can afford to keep high-priced land without sheep.

The closely settled lands of Queensland have to deal with it now. In Britain there are kept 31,000,000 sheep which are fed on land worth from £20 to £30 per acre. In New Zealand, where the price of land is perhaps at its maximum, they fatten sheep and lambs on farms valued at upwards of £40 per acre, and are doing well. In Victoria and South Australia something the same is being done to-day, and I am confident that before many years the same thing will be done in Queensland, and especially on the coastal areas, where there is good land, a sufficient rainfall to grow anything, and almost complete immunity from sheep diseases, with an ideal climate for stock of all kinds, especially sheep.

To give all the particulars of feeding sheep would require half a dozen lectures, so I shall only give the bare outline of what has been done elsewhere, and one or two instances of what has been and is still being done in Queensland in the direction of systematic feeding of sheep.

First there is lucerne, the king of all sheep feed.

I shall quote an extreme case—that of Mr. Gatenby, at Forbes, in the drought of 1902. He stated at the Forbes Show, at the judges' dinner, that 200 acres of irrigated lucerne would feed 15,000 sheep, and the Minister for Agriculture, who was present, asked him if he could prove it. Mr. Gatenby said: "I will prove it by sustaining in good condition 75 sheep to the acre for four months, under any test imposed." The Minister sent an officer to Mr. Gatenby's farm, and the net result, to be short, was, as the officer reported to his Department: "The sheep were in a starving condition; the feed was cut and carted twice each day to them in the hottest months of the year; and 1,675 starving sheep were put in good condition on 22½ acres of irrigated lucerne, an average of 75 sheep per acre, for five months."

At North Yanko, N.S.W., again, sheep were pastured (feed not cut) to the number of fifteen sheep per acre, irrigated land. I know of at least three farms on the Darling Downs where five to six sheep were grazed on unirrigated lucerne for ten months, and recently on St. Helens, Pittsworth, the manager, Mr. Tait, fed twenty-four sheep to the acre (64 acres) on a mixture of rape, barley, and turnips, and fattened off nearly 2,000 sheep before the crop was eaten off or became too old. At Gatton College an average of about twenty sheep (ration sheep) to the acre was fed on about 7 acres of rape for months, last year. And so it is with many other fodders, which can be grown quite as well on the coastal areas as on the Darling Downs.

I have to get on to the other factors, so I will conclude this section of the lecture by quoting the experience of Mr. Frank Anderson, Clifton, Darling Downs. For twenty years Mr. Anderson has fattened sheep and bred fat lambs, and for the past fourteen years has averaged 10s. per head (four months old) on the ground for his lambs. His own evidence under oath before the Meat Commission is as follows:—

The experience of one very successful and practical sheep-farmer may be given here. I had it from his own lips, and saw, just before the rain came in June, 1912, 426 fat lambs sold on his farm for 11s. each. They were about five months to six months old. All through the dry spell he was selling fat lambs and sheep at regular intervals. His method is as follows:—He bought Merino ewes to begin with. These had 70 per cent. of lambs at foot by Merino rams. Immediately on their arrival at the farm, he put Leicester rams to the ewes, and a little later, sold the weaned lambs for 5s. each. Five or six months later, he had a very good drop of crossbred lambs, about 80 per cent.; and five months later again, he sold these for an average of 10s. each on the ground. The net result was:—

	£ s. d.	£ s. d.
1,200 Merino ewes (lambs given in), at 15s.	..	900 0 0
70 per cent. Merino lambs sold, 840 at 5s. each	210 0 0	
Fleeces off ewes, 1,200 at 5s. each	300 0 0	
80 per cent. of crossbred lambs, 960 at 10s. each	480 0 0	
1,190 ewes fattened off, and sold at 12s. each	714 0 0	1,704 0 0
Balance credit on transaction		£804 0 0

This was done on about 400 acres of lucerne; and besides this, expenses of cultivation, &c., were more than covered by sales of surplus hay at the drought prices ruling last autumn. The thing was done, and these results put on record before the Meat Commission, where the gentleman in question gave most important evidence in regard to the fat lamb business. It is not a fancy picture. This is only one year's experience, in a year when most farmers in the same neighbourhood lost heavily owing to dry weather. Other years showed still better results, he tells me. It will be noticed that he bred and sold, as fat lambs, the *first* cross, and had not the slightest difficulty in disposing of them.

I must leave this part of the subject just now, as there are several other matters on which I must speak, yet to be dealt with, and time is limited.

The next thing we have to consider, which caused a good deal of loss in the past, is parasitic diseases. Scab need no longer be considered, as Australasia generally has been free from that pest now for very many years. There are other two parasites, however, still existing. They are the Wire Worm (*Strongylus contortus*) and the Intestinal Nodule Worm (*Oesophagostum columbianum*), both of which are prevalent over a good deal of Queensland.

Much progress has been made in the study of parasites in the past twenty years, and the life history of these is complete in many cases. The wire or stomach worms, it is now known, lay their eggs in the bowels, and these eggs pass out in the excreta, and there lie dormant until sufficient heat and moisture are present to hatch them out. According to Neumann, the temperature must not be below 45 degrees, and there must be considerable humidity. The worms moult three or four times, and then climb up the stalks of grass and lie there until the sheep or cattle come along and nip them off with the grass. The worms, which on infested country exist in myriads, make their way to the fourth stomach and there abide, living on blood drawn from the veins of the stomach, then they lay their eggs and the process begins again. It is known that a 1 per centum solution of salt will kill them, consequently all farmers who keep sheep or cattle should supply salt to their stock, giving them as much as they will take

It is known, too, that if ruminants be taken off country for about fifteen months, the worms will die out for want of a host. Horses may be grazed, however.

There are many medicines which will kill worms in sheep, but it is waste of time to kill the worms in the sheep if the animals are put back on infested country. That is why practical men everywhere are agreed that a holding should be split up into small paddocks (10 acres is not too small), and a rotation established whereby paddocks shall have a spell. With cultivation, much of the danger of infection disappears, and as cultivated fodders have a big food value, the worms do not do the same amount of harm as if the sheep were ill-fed. A homely illustration will make my explanation clearer.

If we look upon the sheep as keeping a boarding-house for worms, and the worms are getting the best of the food in the form of blood, we can understand that while the sheep can keep itself in good condition, and also keep up the food supply to the worms, there is little harm done to the animal beyond some discomfort. The minute, however, food supplies go off or fail, then the boarders get more than their fair share of food, and the sheep dies later on, literally of anæmia or starvation. Therefore, if we feed the sheep well, give them plenty of salt, do not overstock the paddocks, keep one or two paddocks in reserve with no sheep or cattle in them, rest assured that wire worms will give little trouble other than a bluestone drench will cure.

Almost the same can be said of the nodule worm. It is not so hard on sheep as the wire worm. It inhabits the last gut of the bowels, and may be found in the centre of cheese—like lumps along and attached to the bowel.

With regard to so-called foot-rot, that is only found in Queensland if the sheep have been running for weeks on wet, swampy, ill-drained lands. In wet weather it is always advisable to put them on dry ridgy country, and every holding should have a dry ridge, or sandy country at least, in case of excessive rain. The true foot-rot, which is infectious, does not exist in Queensland, I am glad to say. That is an almost negligible disease, and even if scald-foot be present, the shifting of the sheep on to dry country will cure the animals.

Now we come to another question. I understand that in the past, with very few exceptions, the sheep running on the coastal areas were Merinos. Merinos in their pure state are not farmers' sheep. In the first place, they mature much more slowly than the British breeds. They are more delicate in constitution than British breeds, because they are daintier feeders. Their habitat is the dry Western pastures, and are primarily a wool-bearing animal. A farmer should breed or feed primarily for mutton. Yet because the Merinos have such valuable wool, and have the power to transmit to their progeny by a British sheep their good qualities, it has become a fixed practice in Australasia to have at least one quarter of the blood of the farmers' sheep Merino.

The Merino is more susceptible to the attack of worms than the British sheep, cannot stand so much moisture or wet conditions, and, as they move about in mobs, while the British or cross-bred sheep scatter on a pasture, destroy much more food than they eat. We conclude therefore that pure Merinos must not be cultivated on farm lands. It is little wonder that this breed did so ill for the pioneers on the coastal lands. In regard to that phase of the matter we are discussing, the time is coming when the Merinos, and perhaps the cross-breds too, will be bred on the dry sound country for the farmers of the coast, who, with their splendid land and regular rainfall, can grow feed in enormous quantities, and so be able to fatten sheep within a few hours' travel of what is growing into a very big market.

The pioneers, too, must have been discouraged at the want of an adequate market for the survivors of their flocks when disease and unsuitable food had done with them. Nowadays there is an unlimited market abroad. The freezing processes guarantee that the meat shall arrive at the other side of the world as fit for consumption almost as the day it was killed. Besides that, as was pointed out in Dalgety's Review last year, since 1895 the meat-eating and wool-consuming people of the world have increased by 119,000,000, while the expansion since then can only provide for 65,000,000. That is why wool prices are high, keeping high, and increasing, and we householders know what is happening in the meat trade when our monthly bills come in. The world is hungry for meat, and expansion is limited in its production.

The cheap, sound, Western country is going to supply you farmers who possess high-priced land on which you can grow unlimited sheep feed, with healthy stock to fatten, or, if you prefer it, you will be able to breed and fatten lambs for export.

To sum up the whole matter, I can see absolutely no reason why you cannot take on sheep. Try a few, and see how little trouble they are. Even if you have little or no experience, the Department will be only too pleased to give you instruction—not talk, put practical instruction on your own farms. Lectures such as this have a certain amount of value, but nothing equals the lessons given with the sheep before you.

Now I shall give you shortly what I consider to be essentials to the successful keeping of sheep. I am assuming good land. First of all, you must have sheep-proof fences. Nothing is so annoying to a man as to see his sheep getting free board in his neighbours' crops. What his neighbours feel about it is another matter. Existing fences can be made sheep-proof with 24-in. cheap netting at a cost of about £12 per mile.

As soon as you can, subdivide your paddocks. Twenty-five acres is a comfortable size for working. Ten acres is not too small.

Find out the carrying capacity of your land, and keep well below it. Five well fed sheep will pay better than eight underfed.

Give your sheep as much salt as they will take. They will not take more than they require. Rock salt is all right, but coarse salt is better.

If you are going to breed fat lambs, get big, plain, roomy ewes, and do not buy somebody's cast-off rams. Go to a good breeder and buy young rams of the breed you want. You will be put in the way of getting good advice on those points in the Department. Do not think there is any mystery in the business. Plain common sense is what is required. Knowledge will come with experience.

Do not buy very old ewes, for if you want to part with them for any reason, people want to look at their mouth, and if they have nothing to eat with, well—no buyer. In short, see that they have sound mouths. If you fear dogs, put a bell on about one sheep in fifty, and see that you do not bell mates, for the bells will not be distributed. A dog-proof fence, of course, would be better, but that will come later when you see that profits will warrant. You may yard them every night until your paddocks are dog proof. Do not arrange that lambs shall fall five months later, trusting Providence that there will be feed for them. Keep feed in reserve. Sheep require very little to give a handsome return, and the wool is growing night and day at the rate of 6d. per month on average quality sheep.

Watch that your sheep do not get pale skin, pale tongue and lips, bluish-white eyes, and, in later stages, a swelling under the chin. If they are like that, they have taken in boarders who are eating them out. They are overstocked with worms. Communicate with the Department at once, and they will deal with the worms for you.

Interest the children in the sheep. I have found that boys and girls on a sheep farm know more about sheep after awhile than the elders. They take more kindly to sheep than to any other animal on the farm.

If your sheep are doing ill, or are sick, send to the Department. No country on earth has so short a list of sheep diseases at Queensland, so you will not be troubled very much, nor will you have to trouble anybody else.

Remember that sheep always improve country; 90 per cent. of what they eat goes back to the land in the form of one of the very best of manures. It is thinly and evenly scattered over the land, and ground up with sharp toes, so that the rain washes it in. The ancients called the sheep "Golden Toe," and with reason. Remember, too, that sheep eat anything on the farm in the form of weeds, and are used in England and elsewhere to clean the fallows. There is no better destroyer of weeds on a farm than sheep. It pays to shelter sheep either from the sun or from the rain. Do not let your rams run with the flock for more than six or eight weeks. This ensures evenness in size of lambs—a most desirable thing.

Sheep like a change, if even the new paddock be as bare as the former one out of which they came.

There are a lot of other things to know, but those I have mentioned are essentials.

And now I shall be pleased to answer any question, as I look upon the questions at the end of my lectures as being really more than the lectures themselves.

Differences in management, location, fluctuations in prices, and accidents are apt to upset the most careful calculations.

THE USEFUL TOAD.

"Garden and Field" says that cut flowers will last longer if the stems are split up about an inch before putting them in water. Maidenhair fern will last longer if, when it is gathered, the stems are inserted in boiling water and allowed to stand in it until the water is cold before arranging in vases.

Another confirmation of our contention as to the value of toads in the garden and bush- and hot-houses comes from the same source.

Toads are most useful reptiles, and devour thousands of small insects that would otherwise eat up the vegetation. Gardeners well know this when they turn them into the hothouses. An English gardener gives the following testimony:—"In the autumn of last year a pit wherein I grew melons was so much infested with ants as to threaten the destruction of the whole crop, which they did first by perforating the skin, and afterwards eating their way into the fruit; and after making several unsuccessful experiments to destroy them, it seemed to me that I had seen the toad feed on them. I accordingly put half a dozen toads into the pit, and in the course of a few days hardly a single ant was to be seen.

It should be noted that toads, although very ugly, are perfectly harmless.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF FEBRUARY, 1914.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Bee ...	Jersey ...	7 July, 1913	679	6·2	47·64	
Glen ...	Shorthorn...	27 Oct. ,,	778	4·8	42·63	
Butter ...	,, ...	27 Sept. ,,	752	4·9	41·57	
Daisy ...	Holstein ...	14 Feb. ,,	737	4·8	39·87	
Honeycombe	Shorthorn...	7 June ,,	691	5·1	39·81	
Lavinia's Pride	Ayrshire ...	11 Dec. ,,	817	4·2	38·43	
Madame Melba	Holstein ...	10 Nov. ,,	974	3·5	37·80	
Pauline ...	Shorthorn...	8 Oct. ,,	680	4·9	37·59	
Bluebelle ...	Jersey ...	13 July ,,	530	6·1	36·37	
Nellie II. ...	Shorthorn...	5 June ,,	757	4·2	35·61	
Lady Loch...	Ayrshire ...	31 Aug. ,,	811	3·8	34·34	
Burton's Lady	Shorthorn...	23 June ,,	584	5·1	33·66	
Miss Bell ...	Jersey ...	25 Sept. ,,	581	5·1	33·48	
Miss Jean ...	Ayrshire ...	13 Jan. ,,	692	4·2	32·55	
Miss Lark ...	,, ...	27 Dec. ,,	680	4·1	31·19	
Conscience...	,, ...	20 Jan., 1914	661	4·2	31·09	
Queen Kate	,, ...	4 Jan. ,,	810	3·4	30·48	
Lady Margaret	,, ...	26 Mar., 1913	507	5·3	30·43	
Burton's Lily	Shorthorn...	29 Dec. ,,	678	4·0	30·29	
Countess of Brunswick	,, ...	22 July ,,	534	4·9	30·01	
Silver Nell ...	,, ...	26 Sept. ,,	616	4·3	29·70	
Sweet Meadows	Jersey ...	20 Aug. ,,	324	7·8	29·0	
Cocoatina ...	,, ...	19 May ,,	661	4·2	28·46	
Miss Melba	Holstein ...	22 Jan., ,,	636	3·9	27·67	
Miss Edition	Jersey ...	19 July ,,	380	6·2	27·36	
Lonesome ...	Ayrshire ...	26 Oct. ,,	565	4·3	27·24	
Lennie ...	,, ...	1 Sept. ,,	625	3·9	27·19	
Gem ...	Shorthorn...	8 Aug. ,,	555	4·3	26·76	
Rosine ...	Ayrshire ...	27 Nov. ,,	669	3·6	26·76	
Bella ...	,, ...	16 Dec. ,,	581	4·1	26·65	
Auntie ...	,, ...	15 July ,,	404	5·1	23·28	
Miss Morton	Shorthorn...	14 Oct. ,,	579	3·6	23·16	
Lilley ...	,, ...	2 Jan. ,,	391	4·6	20·22	

Fed on natural grasses, with an added ration of 40 lb. of sorghum ensilage per head per day.

NEW TUBERCULIN TEST.

According to a Canadian paper, the tuberculosis test used by the British Columbian authorities is a comparatively new one known as the intradermal test, from the fact that it is introduced between skin layers and has no effect whatever on the temperature, for testing purposes at any rate. Under the old mode of testing, known as the thermal test, the experts introduced a tuberculin, and then took the temperature of the beast being examined. Whether it had tuberculosis or not largely depended, according to the inspectors, upon the rise in temperature immediately after the first injection. No further injection could make any difference in temperature for some time, until the effects of the initial one had worn off. This test is believed to be a good one when in the hands of careful men.

The new test employed by the Department, however, is realised as probably the best in use on the American continent. The Dominion Government authorities are now examining it with a view of using it for all Dominion Government work of this nature, and several States across the line are said to be on the point of adopting it. It is claimed to be unfailing.

The inspector takes a small amount of tuberculin and injects it between two layers of skin on the animal. The reaction in diseased animals is manifested in an enlargement at the point of injection. No temperatures are taken at all, and thus all danger of causes other than tuberculin influencing a reaction are obviated. An expert can work five times as rapidly with this test as with the old style one.—" New Zealand Farmer."

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

Date.	January.		February.		March.		April.	
	Rises.	Sets.	Rises.	Sets	Rises.	Sets.	Rises.	Sets.
1	4·56	6·46	5·21	6·42	5·41	6·20	5·57	5·47
2	4·57	6·46	5·21	6·42	5·41	6·19	5·58	5·46
3	4·58	6·46	5·22	6·41	5·42	6·18	5·58	5·45
4	4·59	6·46	5·23	6·41	5·42	6·17	5·59	5·43
5	4·59	6·46	5·24	6·40	5·43	6·16	5·59	5·42
6	5·0	6·47	5·24	6·39	5·44	6·15	6·0	5·41
7	5·1	6·47	5·25	6·39	5·44	6·14	6·0	5·40
8	5·1	6·47	5·26	6·38	5·45	6·13	6·1	5·39
9	5·2	6·47	5·27	6·37	5·45	6·12	6·1	5·38
10	5·3	6·47	5·28	6·37	5·46	6·11	6·2	5·37
11	5·4	6·47	5·28	6·36	5·46	6·10	6·2	5·36
12	5·4	6·47	5·29	6·35	5·47	6·9	6·3	5·35
13	5·5	6·47	5·30	6·35	5·47	6·8	6·4	5·34
14	5·6	6·47	5·31	6·34	5·48	6·7	6·4	5·33
15	5·7	6·47	5·31	6·33	5·49	6·6	6·5	5·31
16	5·8	6·47	5·32	6·32	5·49	6·4	6·5	5·30
17	5·9	6·47	5·33	6·31	5·50	6·3	6·6	5·29
18	5·9	6·47	5·33	6·30	5·50	6·2	6·6	5·29
19	5·10	6·47	5·34	6·30	5·51	6·1	6·7	5·28
20	5·11	6.47	5·35	6·29	5·51	6·0	6·7	5·27
21	5·12	6·46	5·35	6·28	5·52	5·59	6·8	5·26
22	5·13	6·46	5·36	6·27	5·52	5·58	6·8	5·25
23	5·13	6·46	5·37	6·26	5·53	5·57	6·9	5·24
24	5·14	6·45	5·37	6·25	5·53	5·56	6·9	5·23
25	5·15	6·45	5·38	6·24	5·54	5·54	6·10	5·22
26	5·16	6·45	5·39	6·23	5·54	5·53	6·10	5·21
27	5·16	6·44	5·39	6·22	5·55	5·52	6·11	5·20
28	5·17	6·44	5·40	6·21	5·55	5·51	6·11	5·19
29	5·18	6·43	...	...	5·56	5·50	6·12	5·18
30	5·19	6·43	...	...	5·56	5·49	6·12	5·18
31	5·20	6·43	...	...	5·57	5·48	...	...

PHASES OF THE MOON.

			H.	M.	
4 Jan.	☾	First Quarter	11	9	p.m.
12 "	○	Full Moon	3	9	"
19 "	☽	Last Quarter	10	30	a.m.
26 "	●	New Moon	4	34	p.m.
3 Feb.	☾	First Quarter	8	33	p.m.
11 "	○	Full Moon	3	35	a.m.
17 "	☽	Last Quarter	7	23	p.m.
25 "	●	New Moon	10	2	a.m.
5 Mar.	☾	First Quarter	3	3	p.m.
12 "	○	Full Moon	2	18	"
19 "	☽	Last Quarter	5	39	a.m.
27 "	●	New Moon	4	9	a.m.
4 Apr.	☾	First Quarter	5	41	a.m.
10 "	○	Full Moon	11	28	p.m.
17 "	☽	Last Quarter	5	52	"
25 "	●	New Moon	9	22	"

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, FEBRUARY, 1914.

Three thousand six hundred and forty-three eggs were laid during the month. With the exception of the three leading pens and the Black Orpingtons, all the pens are more or less in heavy moult. Some have from one to three birds nearly through the moult, while Stephens's and Zahl's pens are all in moult, so that we do not anticipate very heavy laying during March. Black Orpingtons (No. 2) owned by R. Burns win the monthly prize with 121 eggs. It looks like a great tussle between Padman and Moritz Bros., only two eggs separating these two pens, and each laid 26 eggs during the last week. The following are the individual records:—

Competitors.	Breed.	Feb.	Total.
A. H. Padman, S.A.	White Leghorns ...	109	1,442
Moritz Bros., S.A.	Do.	117	1,440
J. R. Wilson	Do.	85	1,401
Loloma Poultry Farm, N.S.W.	Do.	106	1,396
T. Fanning	Do. (No. 2)	98	1,380
Range Poultry Farm	Do.	87	1,339
R. Burns	Black Orpingtons (No. 2)	121	1,337
E. A. Smith	White Leghorns (No. 2)	112	1,326
O.K. Poultry Yards	Do.	74	1,318
J. F. Coates	Do.	91	1,293
T. D. England	Do.	78	1,286
H. Tappenden	Do.	97	1,270
R. Burns	Black Orpingtons (No. 1)	102	1,268
W. D. Bradburne, N.S.W.	White Leghorns ...	97	1,262
S. E. Sharpe	Do.	90	1,262
F. McCauley	Do.	93	1,260
Jas. McKay	Do.	104	1,257
Mrs. Munro	Do.	102	1,254
E. A. Smith	Do. (No. 1)	103	1,251
J. Zahl	Do.	59	1,246
A. T. Coomber	Do.	70	1,236
Cowan Bros., N.S.W.	Do.	82	1,228
A. F. Camkin, N.S.W.	Do.	105	1,225
Doyle Bros., N.S.W.	Do.	86	1,222
Yangarella Poultry Farm	Do.	90	1,215
Mrs. Sprengel, N.S.W.	Do.	82	1,213
H. Hammill, N.S.W.	Do.	85	1,206
Mrs. Craig	Do.	104	1,176
T. Fanning	Do. (No. 1)	92	1,175
J. Murchie	Brown Leghorns ...	95	1,169
R. Jobling, N.S.W.	White Leghorns ...	88	1,169
C. Leach, N.S.W.	Do.	95	1,157
J. Archibald, N.S.W.	Do.	94	1,151
D. Grant	Do.	69	1,135
J. Gosley	Do.	75	1,120
A. C. Collis, N.S.W.	Do.	96	1,088
Mrs. Bieber	Brown Leghorns ...	88	1,082
A. Schbrowski	Do.	64	1,069
T. Stephens, N.S.W.	White Leghorns ...	68	1,063
J. Andersen, Victoria	Red Sussex	90	1,045
Totals	...	3,643	49,432

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF FEBRUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING FEBRUARY, 1913 AND 1914, FOR COMPARISON.

Divisions and Stations.	Average Rainfall. Feb.	Average Rainfall. No. of Years' Records.	Total Rainfall. Feb., 1914.	Total Rainfall. Feb., 1913.
North Coast.	In.		In.	In.
Atherton	10·10	11	7·27	21·06
Cairns	14·69	25	17·42	13·90
Cardwell	16·13	25	15·25	23·83
Cooktown	11·79	25	17·02	18·67
Herberton	7·59	25	6·68	12·57
Ingham	15·34	20	17·84	11·66
Innisfail	21·48	25	21·05	32·73
Mossman	16·47	5	18·23	25·95
Townsville	11·83	23	4·76	13·27
Central Coast.				
Ayr	10·17	25	3·15	11·62
Bowen	9·33	25	3·91	10·75
Charters Towers ...	3·98	25	0·97	7·96
Mackay	12·14	25	4·41	24·13
Proserpine	10·63	10	12·66	14·21
St. Lawrence ...	8·98	25	4·64	13·97
South Coast.				
Crohamhurst ...	15·71	20	22·05	8·38
Biggenden	3·72	14	4·27	4·25
Bundaberg	6·81	25	3·40	5·36
Brisbane	6·55	63	3·20	5·06
Childers	6·02	17	6·34	5·47
Esk	6·07	25	4·46	1·94
Gayndah	4·28	25	2·85	7·70
Gympie	7·04	25	6·83	3·91
Glasshouse M'tains	...	...	23·94	9·44
Kilkivan	5·85	25	3·85	3·18
Maryborough ...	6·85	25	11·95	5·61
South Coast—continued:	In.		In.	In.
Nanango	4·95	25	3·36	5·89
Rockhampton ...	8·57	25	2·77	7·02
Woodford	9·90	25	10·32	4·92
Yandina	13·20	19	13 37	7·19
Darling Downs.				
Dalby	2·89	22	0·69	3·57
Emu Vale	2·28	17	5·54	0·40
Jimbour	3·72	24	0·90	1·92
Miles	2·94	25	1·38	1·16
Stanthorpe ...	3·31	22	1·80	0·28
Toowoomba ...	4·98	22	4·15	1·81
Warwick	3·29	22	0·59	1·29
Maranoa.				
Roma	3·34	21	6·91	2·99
State Farms, &c.				
Gatton College ...	3·35	14	2·53	...
Gindie	2·34	13	3·32	3·76
Kamerunga Nurs'y	14·84	23	17·95	...
Kairi	...	...	9·57	...
Sugar Experiment Station, Mackay	9·95	16	5·55	...
Bungeworgorai ...	...	...	5·92	2·89
Warren	...	...	1·50	4·34
Hermitage ...	3·08	7	0·71	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for February this year and for the same period of 1913, having been compiled from telegraphic reports, are subject to revision.

State Farms.

ROMA STATE FARM.

The manager, Mr. R. E. Soutter, reports as follows for the month of February:—

Meteorology.—The unfavourable conditions prevailing when previous report was submitted have been wholly dispelled, and the prospects are better than they have been for two years at this season of the year so far as the pastoral industry is concerned.

The maximum temperature recorded was 105·1; average, 87·3. The minimum temperature recorded was 60·0; average, 64·0. Rainfall recorded was 8·75 inches, representing eleven falls. On one occasion 1·30 points fell in thirty minutes, and did a good deal of damage on cultivated areas.

Vineyard.—Prior to the rain practically the whole of the crop fit for marketing had been removed.

Orchard.—The citrus trees, which were looking really bad, have made a most wonderful recovery and some fruit will now be obtained, there being sufficient moisture, and more in the soil to carry it on to maturity.

Olives.—These have responded marvellously to the congenial conditions, some of the trees now being covered with heavy crops of good-sized fruit.

Silage Crops.—The early-sown maize has been fit for this purpose two weeks now, but owing to the wet weather and still boggy state of the paddocks, it will be another week before operations (cutting) can be commenced. The late sown maize has come on wonderfully, having grown over 3 ft. during the last fortnight.

Cowpeas.—The block of 25 acres sown for green manuring purposes is all that could be desired.

Teff Grass.—This has given most surprising results. When the rain was first experienced a fortnight ago, the plants were from 4 to 6 in. high, and thin in appearance. Two days ago a measured area was cut, the length of the material being 2 ft. 9 in., and estimated weight per acre of green material 6 tons 4 cwt. 1 qr. Notwithstanding such good results, its being an annual will no doubt preclude its being grown to any extent in the near future.

Rhodes Grass has again demonstrated its remarkable recuperative powers, and within a week after the first rain was 6 in. high, in places where it had been eaten close to the ground.

Wheat.—The grading of seed intended for sale has been completed, and there will be about 600 bushels available for this purpose. Orders have come in a little more freely since the rain.

Stock of all descriptions look exceedingly well, and should continue to do so, as the recent rains have made feed plentiful.

GINDIE.

Writing on 14th March, the manager makes the following remarks on sowing Rhodes grass seed:—In my last report I mentioned that we had sown some Rhodes grass, and stated I was afraid there would be a difficulty in getting it to grow on our heavy black soil. Owing to the expansion of this kind of soil during wet weather, and the consequent shrinking and cracking afterwards, there is always a difficulty in getting a start with any small seed that requires to be covered lightly, more particularly in the summer. Ample rain fell to germinate the grass seed sown last month had it taken, say, three days to fall instead of about twenty minutes. After a shower of this kind, if the sun comes out strong the following day, which is usually the case, the surface of the land cracks up into flakes—in fact, acts just the same as the mud in the bottom of a waterhole from which the water has evaporated. The depth to which the cultivated land scales up depends on the amount of rain and the rapidity with which it falls; it may be anything from ⅛ to ½ in., and it is here where the trouble comes in. If it cracks to the depth to which the seed was sown, the greater portion of it is exposed to the direct rays of the sun and the drying effects of the wind. Of course, this cracking only takes place to a limited extent if the rain continues for a few days. The same expansion of the soil takes place, but it is more gradual, and, as the subsidence is more gradual, little or no cracking takes place.

Where frosts do not occur I am of the opinion that it would be advisable to postpone the sowing of the grass seed as late as possible, as in the cooler months the cracking only takes place to a very limited extent—that is, on the kind of soil to which I have referred.

We have put in 18½ acres of Rhodes grass in one of the lower paddocks. The greater part is planted on soil of a lighter character than that previously mentioned. There was a good deal of rubbish on this land, which was harrowed together and burnt. The land was then lightly worked up with the spring-tooth harrow. After the seed was sown, a portion was covered by a light seed harrow and the balance with a chain harrow. On about an acre that had received no previous working, the seed was sown and covered with a heavy harrow. As no rain has fallen up to the time of writing, I cannot say at present what the outcome of these experiments will be.

Our maize crop, with which we hope to fill the silo, is looking much better than could be reasonably expected. Though it will not be a heavy crop, it is cobbing well, and will be a welcome addition to our stock of fodder.

WARREN.

The acting manager, Mr. R. B. Tennent, reports on the work of the Farm for February:—

The early part of the month of February proved very dry, and a detriment to the farm in general. Towards the latter end of the month, however, 1.50 in. of rain fell. This was followed up by good rains in the early part of March and, as a result, everything is appearing at its best.

Over 30 acres of ground have been ploughed and prepared for the reception of seed; 6 acres have been sown with Hunter River Broadleaf lucerne, and is promising well; 5 acres have been planted with seed potatoes, and a good crop is anticipated. The soil in which the potatoes are planted is of a loose sandy nature, rich in nitrogenous matter, a crop of lucerne having previously grown there. This land is very well drained, being situated on the banks of the creek, and the potatoes have been planted under ideal conditions. Three varieties have been sown, these being Carmen, Brownell's Beauty, and Up-to-Date. Some "Defiance" potatoes imported from England have also been planted.

We have cut over 40 acres of lucerne and obtained excellent hay; 20 acres of land have been prepared for the reception of cereals, which will comprise of Revetan, Bald Medeah, and Kubanka wheats, Californian Feed Barley.

Ten tons of maize have been harvested and put into the silo. This maize was chaffed and should make good ensilage. We have at present 20 tons of ensilage, comprised of White Panicum, Japanese Millet, and maize.

The maize crop promises very well, but is being greatly damaged by the ravages of the innumerable parrots. We have at present 70 acres under maize, the chief variety being Early Leaming, which is well adapted for Central Queensland.

There is an abundance of green fodder in the grazing paddocks, and the cows are in full flush. We are at present milking eighteen head of cattle, and supplying the local butter factory with cream three times per week. The records of the herd will be available for publication next month.

In the orchard the citrus trees are bearing very well, but, owing to the clay subsoil, part of the orchard will be demolished.

The stock are in excellent condition, and the young animals show great promise.

KAMERUNGA STATE NURSERY.

The manager, Mr. C. E. Wood, in his report for the month of February, records a heavy rainfall for that month, amounting to 17·95 in., making a total of 47 in. since 1st January.

So far as operations in the field go, this is a heavy handicap, and every dry spell has to be taken advantage of to get the scarifying implements going. Soya beans have never been a success at the Nursery, but a planting was made on 5th February, of five varieties of seed received from Assam, which all came as Soya beans, but two of them are undoutedly Phaseolus, including *P. Mungo* and *P. max*. Most of the seed germinated fairly well, and the plants were beginning to make fair progress, when same were attacked by the bean fly, especially all the Phaseolus, with the result that little, if any, were expected to arrive at maturity. A small plot planted on the 12th February had, up to time of writing, not been attacked, but these had tobacco dust sprinkled along the rows and were afterwards hilled up. On more than one occasion this treatment has been successful, when the plants untreated were destroyed by the fly. We frequently are asked how to prevent the ravages of the bean fly in the case of French beans. We would suggest a trial of Mr. Wood's method, although he qualifies his statement by saying that he has on occasions known it to fail.

Teff grass, which at present is attracting much attention, has been planted at Kamerunga, and in two months from sowing it reached a height of from 18 to 30 in., and was in full flower. The plot was sown too thickly, and the individual blades were very narrow. On harvesting the crop off a measured square yard, the weight (green) worked out approximately at 6 tons 15 cwt. per acre. The dry weight—that is, as hay, was at the rate of 2 tons 3 cwt. per acre.

PLATE 32.—TEFF GRASS AT KAMERUNGA STATE NURSERY, 30 DAYS FROM SEEDING—2 FEET HIGH.

The accompanying photograph shows a part of the plot thirty-eight days after planting, the height of the grass being just on 2 ft. A further plot was to be sown.

KAIRI.

The manager reports that 957 points of rain fell on fifteen days of February, the rain falling mostly in plumps, alternating with bright sunshine. The weather is very trying for young grass, and it is feared that the strike on new clearings may be adversely affected.

Maize on the new clearing is making satisfactory progress; and cowpeas, green-manure beans, sugar-cane, cow cane, and lucerne are all making great growth, while the grass on the clearings sown down last year and the year before is over the backs of the cattle, all of which are in splendid condition.

The Orchard.

FRUITING OF THE MALE PAPAW.

Although the male papaw very rarely produces fruit in the Southern portion of Queensland, it is by no means a rarity to see in the Northern districts, especially in the rich lands about Cairns, male trees bearing dozens of fruits which are produced at the end of the long flower-stems, and dangle like a number of bells from the top of the tree. The accompanying photo. represents a male papaw-tree in full bearing, on Messrs.

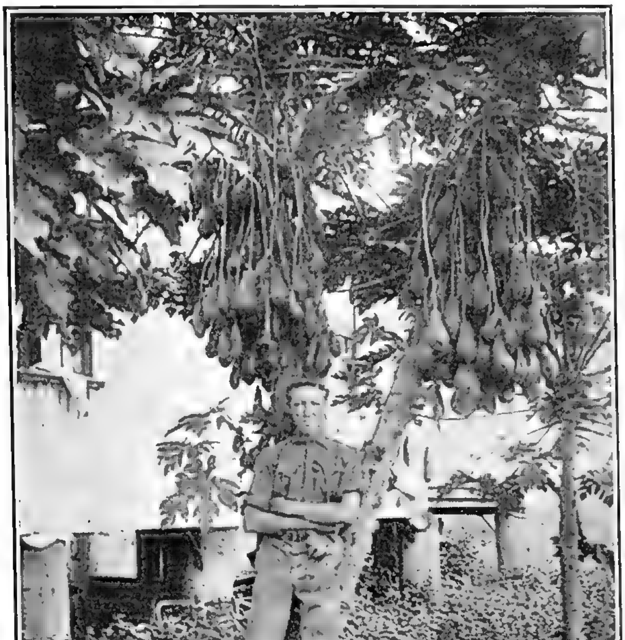


Plate 33.—Male Papaw Fruiting.

Smith Bros.' Victoria Farm, Ayr, Lower Burdekin. When this tree was about 3 ft. high, the sprout on the top was pinched off, with the result that it threw out several branches. About three months later it bore a few fruits, and recently, when eighteen months old, it began to bear abundantly, having now (2nd February) over 100 fruits on each branch. The same process was tried with other trees, but up to the date mentioned only a few papaws had appeared.

FRUIT-GROWING IN THE GRANITE REGION.

Mr. C. Ross, F.R.H.S., Instructor in Fruit Growing, reports to the Under Secretary as follows on his tour in the undermentioned districts—namely, Wallangarra, Wyberba, Lyra, Ballandean, Beverly, Stanthorpe, Blue Mountains, Roesseler, The Summit, Thulimbah, Dalveen, and Warwick.

The weather was very hot and dry during my visit—in fact, very little rain had fallen during the previous eight months, consequently vegetable crops were very poor and fruit trees did not exhibit the usual amount of vigour. In comparison, however, the trees had suffered very little otherwise. The carrying crop, generally, was heavy, and, excepting the earliest varieties of apples, promised to be quite equal in quality, size, and quantity to any previous year. The plum crop is excellent in every way, and the peach crop was never better. Expansion is fairly rapid; new clearings are being opened up in every direction, and upwards of 40,000 trees were planted last winter.

A good class of men, possessing capital, with some knowledge of fruit culture, gained elsewhere, are becoming established. The young men of the district are also paying more attention to the industry, and this with a sprinkling of city men who are looking towards the future and establishing profitable country homes is having a very good effect. The more up-to-date methods of culture, and the stricter attention paid to pests, are becoming better understood, and the condition of fruit-growing (which is already on a fairly sound basis) is gradually assuming a more satisfactory condition. There is still much room for improvement as regards packing, marketing, pruning, and the thinning of the fruit. More thorough methods require to be adopted with the two latter operations, together with the application of suitable fertilisers and green manuring.

Windfalls, as a rule, are more in evidence under early and profuse cropping trees, and some means should be devised whereby the waste could be utilised. In the full-bearing orchards where ground crops are not grown, poultry, pigs, and even sheep are all useful in this respect, as well as for keeping down weeds. Sheep have been used in this manner at the State farms, and no injury to the trees had resulted. One orchard at Thulimbah is adopting this phase by grazing in sections within portable fences.

Those growers who are desirous of planting very early apples should remember that, although showy colours are represented, high quality is not a prominent feature in this section, and when put on the market they have to compete with American shipments. It is, therefore, advisable to plant in moderation and to specialise with the second earlies, mid-season, and late sorts.

I herewith append a list of varieties, some of which are well known and have done well in the granite region, and others that bear a good reputation, and have been proved by my own personal experience.

Orchardists should note the blossoming periods of the various varieties and plant those that blossom at the same time in close proximity to each other. This will ensure pollination and cross-fertilisation, whether it is effected by bees or wind agency. It may here be remarked that the want of pollination is a primary cause of fruit dropping, quite independent of wind force and dryness at the root.

First and Second Early Varieties.

Climax	Beauty of Bath
Marjorie Hay	Coldstream Guard
Cardinal	Emperor Alexander
Golden Spire	Gravenstein
Lady Sudeley	Langley Pippin
Sharpe's Early	Williams' Favourite
Scarlet Pearmain	Astrachan
Liveland Raspberry	

Mid-season Varieties.

Allington Pippin	Bismarck
Charles Ross	Esopus Spitzbergen
Foster	John Sharp
Peasgood Nonsuch	Cox's Orange Pippin
Mona Hay	Prince of Pippins.

Late Varieties.

Adam's Pearmain	Jonathan
Alfriston	King David
Annie Elizabeth	Loy
Black Ben Davis	Munroe's Favourite
Canada Reinette	Prince Alfred
Cleopatra	Purity
Fall Pippin	Rome Beauty
Gloria Mundi	Sharp's Late Red
Glowing Coal	Stayman Winesap, and
Hawthornden	Wright's Perfection.

Codlin moth, San José scale, and scab have been kept well under control, and the dreaded fruit fly is practically absent. The Rutherglen bug attacked ground crops, and some of the early peaches, but the effect of this pest has not been serious this season. A preparation invented by a Stanthorpe resident appears to have suppressed the depredations of this insect wherever it has been tried. If its efficacy is all that is claimed for it, it may become a great boon to the citrus-grower in helping to fight the orange bug, fruit fly, and other winged pests.

With regard to the summer pruning of young peach trees, the side shoots in the interior of the tree should be thinned out and properly spaced in spring, but not stopped, and the terminal points may be pinched out in late summer. If this operation is performed earlier, a profusion of laterals may be produced, which are not required; but when the operation is performed late, the effect is to fill out the fruit buds for next summer's production.

In the care of apple trees, fully one-third of the lateral growth may be suppressed or checked by pruning off, or fracturing. The operation is best performed during February or March, as the sap is then elaborated in the base buds, and will form good fruit spurs when pruned back in winter.

Amongst the older trees of heavy bearing varieties, hard winter pruning must be resorted to if high-class productivity is to be maintained, followed in summer by severe thinning, for producing a good-sized marketable commodity.

Many growers, as regards packing and grading, are as proficient as need be, but there is much room for improvement in the majority of sheds. Too much of this work is relegated to children and inexperienced hands. Instead of being handled like eggs, properly sized, firmly packed according to system, the second-grade fruit is often dumped into the cases and shaken down as if it were potatoes.

Although the whole range of deciduous fruits is profitably grown, the following fruits may be specialised in the localities named:—

Apples, pears, &c. .. .	Thulimbah.
Peaches, plums, &c.	Stanthorpe to border.
Cherries and grapes	On slopes at foot of Range, or where protection is afforded against late spring frosts.

In the Warwick district, orchardists usually experience more trouble with the fruit fly, but happily this season it has not been so, and the following can be well grown:—Peaches, plums, apricots, grapes, and almonds, with apples and pears in moderation.

Chestnuts, walnuts, pistacios, and olives, besides being useful as food for stock, are profitable commercial commodities, and form handsome trees for shade and breakwinds.

There are many moist situations between Warwick and the border, where the first two nuts would do well. The pistacio nut and olive are better suited to drier situations. The peccan nut is also a handsome tree, but probably would not yield heavy crops in the coldest spots.

A GOOD SEEDLING MANGO.

Mr. J. C. Beal, Corinda, who takes great interest in raising new varieties of fruit, has been very successful in obtaining a very fine mango (here illustrated) from the seed. The two fruits shown weighed a shade over 2 lb. The trees are growing in a sandy loam and are now about eight years old, bearing well. A remarkable difference between this variety and others is the great length of the leaves, which measure 15 in. by 3¼ in. The flavour of the fruit is very different from that of all other varieties, no trace of any turpentiny flavour about it, and combining the flavour of other fruits, as in the case of the mangosteen.

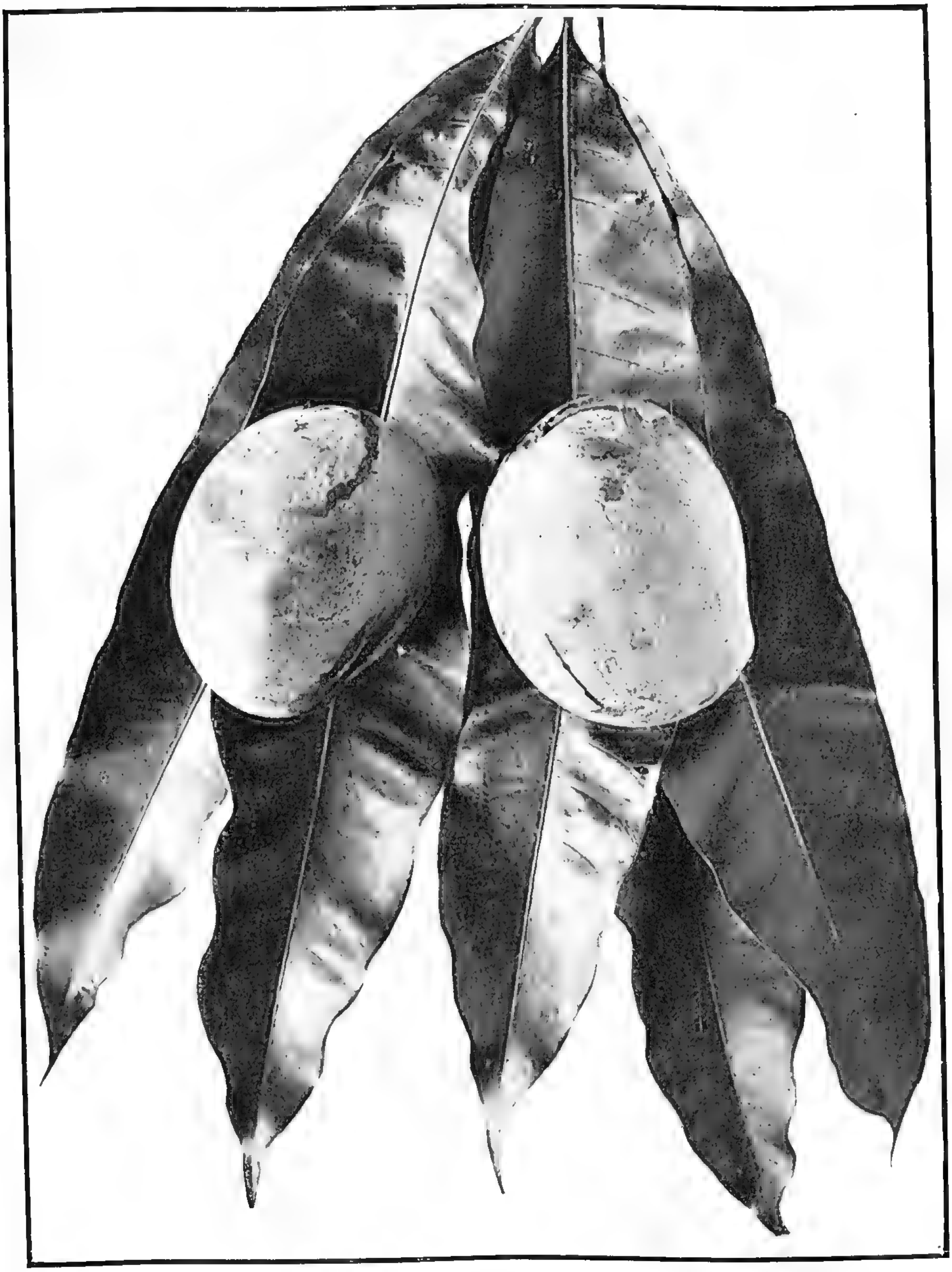


Plate 34.—Seedling Mangoes Grown by Mr. Beal at Corinda.

Tropical Industries.

NOTES ON DATE-GROWING.

[CONTINUED FROM MARCH ISSUE.]

Distance between the Trees in a Plantation.—Considerable differences of opinion exist as to the most economic distance to plant the trees apart from each other in plantations. All distances between 12 ft. and 25 ft. have been advised. In the best plantations that I have seen, the trees have been 17 to 20 ft. apart. If each tree is allowed a circular space having a diameter of about 19 ft., good results should be got. To get most trees into a given area of ground, the trees should be set out in lines, and the trees in adjacent lines should not be opposite, but should alternate with each other. With the distances of 19 ft. apart of the trees in the rows, and 16·4 ft. between the rows, 139 trees approximately will be planted per acre. When there is a distance of 25 ft. or more between the palms in a plantation, fruit trees are usually grown between them.

Preparations for laying down a Plantation.—When a plantation is to be laid down, the land should first be thoroughly levelled or contoured. The positions of the trees should then be carefully marked; holes about 2½ ft. in diameter, and 2½ ft. deep, should be dug. Small water-channels should be made connecting the holes in each row, and main channels should be made where necessary. Many writers advise manure being given to the trees when they are planted, but the Arabs I met in Egypt, and our Arab date-grower from Basra, are all emphatically against manure being used at planting time. Personally, I should not use manure until the plants become established, unless the soil is very poor, in which case I should only use very well rotted manure, and a quantity of it equal to about one-fourth of the bulk of the earth removed from the hole.

Planting the Off-shoots.—Usually the off-shoot is not quite straight, but has a slight curve on it. Date-growers always plant the off-shoots so that their tops lean very slightly towards the south, and the inner side of the curve on the stem is in that direction. The off-shoot is placed in the centre of the hole in the position above described, and the earth is filled in and pressed fairly firmly around it; a basin is usually made round the plant, and a watering is given immediately. The basin should be about 2½ ft. in diameter, and the level of its bottom should be 1 to 1½ in. lower than the bottom of the irrigating channel which runs into it, so as to trap a small pool of water round the tree, and irrigate the soil properly then. The water in the pool should disappear within six to eight hours after the irrigation. In planting, a very important point to notice is, that the crown of the off-shoot (*i.e.*, the position from which the bud of very young leaves starts) is at least 1 or 2 in. above the level of the irrigating water. If the crown is below this level, the irrigating water will get into it and kill the plant by rotting out the young terminal bud. Frequently the off-shoots and the soil arround it sink considerably after the first few irrigations, and the crown of the plant then becomes covered with water at each irrigation. This happens especially when the holes in which the off-shoots were planted have been dug very deep. The hole is perhaps the best depth when, on the plant being placed with its lower end resting on the bottom, the crown is just at its proper height. As the off-shoots are not all of one size, I find that it is most convenient to have all the holes dug to just the correct depth for the smaller plants, and then dig out a little more earth where necessary when planting the larger plants. This method of digging holes, of course, only applies to good loamy lands. Where there are bands of impervious clays, or hard pans, &c., in the soil, the hole should be dug to a depth of 3 ft. or more, and some days, at least, before planting is begun, the earth should be replaced and thoroughly packed to the height required in planting the off-shoot, so as to prevent the plant sinking later on.

To prevent Water getting into the Crown of the Off-shoot when the Plant has sunk.—If, in spite of everything, the plant sinks too low, the irrigating water may be prevented from entering the crown of the plant by filling up the basin round it with earth, and making instead a circular trench round the off-shoot, and about 12 in. away from it, as shown in the accompanying diagram.

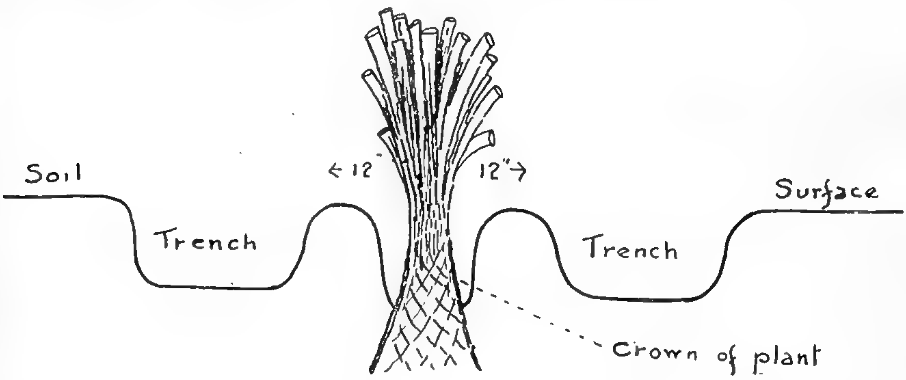


PLATE 35.

The soil around the off-shoot receives water from this trench just as it did from the basin. Care should be taken that earth and dirt do not collect in the crown of the tree, as that is also bad for the plant. Another method of preventing irrigation water entering the crowns of the trees when they have sunk after being planted is, to lower the levels of the water-channels and basins around the trees, and then to only partly fill the channels with water when irrigating. The previous method is, however, usually the better one. When the crowns have not sunk too low, I prefer the plain basins without the rings.

To prevent cracking of the Soil round the Plants, and excessive evaporation of Water.—If the soil is of a stiff nature, a mulch of some sort should be spread on the surface of the soil in the basins around the plants, as soon as possible after planting. The mulch may be composed of clear river sand that will not run together, forming a compact hard cake when it dries, or it may be composed of decaying leaves, refuse litter, straw, or any material which will form a loose layer an inch or two in depth on the surface of the soil. The idea is to form a layer of matter which will contain a considerable volume of air in the spaces between its component particles, and so retard the swift exchange of dry air of the atmosphere for the more or less moist air that is in contact with the soil surface. When the soil is stiff and no mulching is done, the earth around the plants contracts and cracks very readily, and the young tender roots of the off-shoots are apt to be torn during the contraction, or dried up by exposure at the cracks. In the Punjab coal ashes perhaps form one of the best materials for spreading round the plants, as they not only form a nice mulch, but retard the attacks of white ants.

Newly planted Trees must be shaded by Thatch.—On the day that the off-shoots are planted, each plant should be loosely thatched with sufficient grass to provide a gentle shade for its young terminal bud.

Trees must not be shaken till firmly established.—The trees must on no account be shaken or pushed about after being planted, as this breaks the young roots, or allows dry air to get between the plant and the soil, which shrivels up the roots. Ordinary bullock labour should, therefore, not be allowed in the plantation between the time the plants are planted and the time when they become firmly established.

Auxiliary Crops.—It is the general practice in date-growing localities to grow a variety of crops between the trees. While these are small, only such crops are grown as will not injure the palms by over-shading them. Common crops grown, then, are wheat, barley, lucerne, clover, and vegetables. Later, such fruits as grapes, pomegranates, figs, peaches, apricots, almonds, and similar fruits are often grown under the shade of the palms, if there is sufficient space for these. In the Sahara many of these fruits can only be grown successfully under the shade of other trees, and do best where grown under the date palm, and it is quite common to see three crops occupying the land at the same time. First, the date trees towering above everything, then a mixture of other fruit trees, and under them the more shade-loving garden vegetables. Gardens of this sort are, of course, excellent where the other fruit trees can be grown well, and the fruits from these and the crops of vegetables can be dealt with. Rice crops must not be grown between the young date trees, as the stagnant water of the rice plots harms the young plants.

Method of keeping Records of Trees in a Plantation.—The great necessity for keeping a minute and accurate record of the trees will be hereafter pointed out. My method of keeping a record is by making a plan of the plantation, and filing with it all letters and notes of anything of interest connected with the case. Every tree in the plantation is represented on the plan by a small circle with a number inside it, and a reference on the margin of the plan shows the nature of the variety under that number. The date of planting and a reference are given to the connected correspondence.

Register of Watering.—A register should also be kept of the number and dates of waterings, and, if possible, the amount of water given, as different soils and positions require different amounts of water. . . .

Water and other requirements of a young Plantation in Multan.—An irrigation must be given to the date plants as soon as they are planted. A very great stream of water should not be turned on to the plantation when irrigations are given, as this is apt to submerge too much of the plant, carry dirt into its crown, rot the central bud, and kill the plant. The land must be kept almost continuously wet for the first month after planting, and continuously moist until the plants become established. Sandy soils will require much more water than clayey soils will, to keep them in proper condition, and the waterings may have to be applied more or less frequently in different classes of soil, so that the only reliable way to discover when a young plantation requires watering is to see the dampness of the soil in the basin round the plants. When plants have been planted in the first week of September, on well-drained, medium loams in Multan, however, the plants will stand one watering per day for the first forty days, one watering every two days for the next forty days, and one watering every six days till growth starts, and the heat commences in spring. After the frosts in spring are well over, and before the weather is very hot, the thatching may be removed from the plants for a week or two, and then fresh thatching put on. Care should be taken, however, not to shake the plants much while removing the old thatch or replacing it with new. This thatch may finally be removed when the plants have formed a few strong leaves. From spring, the plants may require a watering every four or five days till the rains begin, and one watering per week, or less, after that. One watering every six or seven days will probably have to be given during the next hot weather. By the end of that time the plants will be firmly established, and will require water twice per month or less, the number of waterings depending on the character of the soil, the climate, the height of the permanent water-table, or the amount of percolation of water if near a river, canal, or other body of water. When the permanent water-table is well within 20 ft. of the surface of the soil, adult date palms seem to require no artificial waterings. . . .

The Effects of Allowing the Soil in a Young Plantation to dry up.—A remarkably long time elapses before a palm shows signs of the damage done to it by want of water, and it frequently happens that the soil has been kept in excellent condition as regards water for months after the time it was allowed to dry up, before the palm shows signs of dying off. If the off-shoots are planted in the first week of September, all the weakly plants will have died out, and the others will have produced several well-grown leaves by that time next year. Proper attention as regards water, &c., is well repaid by a young date plantation, as strong, vigorous trees come several years sooner into fruit-bearing than weakly ones.

Death-rate in a Young Plantation.—In most parts of the world the death-rate in a young plantation is usually between 20 and 30 per cent. The results of the past three years' experiments in the Punjab show us that the death-rate could be kept well within these figures by planting fair-sized plants on average quality soil in early September and by giving them the attentions prescribed. For example, forty-three trees out of fifty planted at Lyallpur in September, 1909, are now (1913) firmly established and flourishing vigorously.

Manuring Date Palms.—In many cases no manure is given to date palms, and, if any is applied, it is usually given to young date palms just after they have established themselves firmly in the soil. This will be about two years after the off-shoots were planted, and the plants will then have about a dozen well-developed leaves. The manure applied is usually well-rotted cow-dung, and it may be given at the rate of 100 lb., approximate, per tree. The earth may be removed around the tree to a radius of 3 to 4 ft., and to a depth of 2 to 3 in. In this excavation the dung may be spread and covered up by replacing the soil. The operation is done before spring growth commences. It may be repeated every two or three years.

[TO BE CONTINUED.]

RUBBER SUPPLY AND DEMAND.

Dealing with the Rubber Lesson of 1913, " Investigator," writing in "Grenier's Rubber News," for 1914, forecasts the probabilities of the rubber industry during 1914:—"There is," he says, "no doubt that a feeling is becoming increasingly prevalent that the slump, which has been carried too far, may cause another sharp rise in rubber before long. Whether the long decline be attributed, as in some quarters, to bear manipulation, or as in others to the temporary slackening of demand from America, there is good support for the theory that the present situation will bring about its own remedy in the form of a shortage, followed by a rapid rise in prices.

RESTRICTED OUTPUTS.

"The principal reason for this expectation lies, of course, in the restriction of output both of wild and plantation rubber, the latter largely on account of the postponement of tapping on young areas. Various estimates of supply and demand have already been published, some of which err on the side of generosity, but I will endeavour to keep my figures on strictly conservative lines. Referring first to the world's production it has been already shown that the total in 1913 was 105,000 tons.

" Some very drastic modifications may be looked for during the present year. Brazil will probably show a decrease to about 30,000 tons. West Africa may be responsible for 5,000-6,000 tons, and East Africa for about 1,000 tons, while Central America rubber, Guayule and Jelutong, will probably not account for more than 4,000 tons between them. Allowing an increase of plantation rubber to 55,000 tons, the result is an estimate of not more than 95,000 tons. I will increase this to, say, 100,000 tons to cover all contingencies. How does this compare with the probable demand?

ANTICIPATED DEMAND.

"In 1913, which was admittedly an abnormal year, the demand increased by about 6 per cent. over 1912, the total of 105,000 tons, as shown above, all being utilised, plus a large quantity of reclaimed rubber. At the same rate of increase the demand for 1914 should be in the neighbourhood of 110,000 tons, at the lowest estimate, which leaves a deficiency of 10,000 tons or more. The requirements for 1914 are, however, generally set at 120,000-140,000 tons, so that, unless trade falls off to a phenomenal degree, it would appear that a rubber shortage of considerable extent is in sight.

"Only one outcome of such a position would be possible—namely, a wild upward rush of prices, as in 1910, followed by another long period of depression. The present low prices suit certain producing groups very well, and also some of the buyers, but their long continuance is to be deplored. A moderate level of prices would have a much more healthy influence, not only by saving some of the younger companies from ruin, and by preventing large areas going out of cultivation, but would at the same time obviate any pronounced shortage and tend to regularity of prices, which are much more to the advantage of the manufacturer than wide fluctuations."

THE GINNING OF COTTON BY THE DEPARTMENT IN NORTH QUEENSLAND.

By HOWARD NEWPORT, Instructor in Tropical Agriculture.

The cotton harvest for this season is now over in Northern Queensland. Those growers who took advantage of the Government's offer to gin and market for them, as well as advance them 1½d. per lb. on their boll cotton—an amount that would cover the out-of-pocket expenses of the grower in picking, bagging, and transporting the raw cotton from the field to the factory (in this case the ginnery)—got their cotton in by the end of the year.

During the last six, and, in some cases, seven, months of 1913 in most parts of the North no rain was experienced, and conditions were approaching those of a drought. While cotton generally appreciates a fairly dry season, this was rather too long for this staple, and though it afforded a good and safe picking season, the crops were generally not as heavy as would have been the case had rains been obtained in August and September. When crops are small, however, the staple benefits in quality as a rule, and this season's was of fair length, uniform, and of fair lustre.

The variety sent in was exclusively Caravonica, and indeed very little, if any, of any other variety is grown in the North now.

The cotton submitted to the Department was dealt with this year by the Gossypium Park Estates Company, at their ginnery at Kamma, on the Cairns-Babinda Railway, about 12 miles out from Cairns. There, under the supervision of the Department's officer, Mr. J. Campbell, the director of the company put the cotton through the machines, and description of the processes to which their cotton was submitted may be of interest to the growers.

Fig. 1 is an illustration of the cotton gin that deals with the long-stapled Caravonica cotton, and that cleaned the cotton sent in on behalf of the Department as well as the Gossypium Park Estates Company. It is of the roller type, and is run by a small oil-engine, which may also be seen on the right of the illustration.

Some of the aboriginals that are working on these plantations have been taught to run this machinery, and one of them may be seen serving it with boll cotton taken from the open bale in front, which is just as

PLATE 36 (FIG. 1).—COTTON GINNERY, SHOWING ENGINE, GIN, BALING PRESS, &c.

it comes from the grower, unless it has been sent in wet or damp, when redrying is necessary before it can be treated. The lint is drawn by a leather-covered roller between knives working to within a very small fraction of an inch of each other, and requiring very delicate adjustment. These separate the seed, which, in the case of Caravonica, and indeed with practically all cotton of the Sea Island type, is, except for a little tuft at one end, clean or free. It is, however, impossible to get the seed away quite clean; some short lengths of lint or small particles of long lint always remain with the seed as it passes through a sieve and falls below the machine in the space through which light can be seen in the illustration. The adhering short cotton is known as linters, and in big factories or previous to being pressed for oil the seed is put through another machine called the linter or "de-linter," which is a finely-set gin of the "saw" type, and removes the last particle of cotton lint. The seed in its dirty state, and with a certain amount of rubbish (usually from 1 to 2 per cent.), and of course both "light" or bad seed with the good, is shovelled away and bagged. This is dealt with afterwards in a manner that will be described later on, as it does not concern the subject of this article. After the process of ginning, the cotton is known technically as "lint."

From the gin the now seedless cotton lint comes out in billows as shown in the illustration (Fig. 1). From there it is gathered up and put into the baling machine, into the bottom part of which the hessian or wrapping of the future bale has already been placed. The baling machine may be seen on the left-hand side of Fig. 1, reaching to the top of the picture. The bale consists of a series of boxes, some 2½ ft. square, fitting upon one another, with an arrangement of wire ropes and

PLATE 37 (FIG. 2).—LOADING THE BALES INTO DRAYS.

cogged wheels and levers, whereby the cotton, which at first fills the whole series, can be compressed until it is all contained in the lowest of the boxes. The pressure having been applied and the cotton compressed, the hessian cover of the bale is sewn up, the bale turned out and branded, when it is ready for its journey to the market. The branding generally includes the weight, the variety of cotton (in this case "Caravonica"), the initials of the estate or company who grew it, and town of destination, &c. An ordinary bale of cotton shown in Fig. 2 weighs about 2 cwt., so is rather lighter than wool, and the freight on which is similarly charged for by measurement and not by weight. This illustration shows the bale being loaded from the ginnery on to a dray for transport to the railway siding.

Fig. 3 illustrates the process of carting, and Fig. 4 the loading from the dray into railway wagons at the Kamma railway siding. The director

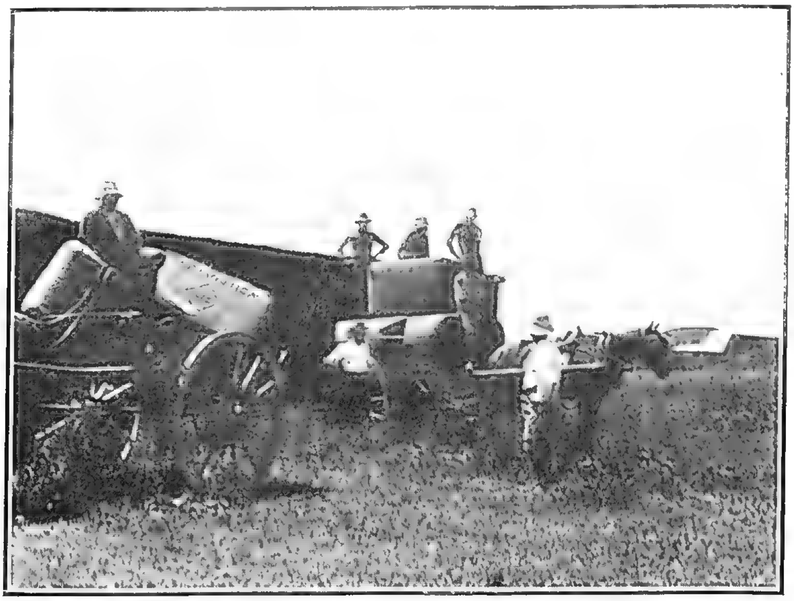


PLATE 38 (FIG. 3).—CARTING THE BALES OF COTTON TO THE RAILWAY.

of the Gossypium Park Estates Company stands in the foreground, and the company's ginnery and store buildings can just be seen in the distance on the right.

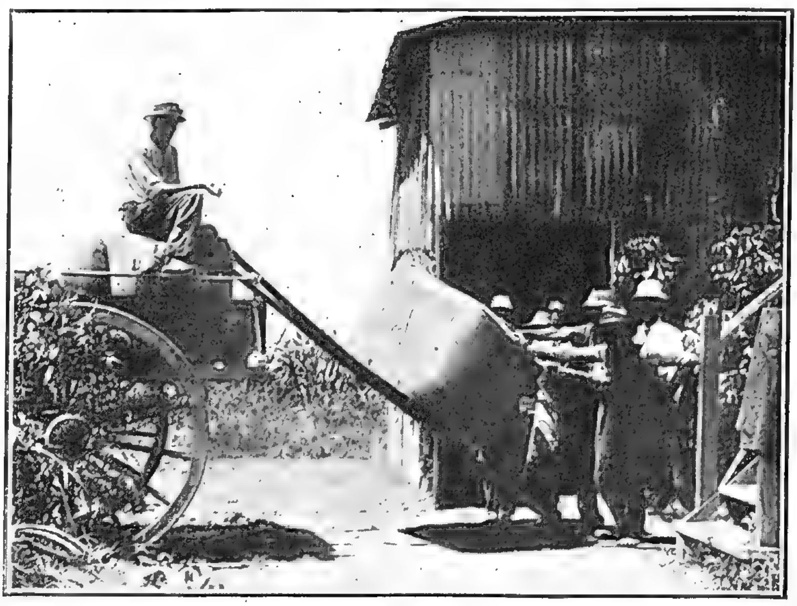


PLATE 39 (FIG. 4).—LOADING INTO RAILWAY TRUCKS AT KAMMA, NEAR CAIRNS.

The growers' cotton sent in for treatment by the Department is among the consignment here photographed. This after being trained to Cairns wharf has now been despatched per s.s. "Roscommon" to Liverpool, England, for realisation.

It will take about three months to get the returns and account sales, when it is hoped it will be found that a good price has been realised.

The outturns of the cotton sent in have been as follows:—

Lint	31·91 per cent.
Seed	59·64 per cent.
Loss	8·45 per cent.

The latter item is made up with dryage of the cotton due to moisture contained when sent in, as well as leaves, dust, &c., and is less than usual, the loss generally amounting to 9 per cent., and often touching 10 per cent.

The percentage of lint might have been higher had a little rain been obtained earlier in the season, as already mentioned, and with more attention to cultivation.

AGRICULTURE AND ELECTRICITY.

EXPERIMENTS WITH THE SOIL, PLANTS, AND ANIMALS.

The "Agricultural News," of Barbadoes (17th January, 1914), publishes a paper on the above subject by Mr. T. Thorne Baker, A.M.I.E.E., F.C.S., which originally appeared in the "Journal of the Royal Society of Arts" (12th December, 1913). From this we take that portion dealing with "practical experiments in the application of an electric stimulus to animal life," from which it will be seen that in one direction certainly there is great promise of economic success.

"Young chickens hatched in incubators can be grown under electric stimulus at about double the rate, thus doubling the output of a chicken farm and halving the food bill per chicken. But what is of far more importance from an economic standpoint is the decrease of the death roll during the first few days after hatching. In the summer months, under normal conditions, the mortality is often as much as 50 per cent. This disastrous dying off is practically non-existent where suitable electrification is used. In the experiments, the chickens were kept in a chicken-house which was electrified by a large helix of heavily insulated wire wound round it in turns about 6 in. apart. The current was applied for ten minutes every hour during the day. There was only a mortality of 1·5 per cent. and as much as 35 per cent. increase in weight of the electrified chickens after three months. The vitality of the treated birds is reported to be remarkable. In the words of the author: 'Instead of running away when one puts one's finger to the netting, they will rush up and peck vigorously. During the treatment they are so highly charged with electricity that quite a distinct shock is felt in the fingers on touching them, although the birds themselves are unconscious of anything. The sparks which fly from their beaks on their pecking one's finger do not appear to be felt in the least by them.' It must be borne in mind, however, that too strong or too frequent application is liable to have a harmful rather than a stimulating action."

Vegetable Pathology.

NOTES ON DISEASES OF CITRACEOUS PLANTS.

By E. JARVIS, Assistant Government Entomologist.

With reference to recent investigations relating to diseases of citraceous plants occurring in the Howard and Maryborough districts, I have the honour to state that the present trouble is for the most part due to Collar Rot (*Fusarium limonis*), although Root Rot (*Armillaria sp.*) and a few other diseases are also doing much damage.

COLLAR ROT.

The injurious symptoms noticed as being typical of this malady may be briefly mentioned here for the benefit of growers who may not be familiar with them.

Symptoms.—(1) Abundant gumming on trunk and near base of tree, followed by a brownish discolouration of portions of the collar-bark, and the presence of cavities beneath such diseased areas filled with gum.

(2) Rotting of the bark at these affected spots, generally characterised by a disagreeable odour.

(3) Yellowing of the foliage, and death of the diseased bark at collar, which ultimately scales off leaving the sapwood exposed and dead looking.

Note.—In this connection I wish to take the opportunity of recording a form of gumming noticed at Howard on Emperor mandarin trees attacked by collar rot.

The first symptom is the appearance of a white frothy fermenting liquid accompanied by watery-looking gum which exudes from a crack in apparently healthy bark, and sometimes flows a few inches downwards. The wound gradually enlarges, and upon removing the bark one sees a shallow cavity in the sapwood filled with a substance resembling thick milk, which often contains maggots of some dipterous insect, doubtless attracted to the place by the ferment odour. Before long the bark over such spots dies, and in course of shrinkage projects slightly from the surrounding surface in blackened irregular flakes, which ultimately peel off, leaving an unsightly scar.

These injuries, which vary much in size, are usually about 1½ in. across by 2 or 3 in. in vertical length, the general shape being somewhat ovate with pointed ends.

Occasionally they are 6 or even 9 in. in length, but the width is not proportionately increased; and it is interesting to note that, unlike typical collar-rot scabs—which are said to seldom extend more than 18 in. above the soil—these scabs in several instances occurred 3 ft. or more from ground level. I was told that they usually heal well, and the tree makes fresh bark to repair the damage.

Larvæ of a beetle (*Trogositidæ*) were associated with the early stages of this gumming, and are probably predaceous on the dipterous maggots.

Microscopical examination of the gum revealed the presence of the fungus *Fusarium limonis*, and another species not yet identified.

Nature of the Fungus.—Collar rot is supposed to be caused by the fungus *Fusarium limonis* Briosi, which both McAlpine and Briosi have always found accompanying the disease; its presence, together with the symptoms already mentioned, being conclusive proof, as far as we know, of the identity of this form of bark rot.

I made a microscopical inspection of infected material obtained in the Burrum district, and found it to contain conidia and hyphæ of this fungus.

Conditions Favouring the Disease.—It appears that this malady is by no means new to the locality but has been known for at least fifteen years, during which time it has annually destroyed a varying small percentage of orange trees.

I am inclined to believe that the severity of the present outbreak may be due in a measure to recent unfavourable climatic changes.

Heavy rain succeeding a period of comparative drought on badly-drained soils is liable to cause the skin of half-grown fruit to become ruptured, for the simple reason that long-continued warm weather tends to toughen plant tissue and partially destroy its powers of expansion.

When copious rains fall, such fruit, unable to swell quickly enough under the rapid development of internal growth pressure, often bursts open along some line of least resistance.

It is, therefore, only reasonable to conclude that prolonged dryness of the crown bark of citrus trees, followed by a sudden rush of sap, may at times injure its cellular structure, and so pave the way for more serious complications.

These thoughts were suggested by the occurrence of plenty of such ruptured oranges growing on undrained soil in some of the plantations near Howard.

Remedial Measures.—Our Fruit Expert has already dealt with this important side of the question, but I would like to supplement his remarks by saying that the Florida Experiment Station claims to have perfectly prevented this disease by budding nursery trees to roots of sour orange (*Citrus bigaradia*); and, that whilst they consider this stock to be the most suitable for low-lying wet lands or flat country, they recommend the grape-fruit stock (*C. decumana*) for high dry lands. I agree with Mr. Ross in thinking that the rough lemon stock should not be ignored. A capital illustration of its value was seen at Mr. E. J. Stafford's orangery.

Trees badly affected with collar rot are said to frequently recover if transplanted and given more room. A remarkable instance of this is recorded by the United States Department of Agriculture, who state that in 1892 40 acres were planted with large trees affected with this disease, and that after three years every tree out of the several thousand transplanted appeared to have fully recovered.

In many cases a cure has been effected by simply digging away the earth and exposing the diseased roots to the drying influence of the air, a procedure that in California is thought of more importance than the usual commendable practice of cutting away injured portions and disinfecting the damaged surface.

ROOT ROT (*Armillaria sp.*).

Citrus trees attacked by this fungus disease were not uncommon on badly-drained land on the banks of the Burrum River. The trouble usually starts on a deep root and spreads through the soil by means of black strands, or rhizomorphs, as they are called, which are conspicuous when present on affected roots. Mr. H. Smith, of Howard, has noticed that the fructification of this fungus appears during October, when clusters of light-brown toadstools come up under diseased trees and cover the ground and surrounding leaves with an immense number of dust-like spores.

Treatment.—Fortunately, the disease does not increase rapidly, but knowledge of this fact should not induce growers to neglect taking prompt action with a view to its eradication or possible prevention.

Professor Horne, of California, is of opinion that "the greatest importance attaches to treatment of the margin of the affected area to prevent the further spreading of the fungus," and says: "Where the trouble is still confined to one or more distinct spots it has been suggested that a number of healthy trees should be uprooted in the zone of advancing infection, hoping thereby to remove enough roots so that the fungus will not have anything on which to travel through the soil. If done with sufficient thoroughness, this may be effective, but it must be borne in mind that all the larger roots must be gotten out of the cleared strip."

GUMMING DISEASE.

I wish to record the presence of a rather serious gumming disease affecting the main branches of citrus trees at Melrose, and occurring also to some extent on the Burrum River.

The effects produced by it are very similar to those said to be characteristic of "Scaly Bark" in California, the presence of which is believed to be closely connected with extreme changes of moisture conditions in the soil.

The disease in question commences with the appearance of small longitudinal cracks in the bark, about an inch long and half an inch apart, from which gum exudes more or less freely.

The bark ultimately dies and scales off in ragged flakes, the injury being repaired by a fresh layer, which, however, is in turn liable to become similarly affected, and the limb is either seriously injured or else gradually killed. I noticed a tree twenty-five years old on Mr. N. C. Richards' selection at Howard that had lost two side branches and a large central main limb, and many older trees at Melrose severely crippled by this gumming disease.

GENERAL REMARKS.

With regard to the distribution of the diseases enumerated, I may say that collar rot was prevalent in all orangeries visited on the banks of the Burrum River except that of Mr. E. J. Stafford, root rot being also present in the same locality to a lesser degree on selections belonging to Messrs. H. G. Smith, R. Burgess, and Ross.

The state of the citrus crop as a whole in the Howard district reflects great credit on all concerned, the fruit being remarkably free from blemish of any kind. Injurious scale insects have been effectively controlled by fumigation and systematic spraying with a 40 per cent. solution of red oil emulsion.

In conclusion, I would advise growers to put into immediate practice the various remedial methods advocated by us for the treatment of collar rot, and to lose no time in planting young trees budded on suitable resistant stocks—of varieties to be determined by our Fruit Expert—giving them liberal treatment and the best drainage conditions possible.

As soon as these trees attain a fair size, as they should do in about six or seven years, transplant any old existing trees worth saving, and destroy the remainder to prevent possibilities of ill-effects from over-crowding. Avoid using organic fertilisers, especially those rich in nitrogen, using as a substitute chemical manures such as sulphate of ammonia or nitrate of soda.

TOMATO DISEASES.

Of late years, several diseases of the tomato plant have appeared in various parts of this State, owing to which growers have suffered severe loss. An excellent Bulletin (No. 142, October, 1913) on Tomato Diseases, has been issued from the Agricultural Experiment Station of the Louisiana State University, Baton Rouge, from which we take the chapter on

TOMATO WILT (*Fusarium lycopersici*),

this being the most prevalent in Queensland, although much loss is often sustained by anthracnose or black rot of the fruit, yet in Louisiana this is looked upon, according to the writers of the above Bulletin, as of very little importance, the disease doing so little damage as to make treatment not worth while. The subject of "Tomato Wilt" is, however, treated at length as follows:—

"EFFECT OF TOMATO WILT ON DIFFERENT PARTS OF THE PLANT.

Roots.	Stems.	Leaves.	Fruit.
Rotten or black on inside	Outside normal, inside black	Turn Yellow and die	Ripen prematurely

"The disease is produced by a fungus which lives over from year to year in the soil, and after a field is once badly infected it is difficult to grow tomatoes there for a number of years.

"APPEARANCE OF DISEASED PLANTS.

"The effect of this disease usually becomes noticeable at about the time the plants are coming into flower or a little later. The lower leaves of the plants turn yellow and finally die. The whole plant also becomes more or less stunted and has a more or less sickly appearance. As the disease progresses more of the leaves die and fall off, and finally the whole plant dies. Usually a few fruits develop on the plants, but they do not grow very large, and as the leaves of the plants have been shed they cannot ripen normally. They gradually colour up on the dead or dying plants, though they are not normal in size or flavour. During the last stages of the disease the dead plants hang limp on the stakes, the leaves have fallen or dried up, the stems are black, and the prematurely ripened fruit gradually rots. A plant that becomes infected late often ripens a few fairly good fruits before it dies, but a plant that becomes infected early usually dies before any first-grade fruit develops. Plants infected with the wilt may be scattered through the field, or the infection may be general; that is, with practically all of the plants infected.

"APPEARANCE OF THE STEMS AND ROOTS.

"If a plant that is affected with the wilt disease is pulled up and the stem cut across with a knife, the interior of the stem will be seen to be wholly dark coloured, or else there will be black areas in it. If a longitudinal section is made of the stem, these black areas will be seen to extend from the roots up to the leaves and sometimes even out into the petioles. An examination of the interior of the stems forms the best method of diagnosing the tomato wilt disease. A positive determination of this trouble can always be made in this manner, and it also forms a very easy method.

"The roots of the diseased plant are also discoloured on the inside, and many of the smaller roots and often some of the larger ones will be seen to be rotten. This disease is primarily a root and stem trouble, and all of the damage is done in these parts. The leaves only show the effect of the disease after the stems and roots are badly diseased and are unable to function as they should.

"THE CAUSE OF THE DISEASE AND ITS COURSE OF DEVELOPMENT.

"The tomato wilt disease is caused by a very small microscopic fungus, which is known technically as *Fusarium lycopersici*. This fungus is very closely related to the one which causes cotton wilt. The cotton wilt disease, perhaps better known to the Louisiana farmer than any other wilt disease, has a very similar appearance to the tomato wilt. Its presence in a diseased cotton plant is told by the same method; that is, by cutting open the stem and examining for the dark discolouration. However, the two diseases are distinct and the tomato plant cannot become infected from cotton or the cotton plant from tomatoes.

"The tomato wilt fungus lives in the soil, and will grow and develop there on the dead organic matter for some time even if there are no tomato plants in the field, though it will gradually decrease from year to year, if tomatoes are kept off the ground. The fungus apparently attacks the young roots of the plants and then grows up through them and into the stems. The tubes in the stems, in which the water is carried from the roots to the leaves, become plugged with the fungus mycelium and the water supply is shut off. This shutting off of the water supply, combined with the damage done to the roots, results in the wilting and the death of the whole plant.

" After the plant dies of the wilt disease, the fungus grows out to the surface of the stems and roots, and there produces the spores, which are the fruiting bodies of the fungus.

" While the life history of this disease in the plants is comparatively simple when compared with many other plant diseases, the location of the fungus in the ground and in the interior of the plant makes the disease a very difficult one to combat.

" THE SPREAD OF THE DISEASE.

" A question of much importance in the study of a disease of this nature is the methods that the fungus uses in spreading throughout the field, and especially from field to field. There are many fields in the State that have the disease in only scattered places, and also there are many fields which do not have the disease at all at present. It is important that we know how the disease is apt to get established in these fields so that we may guard against any infection. The spread of the disease in the field, or from one field to another, is accomplished in several ways. These may be taken up separately.

" *By Growing through the Soil.*—The fungus may spread in the field by means of the fungus mycelium growing through the soil from a diseased plant to a healthy one. This, however, is one of the least important methods as the fungus grows slowly in the soil.

" *By Old Diseased Material that is left in the Field.*—If the old diseased and dead plants are left in the field during the fall and winter, an excellent opportunity is afforded for the spread of the disease. The pieces of the dead plant with the disease still in them are blown around the field by the wind or are carried from place to place by various agencies, or are scattered about in ploughing. Wherever these pieces find lodgment, the disease is liable to develop the coming season.

" *By the Scattering of the Spores.*—When the plants die, spores of the fungus which causes the disease develop abundantly on the stems. These spores are very light and they are easily blown about the field by the wind, or they may be carried by men or animals that walk through the field and brush against the diseased plants.

" *By Planting Seed from Diseased Plants.*—While it has never been proven it would seem possible at least for the disease to be transplanted to a field by spores which might have found lodgment on the seed in the field. It is probable, however, that this is not a very important method of the spread of the disease.

"*By Planting the Seed in Infected Seed Beds.*—One of the most important ways in which the disease finds its way into new fields is by means of infected seed beds. In many places in the State, truckers use their seed beds or cold frames year after year without changing the soil, or at least not all of it. In many places these are filled with infected dirt or the disease later finds its way into them. When young plants are grown in such places, they become infected before they are set in the field. They do not show the disease at the time of transplanting, but later they show it in the field. Often a grower will ask why he had this disease in a field where he had never grown tomatoes before, not realising that he put it there himself when he set out his plants.

All of these factors have their influence on the spread of this disease and should be considered; though perhaps the most important ones are the leaving of the old plants in the field and the setting out of plants in the field that had already become infected in the seed beds or cold frames.

"THE CONTROL OF THE DISEASE.

"As the disease is one that is confined to the soil or to the interior of the plants, none of the ordinary treatments, such as spraying, will have any effect on it. In order to control this disease, we must keep it from infecting the soil, or if it is already present, we must try to eradicate it, or we must grow plants that will not become infected by the fungus. The important points which should be considered in the control of this disease are perhaps as follows:—(1) Keeping the disease out of a field that is not infected, or at least only has a small amount of the disease; (2) the rotation of crops; (3) the growing of resistant varieties.

"KEEPING THE DISEASE OUT OF THE FIELD.

"By looking at the methods of infection of this disease, as given on a previous page, we see that the disease is admitted to a field by pieces of old diseased plants, by spores of the fungus, by transplanting diseased plants from the cold frames, and possibly by planting seed with the disease on them. A great deal can be accomplished in checking this trouble by taking steps to prevent the introduction of the disease in the field. In the first place, all of the old infectious material should be destroyed. As the plants die from this disease they should be pulled up and piled and then burned as soon as they are dry enough. This will prevent the spread of the disease by the spores, which are produced on the dead plants, being blown around by the wind, and also from developing from the old diseased material in the soil in the coming year.

"Then particular care should be taken to keep the disease out of the cold frames or seed beds. Soil for these should only be obtained from fields that have never grown tomatoes, and it is questionable whether the same soil should be used for more than a year. If the disease can be kept entirely out of the field by a little care in this matter and a little extra work, more has been accomplished than can be done in any other way. There is no question but what many fields become infected by setting out diseased plants from the seed bed or cold frame.

"While it has not been proven that the disease is carried on the seed, it is possible that it can be carried in this manner, and it would probably be well to disinfect seed before planting. Tomato seed will stand short exposures to strong disinfectants without injuring their germinative power. Some experiments were tried to see what effect some different disinfectants would have on the germinative power of tomato seed. The seed were soaked in the different solutions and then, without drying, were tested for germination. In the following table the results of this test are given:—

TABLE II.

EFFECT OF DISINFECTANTS ON TOMATO SEED.

Treatment.	Germination, Per Cent.
Checks, not treated	70
Soaked in corrosive sublimate solution, 1 to 1000, for ten minutes ...	86.5
Soaked in corrosive sublimate solution, 1 to 1000, for fifteen minutes ...	83
Soaked in formalin solution, 1 to 300, for fifteen minutes	70.5
Soaked in formalin solution, 1 to 100, for ten minutes	76.5
Soaked in corrosive sublimate solution, 1 to 1000, for ten minutes and then soaked in pure water for ten minutes, in order to wash off the poison	92.5

"From this table it is seen that a soaking of the seed for ten to fifteen minutes in a 1 to 1,000 corrosive sublimate solution does not hurt its germinating power. In fact, this treatment seems to help the seed, perhaps by killing the various rotting organisms that are normally on the seed. Corrosive sublimate solution is very easily obtained. It can be purchased at the drug stores in the form of tablets, each tablet to be dissolved in a pint of water, making a 1 to 1,000 solution. It would probably be well for a farmer to always disinfect his seed before planting. Not only this disease but perhaps some of the others also may find their way into a field on the seed. Care should be taken, however, when this solution is used, as corrosive sublimate is very poisonous. It will not hurt the hands, but is very poisonous when taken internally. Porcelain vessels should be used to contain the solution.

"ROTATION OF CROPS.

"Tomatoes should not be grown in the same ground for more than one year out of three. In old tomato sections, truckers have found that this is a rule which must be followed if tomatoes are to be grown successfully, and while the tomato industry is young in this State, we should start in right. If the tomato wilt disease is present in the ground, it will increase in severity rapidly from year to year if tomatoes are kept on the ground. However, if tomatoes are planted only every third year, much of the disease will die out during the two years when tomatoes are not on the ground."

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

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

Order URTICACEÆ.

FICUS, *Linn.*

F. frutescens, Bail. sp. nov. (Plate 40).—An upright, rather slender shrub or small tree (or shrub mostly under 15 ft. in height). Branchlets mostly terete, only the very young growth slightly angular; stem hollow, distinct, mark brown and smoothish. Leaves from 3 to 5 in. long and ¾ to 1 in. broad, margins rather wavy, lanceolate, roundly truncate at the base; petiole mostly under 1 in. long and slender; the parallel primary nerves numerous but rather slender. The reticulate veins rather widely open. Stipules very narrow, 8 to 12 lines long. Receptacles axillary in pairs, globular, smoothish, about 5 lines diam., on peduncles of about 6 lines, rather thin. Male flowers not seen in the ripe fruit examined. Achene deep blood-red, shining, and minutely rugose. Style lateral, elongate.

Hab.: Bellenden-Ker Creek and Harvey's Creek, *E. W. Bick.* Feb., 1914.

The specimen examined was in bad condition, and the receptacles too far advanced for detailed examination.

TO MAKE SAUERKRAUT.

This favourite German method of utilising cabbages is often of value when there is a glut in the market, or when many of the cabbages are soft or burst. The process is very simple as described in Professor R. L. Watts's "Vegetable Gardening." After removing the cores and outside leaves, the heads are sliced or shredded (by special machines in manufacturies). The finely cut cabbage is then placed in a barrel in successive layers of about 6 in. Each layer is slightly salted and pounded. This operation is repeated until the barrel is nearly full. About one pint of salt is required for a barrel of kraut. The cabbage is then covered with a cloth, and boards cut to fit loosely in the barrel are heavily weighted. The brine formed by the salt and the juice should cover the cabbage during the acetous fermentation. When this is complete the kraut is ready for eating or canning. Vinegar is sometimes added to sauerkraut made on the farm, but in the factories nothing is used to sour the cabbages.

PLATE 40.—FICUS FRUTESCENS, *Bail, sp. nov.*
A—Stipule (nat. size). B—Ripe achene (enlarged).

The Horse.

CAN MULES BREED?

"La Hacienda" shows a photograph that says Yes! How often, we wonder, have all those to do with estate work, either in North or South America, as well as in many other centres, discussed the whys and wherefores that prevent a mule from breeding. We have always understood that such a thing is impossible. Venezuelan llaneros, American breeders, negro overseers, Spanish hacienderos, East Indian coolies, even Portuguese and Chinese shopkeepers have all in turn discussed the matter with us, and proved conclusively that for a mule to foal is impossible. In spite of all this, our contemporary, "La Hacienda," of Buffalo, trimphantly includes a photograph of a mother mule and a foal, with these words underneath (see their August issue, p. 349): "Mula que dio á luz un potrello en la Hacienda Hortela, Pilar de Alagoas, Brasil." (Mule which gave birth to a foal on the Hacienda Hortela, in Pilar de Alagoas, Brazil). Surrounding the two animals, which stand side by side, is a crowd of twelve men and boys, and probably there were others that could not be squeezed in the picture. We wonder whether all of these realised at the time how many tongues will be set wagging again over this evergreen controversy, at the sight of the photograph of this mother and son, since *potrello* not *potrella,* is used.

To further remove any doubt on the matter, we reproduce the following paragraph from the "Agricultural News" of Barbados, W.I., of a similar case in Cyprus, but in this instance it will be seen that two young mules had made their appearance. This would disprove any claim of the occurrence being a freak.

Under the heading "A Fertile Mule," our West Indian contemporary reports that some very interesting correspondence recently appeared in "The Field" (August 2nd and 9th, 1913) concerning the case quite lately observed in Cyprus of a female mule with foal at foot, (Plate.) The observations were recorded in the first instance by G. J. Harvey, M.R.C.V.S., Government Veterinary Surgeon, Nicosia, Cyprus. When called to the case he was informed that the foal was the second one born; last year the animal had given birth to a filly foal which lived two months. The present one was a colt foal two months old by a jack donkey and resembled somewhat a young donkey, but was bigger. The mule herself was 6 years old, 13.2½ hands high, and bay with black points. There were no special marks or stripes, and the animal was of a very good type. Inquiry seemed to indicate that she was bred from a she-donkey, sire unknown. At the time of writing she was giving milk, and the foal suckled in the presence of the veterinary surgeon, who was able to certify that both mule and foal were genuine. —"Tropical Life."

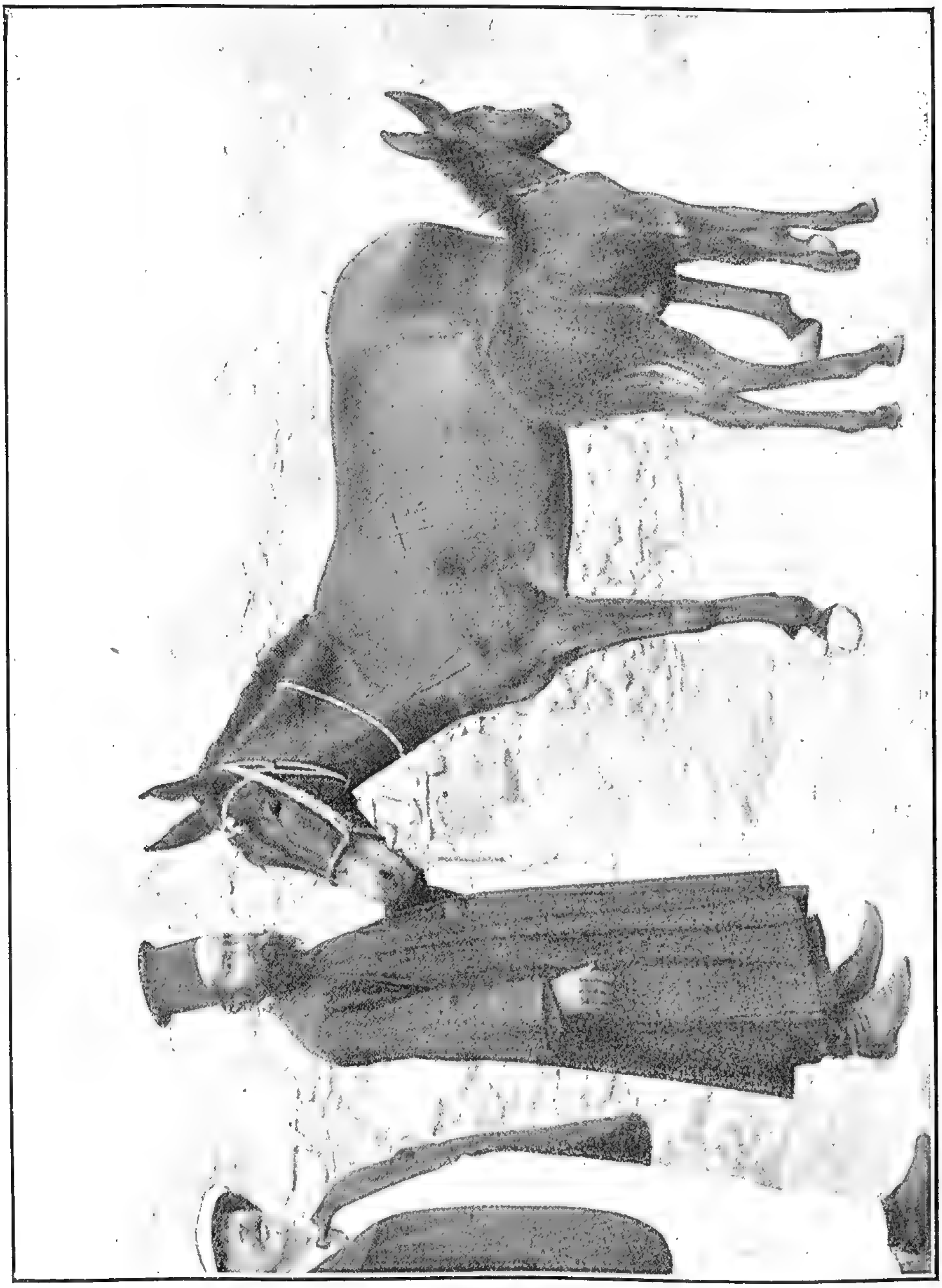


PLATE 41.—MARE MULE WITH FOAL. ILLUSTRATING NOTE BY G. J. HARVEY, GOVT. V. S., NICOSIA, CYPRUS.

Entomology.

A NEW FRUIT-BORING CATERPILLAR OF BANANAS OCCURRING AT TWEED HEADS (*HETEROMICTA LATRO*).

By E. JARVIS, Assistant Government Entomologist.

The following notes are written for the purpose of directing the attention of planters to an insect, hitherto unrecorded as economic, that is causing damage to green Cavendish bananas in the above-mentioned locality.

Samples of affected fingers, exhibiting the peculiar form of injury shown in the accompanying illustration, were submitted at this office last November, and examination soon revealed the presence of large, active grubs hidden under the damaged skin and engaged in devouring the fruit pulp.

Previous Occurrence.—These larvæ were transferred at once to a breeding cage, and in due time, when the first moth emerged, it was seen to be identical with a species previously bred by the writer during September, 1908, from larvæ tunnelling the trunks of grass-trees on Moreton Island. In the spring of the following year (1909) Mr. H. Tryon, Government Entomologist, noticed it boring the same plant at Glass House Mountains; so it seems reasonable to assume that this moth may eventually be found to breed more or less freely throughout grass-tree country.

Its possible occurrence in the Wide Bay district constitutes a danger which, although by no means alarming at present, may perhaps prove a source of trouble later on, and it behoves banana-growers at Nambour and Mooloolah, &c., but particularly those on the Southern border of the State, to keep a lookout for early signs of the presence of these fruit grubs.

My thanks are due to Dr. A. J. Turner, who has identified this pest as *Heteromicta latro,* and to Mr. N. Joubert, a well-known planter, for supplying information relative to its first appearance on the Tweed River.

This occurred about seven years ago, and at present the insect is more or less in evidence on all banana plantations in that district. He informs me that the injury is usually noticed on isolated plants, and seemingly may originate on either very young, half-grown, or ripening fruit.

Large or small bunches may be attacked, but as a general rule only a few fingers of a bunch, and these do not infect adjacent fruits.

Nature of Injury.—The disease invariably commences at the flower end of a finger, and soon becomes too conspicuous to be easily overlooked.

It bears no resemblance, however, to the comparatively smooth scab-like blemishes produced on green bananas by our other fruit-eating caterpillars,* but appears more like dry rot of a greyish-brown colour, and

* See—"Fruit Caterpillar of the Banana," E. Jarvis, "Qld. Ag. Journal," Jan., 1914

apparently does not hasten the decay of fruit or cause it to fall prematurely. The excreta of the grub are often noticeable on the damaged skin, and usually webbed together to form a mass, that serves to hide the mouth of the tunnel through which it has been ejected.

Although this disease may extend an inch or so towards the middle of a banana, it does not prevent the lower half from ripening in a normal manner; unless, as sometimes happens, fungi, such as ripe-rot (*Gloeosporium sp.*) or other organisms have invaded the tissues, in which case the entire finger may quickly blacken and decompose.

Our common maize moth (*Dichocrocis punctiferalis*) has lately taken to boring green bananas, and its work might easily be mistaken for that of the insect under discussion, as it attacks the flower end of the fingers, producing effects very similar to those alluded to above.

Note.—It will be of interest to mention that a few diseased bananas, kindly submitted by Mr. Joubert, exhibited symptoms differing in many respects from those just described.

No moth-borer occurred, but the extremities of these fingers were whitish or flesh-coloured, presenting a remarkable form of dry rot of the consistency of hard cheese, that when broken across was found to enclose pupæ from which there ultimately emerged specimens of a beetle belonging to the genus Doticus, and apparently identical with *Doticus pestilens*, an insect known to be injurious to apples in some parts of Victoria.

This beetle should be regarded with suspicion until we know more about its economy. Apples attacked by it are said to shrivel on the tree and hang there the whole year, the larvæ pupating in the dried fruit, from which, in the ensuing spring, the beetles emerge to lay their eggs.

The diseased portions of these fingers also harboured numerous larvæ of a species of *Nitidulidæ* closely related to *Carpophilus hemipterus*, a notorious destroyer of dried Turkey figs, &c.

The Moth.—Life-size photos of both sexes of the perfect insect are figured on plate 42, but, as it is seldom noticed in the field, a technical description of the moth is unnecessary, and it will be sufficient to mention that the front wings of the female are of a uniform pale brownish-gray, and those of the male similarly coloured, but with the addition of a longitudinal white streak and a dark-brown one adjoining it running the full length of the wing, the latter streak occupying a nearly central position.

The hind wings in both sexes are very pale-silvery gray, with the outer angles faintly clouded with brown.

Description of Larva and Pupa.—The following brief descriptions will enable growers to identify the caterpillar and pupa of this fruit grub:—

Larva.—General colouration, dark smoky-brown with a dull yellow band down centre of back on the three posterior segments constituting the tail end, and less noticeable blotches of the same colour on segments just behind the head.

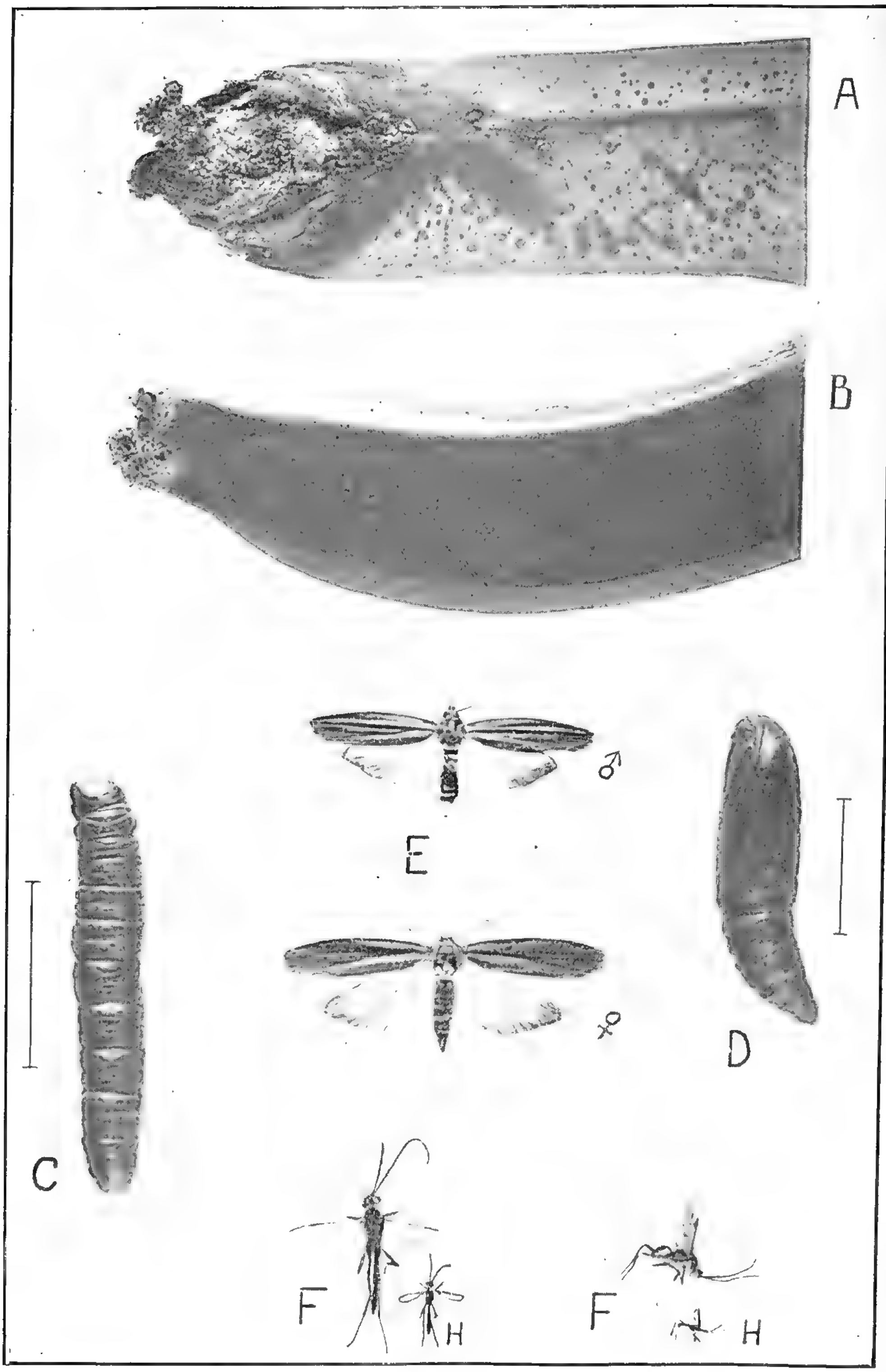


PLATE 42

A—Injury to flower end of finger (advanced stage). B—Injury to flower end of finger (early stage). C—Caterpillar, magnified about 2¼ times. D—Pupa, more than twice natural size. E—Moth (*Heteromicta latro*) natural size (♂ male, ♀ female). FF—Hymenopterous parasites of *H. latro* (magnified). HH—Natural size of these parasites.

First thoracic segment (next to head) reddish-yellow, smooth, and shining, with a narrow light-yellow central line and the frontal edge blackish.

Head dark shining red. Under surface of body, including feet, dull greenish-yellow.

Length about 25 mm. (about 1 in.).

Pupa.—The pupa, which is enclosed in a somewhat papery-looking silken cocoon covered with excreta and débris, is pale yellow suffused with dark reddish yellow on the back and head, and has a narrow keel-shaped ridge running along the middle of back and extending the whole length of the body.

The extremity of the anal or last body segment is dark reddish in colour and provided with eight short, stout, pointed protuberances.

Length of pupa about 18 mm. (about ¾ in.).

Control Methods—Natural Enemies.—Fortunately this insect is held in check by hymenopterous parasites which, up to the present, appear to have kept it from doing serious damage.

The two parasitic wasps, figured F.F. on the accompanying plate, were bred by the writer from larvæ procured in 1908.

The thorax, head, and antennæ of the larger species are black, the abdomen light-red, barred with somewhat triangular-shaped black dorsal blotches, and the legs light red with hind tarsi black. Length of insect about 7 mm. (¼ in.).

The smaller wasp is brownish-yellow with green eyes, and two-thirds of the dorsal surface of its abdomen—viz., the basal and apical portions—are dark-brown, the remaining central third being brownish-yellow bordered on each side with black. Nervures of the wings and stigma brown, the latter large and conspicuous. Length of insect about 4·50 mm. ($\frac{1}{8}$ in.).

Artificial Control.—Growers should endeavour to prevent the moths from breeding by picking and destroying all infested fruits as soon as noticed.

Such treatment followed systematically would go far towards exterminating this pest, and at the same time check the breeding—among bananas, at any rate—of its more dangerous associate the maize moth (*Dichocrocis punctiferalis*). In this connection, I should like to embrace the opportunity of warning growers of the danger likely to result from planting maize in the immediate vicinity of bananas.

Other hosts favoured by this pest are—cotton, pawpaws, loquats, custard apples, peaches, &c.

It will be of interest to mention that a grower at Blackall has succeded in keeping the maize moth in subjection by simply rubbing off the flowers from the ends of fingers as soon as they have assumed a brown tint and become partially dry, from which we may infer that the eggs of this insect are probably deposited among the petals of withered flowers on half-grown fruit. These useless blossoms not only afford possible security to eggs of noxious insects, but in some districts may be a source of positive danger to developing bananas, as they occasionally harbour destructive fungi, the spores of which, when scattered broadcast over the bunch in enormous numbers, are ever ready to invade green or ripening fruit as soon as favourable opportunity offers.

Whilst on this subject, I would like to emphasise the advisability of preventing, as far as practicable, the spread of "Ripe Rot" or Anthracnose (*Gloeosporium* sp.) among banana plantations.

This fungus attacks a great variety of different fruits and vegetables, usually gaining an entrance through wounds in the peel or skin, caused by puncturing or biting insects, birds, falling twigs, hail, or unsuitable cultural conditions, &c.

I cannot do better than briefly summarise in part the admirable advice published by Professor Cobb relative to the best preventive treatment for this fungus:—

(1) Prevent the fruit from being injured by insect pests or other enemies.

(2) Destroy all affected unmarketable fruit that may be growing in the vicinity of the plantation.

(3) Destroy all rotting tomatoes, cucumbers, pumpkins, and vegetable matter generally.

(4) Apply fungicides to affected banana plants and to other plants or trees in the vicinity that may be found harbouring the ripe rot fungus.

(5) Do not spray at a time when the operation will be immediately followed by hot sunshine; and take care to apply spraying solutions in a mist-like form.

(6) Guard against injury to the fruit from chafing, or from falling twigs and other débris.

(7) Provide efficient drainage conditions.

(8) Disinfect fruit cases, boxes, &c., by immersion in boiling water or weak formalin solution.

To return to the question of the control of *Heteromicta latro*, I may say, in conclusion, that grass-trees growing near banana plantations are a possible source of infection and should be rooted out and burnt.

And now, just one word with regard to the treatment of grub-infested fruit.

In view of the possibility of such bananas containing parasitised larvæ, they should not be burnt, but the dried ends cut off just below the injury and thrown into an empty kerosene case or other wooden box that has been previously made grub-proof and fitted with a cover of perforated zinc (16th inch mesh). A few dead leaves and a little sawdust sprinkled over the bottom will induce larvæ to pupate in this box instead of attempting to crawl away; and moths that may emerge later on will be unable to escape, whilst any parasites hatched will at once crawl through the holes in the metal lid and be free to carry on their useful work.

General Notes.

POISONING TREES.

We have received the following letter from Mr. G. H. Bomford, Izulwini, Byrnestown, giving his and Mr. E. Neilsen's experience in the work of not only killing growing trees, but in also preventing the growth of suckers. We have many inquiries on this subject, and Mr. Bomford's letter will doubtless be read with much interest by many farmers and new settlers, who are troubled with an after-growth of suckers after ringing or felling the trees. Mr. Bomford writes:—

"In your issue of a few months back you ask for information and experience with the arsenic method of poisoning trees. Two years ago I tried that method on about 5 acres of thickly-timbered box and ironbark country, with the result that about 80 per cent. died right out, about 15 per cent. died at the top, but suckered below the ring, and the remaining 5 per cent. are still green.

"I rung the trees about 2 ft. 6 in. from the ground, with a single ring, and then poured the poison in the ring. The trees that remain green at the top are those in which the cuts did not meet all the way round the tree. The ring is apparently complete in the trees that have suckered at the bottom, but died at the top. I only tried the treatment on the one occasion in the month of February. My neighbour, Mr. E. Neilsen, has treated about 80 acres (mostly grey gum), and his experience with the ring about 2 ft. 6 in. from the ground is practically the same as mine. Most of his, however, were done with the ring as close to the ground as practicable, and he reckons his result with that is practically 100 per cent. of deaths without suckering, if the ring is continuous. Mr. Neilsen was ringing for several months at about the same time that I did mine. The poison used by both of us was 1 lb. ordinary grey commercial arsenic, dissolved in a kerosene tin of boiling water, with 2 lb. of washing soda."

BANANA JUICE *v.* SNAKE-BITE.

A correspondent of the Rockhampton "Bulletin," from Mount Larcom, gives an instance of a cure effected by the use of banana juice, on a dog which had been bitten ten days ago by a brown snake. He writes: "At 9 o'clock on Friday morning, 20th February, my cattle slut was bitten by a brown snake about 3 ft. long. I killed the snake, but did not know my dog was bitten until 10 o'clock. The bite was on the lip, and the head was swollen, the heart was thumping against her ribs, and the poor animal seemed in a bad way. I got some banana juice from young suckers, and gave the slut a dose. This seemed to relieve the heart-beating at once. I gave five doses, I should say, about half a pint in all, and by the evening she seemed much better. She is now quite well except for a swelling where the bite was. My dog has killed a large number of snakes, and this is the fifth time she has been bitten, but it is the first time a brown snake got hold of her. The cure seems to show that banana juice is a good antidote for snake-bite, and I think I should chance taking some myself if ever I have the bad luck to be bitten. We have killed over 150 snakes since coming here. I think it is the worst place I have ever struck for the reptiles."

We have several times drawn attention to reported cures of snake-bite in Brazil and India, and now we have apparently confirmation of the benefit of banana juice in Queensland. Of late there have been several cases of snake-bite in the country districts near Brisbane, one of which proved fatal. Surely the antidote could have been tried, the juice being perfectly harmless. Now we hear of the death of Dr. Fox, in India, a scientist who has been demonstrating the powers of an antidote he possessed. He frequently allowed himself to be bitten, and unfortunately he overlooked one of five punctures made in his arm by a "fraity" snake, and his death consequently followed.

An analysis of the juice of the banana would doubtless reveal the presence of something besides tannin and water.

A JUMPING RABBIT.

It is generally understood that rabbits in Queensland have developed a climbing habit, which enables them to overcome such an obstacle as rabbit netting. What is most remarkable is, that the rabbit here has developed a new nail—a long nail by which they can retain their hold on a wire fence whilst climbing.

An article in the "Enquirer," in connection with this new feature in the rabbit's anatomy, was to the following effect:—"About forty-five years ago, three pairs of enterprising rabbits were introduced into Australia. To-day the increase of those six immigrants may be counted by millions. They became a pest to the country Fortunes have been spent to exterminate them. Wire fences many feet high have been built to keep out the invaders for hundreds of miles in the West. The rabbits had to fight awful odds to live, but now they have outwitted man. They have developed a new nail, which not only enables them to climb the fences, but to burrow 6 to 8 in. beneath the wire." This statement was submitted in March, 1913, to Dr. Hamlyn-Harris, Curator of the Queensland Museum, and he said that so many variations have been noted in the structures of rabbits that he would have considerable hesitancy in giving a direct negative to the story of an abnormal development of a rabbit's nail, since rabbits introduced into the island of Porto Santo have developed distinct characteristics. But there is no definite record of any such modification in Australian specimens. The new nail is probably an individual abnormality. We find in the "British Live Stock Journal" (16th January, 1914), that "Brer" Rabbit has developed jumping tendencies. A paragraph in that journal, taken from "The Field," is to the following effect:—

> "The other day, when covert shooting, I saw a rabbit jump a 3 ft. 6 in. stake and bound fence. I have never before seen a rabbit do anything but crawl through a gap in a stake and bound fence; the ditch was towards the rabbit in the above instance, but the ditch was small, the fence newly made up, and no doubt the rabbit, which had been shot at and missed, found its usual gap made up and had to jump."

It will be a sorry day for Australia should our rabbits contract a jumping habit, as our rabbit fences are only 3 ft. 6 in. high, and they would require to be raised to the height of dog-proof fences.

A NEW SISAL SCUTCHING MACHINE.

A new machine for extracting sisal hemp fibre is referred to in the "Monthly Bulletin of Agricultural Intelligence and Plant Diseases" (May, 1913). This machine is stated to be distinguished by its great simplicity; and the recent trial before a number of managers of plantations in German East Africa showed the extraction of the fibre to be excellent. The "Roland" machine—as it is called—is built of heavy iron, and the intermediate gearing is mounted on the machine itself, which is besides fitted with ball bearings of a special type, which allow it to run with extraordinary smoothness. About 25-h.p. are required to drive it when working at its maximum.—"Agricultural News," Barbados.

SUGAR FROM LUCERNE.

We already well know the various sources whence sugar is derived, and at least many proposed sources for the commercial extraction of sugar, many of which, so far, have never got beyond experiments in the laboratory.

Now, however, it is from the lucerne plant that it is proposed to extract sugar. Naturally, it is from the United States that this news comes, and it is said that during the past year a company has been formed entitled "The National Alfalfa Products Company," to place the products of lucerne on the market. Amongst these, that of greatest importance is a syrup containing 33·15 per cent. of sugar—that is to say, as much as is contained in the syrup of apples. The flavour of the lucerne syrup is said to be very delicate, and this product is obtained from very young lucerne, cut after only twelve days of growth. This admits of twelve crops in a season. The product is treated by artificial heat, and the cost of production is set down at 1 fr. 25 (about 1s.) per gallon. According to the promoters of the company, lucerne thus utilised would be so valuable that it would no longer be cultivated as simply fodder for stock. It would, furthermore, be a source of cheaper sugar.—"Journal d'Agriculture Tropicale," Paris.

According to an analysis of green lucerne by Mr. J. C. Brünnich, Agricultural Chemist (1st December, 1901), published in the "Queensland Agricultural Journal," the constituents of the grass are as follows:—

	Per Cent.
Moisture	79·30
Total dry substance	*20·70*
Soluble albuminoids	·69
Insoluble albuminoids	2·20
Digestible fibre	5·61
Woody fibre	5·06
Soluble Ash	7·41
Insoluble Ash	·55
Crude Ash	...
Pure Ash	*2·31*
Fat	·31
Amides, &c., by difference	4·52
Amide nitrogen	·243
Total nitrogen	·706

Notwithstanding this dazzling project, Queensland dairymen will still continue to feed lucerne to their stock, and thus make more money out of it than by any such Utopian scheme as above described of turning the fodder into sugar.—[ED. "Q.A.J."]

TO COTTON GROWERS.

The Department of Agriculture and Stock is prepared to receive raw cotton for ginning, to be consigned to Brisbane. The cotton will be ginned and sold, and the net proceeds, after deducting the cost of ginning and marketing, will be paid to the grower.

An advance of 1½d. a lb. will be paid upon receipt of the raw cotton in Brisbane, calculated upon the weight received.

Answers to Correspondents.

COOLING CREAM.

J. TRAVERS, Crow's Nest—

Your letter asking for a simple method of cooling cream and retaining it at a comparatively low temperature on the dairy farm was submitted to Mr. E. Graham, Dairy Expert, who has forwarded to you his pamphlet entitled, "Advice on the Routine of the Dairy," on page 21 of which is given an illustration of one of the best designs of cream-coolers, set ready for operation. The water supply is contained in water-bags as shown, and the water may be reused for the purpose required of it.

Explanatory notes on the treatment of the cream supply on the dairy farm are given on page 22 of the pamphlet.

After cooling and aerating the low temperature of the cream may be retained by lodging it in a cream cabinet. A sketch of this device is shown on accompanying plan, marked in red ink, while the structural essentials of the cabinet are detailed in the latter portion of the specification enclosed.

To your question on feeding dairy stock, Mr. H. C. Quodling, Inspector of Agriculture, replies:—

"Panicum and Japanese millet are incomplete foods for milk production, as they do not contain sufficient protein; this element is essential to carry on the vital function of an animal.

"When using these or other green fodders such as sorghum or maize, it is necessary to use about 40 or 45 lb. of this greenstuff per day for each animal, and add from 15 to 18 lb. of lucerne or cowpea chaff to it, in order that the beast may receive a properly-balanced ration.

"Skinless barley and field peas, grown together, afford a nutritious fodder, well suited for milk production. Use about 50 lb. of barley and 25 lb. of peas per acre. The present month is a suitable time to plant."

ORANGES AND THE FRUIT FLY.

Replying to a query from A. E. L. Birtling, Boyne River, Mundubbera, Mr. C. Ross, F.R.H.S., Instructor in Fruit Culture, writes:—

"The close proximity of the deciduous orchard, owing to its subjection to fruit fly, would certainly be a menace to a late orange crop. The Washington navel is a shy bearer when young, especially on weak soils. It does best on a fairly strong loam with proper drainage, and requires more generous treatment regarding fertilisers than most varieties. It can be brought into a regular habit of bearing by cincturing, articles on which are to be found in the January and February numbers of the "Queensland Agricultural Journal." The Joppa, being a more consistent bearer, may be substituted. The Valencia, being late, is more liable to fly attack, nevertheless, taking year by year, it is probably the most profitable variety. Mediterranean Sweet and St. Michael are both sure croppers, and much earlier will suit the locality."

TOP-DRESSING PASTURE LAND.

W. V. JOCUMSEN, Cooroy—

To be effective bone dust applied as a surface pasture fertiliser should be in a very fine state of division, such as bone flour. Bone dust is a phosphatic manure, and for grass land a manure containing both soluble phosphoric acid and nitrogen is to be recommended. The nitrogen is very important. As to when the paddock would require another dressing, this would depend upon the class of land and the amount of manure applied in the first instance, possibly three or four years. There is no danger to stock from an application of bone dust—in fact, it would be more a benefit than otherwise. Should it be intended to apply a fairly heavy dressing of fertiliser, the pasture could be improved to a much greater extent by spending the money on breaking up the land and putting it under Rhodes grass, but as you will be unable to plough it for three years, your plan will have to be followed.

SAP-SUCKING INSECTS.

H. H. STEGMAN, Ebagoolah—

The insects referred to in your letter were handed to Mr. Edmund Jarvis, Assistant Entomologist, who has furnished the following report thereon:—

" The two insects forwarded by Mr. Stegman are different species of plant-bugs, the larger belonging to the family Coreidæ, and the smaller one to family Pyrrhocoridæ.

" Both insects are sap-sucking in habit, the latter, which is very common, having been unusually plentiful during the past season.

" The Coreid bug has not hitherto been recorded as a serious economic insect, although it is closely related to species that are known to be destructive at times to cucurbitaceous and other plants.

" Both of these bugs when numerous will probably attack any cultivated fruits that they may find will afford palatable moisture.

" They can, however, be effectively controlled by hand methods of collecting, practised during early morning or at times when the insects are seen to be resting on foliage and disinclined to fly.

" At such times they may be shaken or brushed off the leaves into a shallow pan or dish containing a little water and kerosene, or trapped in any other manner which may suggest itself as being adaptable to circumstances."

TESTING THE SOIL FOR LIME.

" SISAL," Logan road—

Sisal (*Agave rigida var. Sisalana*) will not thrive without a certain proportion of lime in the soil. It is very easy to ascertain whether this is present or not, by taking a portion of the soil and pouring some hydrochloric acid on it. If lime is present, an effervescence will follow. Should this not occur, it will be necessary to apply lime before planting. About one ton per acre would be sufficient. The above test will not tell you what quantity of lime is in the soil; it merely shows that it is there.

APRICOT AND PLUM TREES CEASING TO BEAR.

A. S., Veradilla—

Our correspondent asks if anything can be done for plum and apricot trees that have ceased to bear when eight years of age, after having borne heavy crops at the second and third fruiting, the plum-trees flowering well, but the fruit dropping off after attaining the size of a pea, the apricot-trees not flowering at all.

Mr. C. Ross, F.R.H.S., Instructor in Fruit Culture, advises:—

"Endeavour to form a new head to the trees by pruning hard back next winter, reducing the size of the head to at least one-half. Do not allow the following summer's growth to become overcrowded. See that the new growths are properly spaced by rubbing off superfluous shoots with the finger and thumb. Encourage root action by good cultivation. Keeping the surface well stirred will conserve sufficient moisture to prevent dropping. Dress the soil as far as the extremities of the branches with 4 lb. superphosphate, 2 lb. sulphate of potash, and 1½ lb. sulphate of ammonia for each tree, and chip in annually."

FEEDING FOWLS FOR EGGS.

C. D. C., Cooktown—

In reply to yours of 16th instant *re* feeding fowls for eggs: Fowls when laying require flesh-forming foods. A laying ration should be of meat or green bone in addition to a living ration. The latter should consist of warm soft food, and each hen should get a lump the size of a tennis ball in the morning, a good handful of grain (preferably wheat) at night, with plenty of green food at midday. Then the laying ration should be ½ oz. of meat or green-cut bone given at midday. A little meat may also be given with the morning meal, but the diet should never consist of all meat or all grain or all greenstuff, otherwise you will engender liver disease, gall bladder, and disorders of the intestines. For a good egg supply a varied diet composed of meat, grain, and vegetables is undoubtedly the best. Pollard and bran are good for the soft morning meal. Maize is a dangerous food. Given in excess, it produces liver disease. It is heating and fattening, and therefore dangerous to birds in a warm climate or in constant confinement. It produces a yellow fat and induces the laying on of internal fat which clogs the organs of egg production. It is all right for broody hens, which should be fed only once a day, and want a heating, fattening, filling grain that does not digest too rapidly. Maize is just such a food. One pound of potatoes and 1 lb. of bran is a useful soft mixture. There is a deficiency of fat in this, but a handful of grain in the evening will supply it. When using bran, be sure and scald it well before mixing. Water should be supplied plentifully, seeing that the body of the fowl is composed of 75 per cent. of water, and the egg 75 per cent.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR MARCH, 1914.

Article.		MARCH. Prices.
Bacon	lb.	11½d.
Bran	ton	£5 10s.
Butter	cwt.	108s.
Chaff, Mixed	ton	£5 10s. to £6
Chaff, Oaten (Victorian)	"	£4 to £4 10s.
Chaff, Lucerne	"	£5 5s. to £5 12s. 6d.
Chaff, Wheaten	"	£3 5s. to £4
Cheese	lb.	6d. to 6½d.
Flour	ton	£9
Hams	lb.	1s. 1½d. to 2s.
Hay, Oaten (Victorian)	ton	£6 to £6 10s.
Hay, Lucerne (Prime)	"	£3 10s. to £4 15s.
Honey	lb.	1½d. to 2¾d.
Maize	bush.	4s. 4½d. to 4s. 5½d.
Oats	"	3s. 9d. to 4s. 6d.
Onions	ton	£11
Pollard	"	£5 10s.
Potatoes	"	£9 to £11 10s
Potatoes (Sweet)	cwt.	3s. to 4s. 6d.
Pumpkins	ton	£1 10s. to £2 10s.
Wheat, Milling	bush.	3s. 6½d. to 3s. 6¾d.
Eggs	doz.	1s. to 1s. 6d.
Fowls	pair	2s. 3d. to 3s. 9d.
Geese	"	5s. to 5s. 6d.
Ducks, English	"	2s. 3d. to 2s. 6d.
Ducks, Muscovy	"	3s. to 4s.
Turkeys (Hens)	"	7s. to 9s.
Turkeys (Gobblers)	"	15s. to 20s.

SOUTHERN FRUIT MARKETS.

Article.	MARCH. Prices.
Bananas (Fiji), G.M., per case	13s. to 16s. 6d.
Bananas (Fiji), per bunch	2s. 6d. to 3s.
Bananas (Queensland), per case	9s. to 11s.
Bananas (Queensland), per bunch	...
Mandarins (Emperors), per case	...
Oranges (Navel), per case	...
Oranges (other), per case	...
Pawpaw Apples, per quarter-case	
Passion Fruit, per half-case	11s.
Pineapples (Queensland), (common), per case	6s. to 7s.
Pineapples (Queensland), (Ripleys), per case	6s. to 7s.
Pineapples (Queensland), (Queens), per case	7s. to 8s.
Pineapples (Rough), per half-case	1s. 6d. to 2s. 6d.
Strawberries	...
Tomatoes, per quarter-case	...

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	MARCH. Prices.
Apples, Eating (American), per case	8s. to 10s.
Apples, Cooking (American), per case	6s. to 7s.
Apricots, per quarter-case	...
Bananas (Cavendish), per dozen	2d. to 3½d.
Bananas (Sugar), per dozen	1¼d. to 2d.
Cape Gooseberries, per quarter-case	...
Cherries, per quarter-case	...
Citrons, per cwt.	...
Cocoanuts, per sack	...
Cumquats, per case	6d. to 9d.
Custard Apples, per case	...
Grapes, per pound	½d. to 4d.
Lemons (Local), per case	8s. to 10s.
Limes, per case	...
Mandarins, per case	...
Mangoes, per case	3s. to 4s.
Oranges (Italian), per case	...
Oranges, per case	...
Papaw Apples, per quarter-case	...
Passion Fruit, per quarter-case	7s. to 8s.
Peanuts, per pound	3d. to 3¼d.
Peaches, per quarter-case	3s. to 4s. 3d.
Persimmons, per quarter-case	1s. to 1s. 9d.
Pineapples (Ripley), per dozen	6d. to 3s.
Pineapples (Rough), per dozen	4d. to 2s. 6d.
Pineapples (Smooth), per dozen	1s. to 3s.
Plums, per quarter-case	3s. to 4s.
Quinces, per case	1s. to 3s.
Quinces, per quarter-case	1s. to 1s. 6d.
Rockmelons, per dozen	...
Strawberries	...
Sugarmelons, per dozen	1s. to 1s. 6d.
Tomatoes, per quarter-case	1s. 6d. to 2s. 6d.

TOP PRICES, ENOGGERA YARDS, FEBRUARY, 1914.

Animal.	FEBRUARY. Prices.
Bullocks	£11 12s. 6d. to £13 17s. 6d.
Bullocks (Single)	£14 7s. 6d.
Cows	£8 10s. to £10 17s. 6d.
Merino Wethers	21s. 3d.
Crossbred Wethers	28s.
Comeback Wethers	31s. 3d.
Merino Ewes	19s. 6d.
Crossbred Ewes	21s.
Lambs	19s. 6d.

ENOGGERA FAT STOCK STATISTICS.

THE FOLLOWING WERE THE SALES OF FAT STOCK THROUGH THE NEWMARKET YARDS FOR THE MONTH OF FEBRUARY, 1914.

—	Sheep.	Lambs.	Cattle.	Calves.
Fenwick and Co.	7,358	770	1,116	243
Morehead's Ltd.	6,105	450	671	157
Dalgety and Co.	4,200	115	613	160
N.Z. Loan and M.A. Co., Ltd. ...	2,625	437	119	49
The Aust. Estates and M. Co., Ltd.	1,910	314	61	49
Winchcombe, Carson, Ltd.	1,814	51	391	84
John Bridge and Co., Ltd.	1,481	52	676	87
Sturmfels Ltd.	1,201	649	212	14
Thos. Noyes	1,037	...	126	...
Mactaggart Bros.	70	...	217	59
A. M. Land and Finance Co., Ltd. ...	...	...	1	11
	27,801	2,838	4,203	913

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 at 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. Cotton-growers are notified that cotton-ginning and baling machinery has been installed on the premises of the Department of Agriculture and Stock in William street, where seed cotton will be received by the department from the growers, to whom an advance of 1½d. per lb. will be paid. The cotton will then be ginned, baled, and marketed in the best market and whatever balance to credit is shown when account sales are received will be distributed amongst the suppliers according to the amount of cotton supplied by them. Only bare expenses of preparing the shipments; freight will be deducted. Thus it will be seen that cotton-growers will have a sure market for their produce. Every effort should be made to insure feed for stock during the winter by utilising all kinds of green fodder in the form of silage or hay. Those who own dairy stock will be wise to lay down permanent grasses suitable to their particular district and soil. A few acres of artificial grass, notably, Rhodes grass, will support a surprisingly large number of cattle or sheep in proportion to acreage. Couch grass in the West will carry ten to twelve sheep to the acre. Coffee-picking should now be in full swing, and the berries should be pulped as they are picked. Strawberries may be transplanted. The best varieties are Pink's Prolific, Aurie, Marguerite, Annetta, Phenomenal, Hautbois, and Trollope's Victoria. Aurie and Marguerite are the earliest. 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 long since have been thoroughly cleaned, pulverised, and should be 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.—Planting and transplanting 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, pentstemons, heliotrope, &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, watsonias, iris, narcissus, daffodils, &c. Tulips will not suit the Queensland climate, but hyacinths may be tried, although success is 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.

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 loam 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, pawpaws, 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 elewhere, 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 bone dust, 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 overlarge and coarse, and is only of value for peel. Only the finest fruit should be cured; the larger fruit, when 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.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. I. MAY, 1914. PART 5.

Agriculture.

AGRICULTURAL LIME AND LIMESTONE IN QUEENSLAND.

By J. C. BRÜNNICH, Agricultural Chemist.

The use of lime in agriculture is so ancient and so well known that it hardly appears necessary to write any more about it. A good deal of misunderstanding, however, still exists, more particularly with regard to the use of various forms of lime; and a few notes on the action of these may be welcome to a few.

All practical farmers know, or should know, that, unless their soil contains a sufficient amount of lime, the plant will not be able to derive full benefits from an application of natural or artificial fertilisers, and large amounts of artificial fertilisers have gone completely to waste by overlooking this fact. Although it is now recognised that lime in itself is a necessary plant food, it must not be considered a fertiliser in the ordinary sense of the word, as its chief value lies in the fact that it has a powerful action in improving the quality of soils in various ways.

Liming improves the texture of the soil, increasing, on the one hand, the porosity and tilth of heavy clayey soils, and, on the other hand, helps to bind loose sandy soils, giving them a more loamy character and making them more retentive. Lime counteracts any excess of acidity, and also precipitates and destroys ill-effects of certain soluble iron salts. It again liberates valuable mineral plant foods, chiefly potash, and helps in the decomposition of organic matter, in aiding the activity of various kinds of bacteria, more particularly the valuable bacteria of nitrification, which change ammonia salts into nitrates, and in making the nitrogen available to plant life.

Lime may be applied in various forms, in accordance with the nature and requirements of the soil. The principal forms are—

1. Caustic lime, burnt lime or quick lime, and air-slacked lime.
2. Carbonate of lime, marble, limestone, chalk (shells, coral).
3. Sulphate of lime or gypsum.

Burnt lime or **quick lime,** is obtained by the burning of limestone (carbonate of lime) ; it has a powerful caustic action, and is of particular value to heavy clayey soils and soils containing large amounts of organic matter, like peaty and swampy soils; it is also useful to be applied after ploughing under a heavy crop of green manure. It is generally applied at the rate of 10 cwt. to 1 ton per acre, and every three, five, or more years according to nature of the soil. Caustic lime may be applied as such in finely ground form, but it is more frequently used in the slightly milder form of slaked or air-slaked lime. Caustic lime absorbs moisture eagerly, evolving a considerable amount of heat, changing into slaked lime. The burnt lime may be simply left in heaps on the field, allowing it to crumble gradually into powder form, or the process may be hastened by sprinkling the heaps with a little water. As soon as all the lime has fallen into powder it is broadcasted over the field. As lime has a tendency to sink readily into the soil by the solvent action of water, it is not ploughed in, but may be slightly harrowed in. Quick lime is generally applied by itself a few weeks before giving a dressing of artificial fertilisers, because if applied with superphosphates it would change the soluble phosphate into an insoluble form, and if applied with ammonia salts, like sulphate of ammonia, it would liberate and drive off ammonia.

Carbonate of lime is generally applied in form of limestone screenings, crushed coral, and shell sand, and is chiefly used for lighter soils. Its action is very much slower, and, as it contains generally only about 50 per cent. of lime, it must be applied in much larger amounts than quick lime. As a rule, from 1 to 2 tons of limestone will have to be applied per acre. The action of limestone is, in many cases, very much improved by applying at the same time a small amount of air-slacked lime, say from 3 to 5 cwt. per acre, on account of the immediate stimulating action of this more soluble form on bacterial life.

Sulphate of lime, or gypsum, is often used as a top dressing for clover, lucerne, and other leguminous crops. Its chief value lies in its use for soils containing alkali carbonates, and infertile "alkali patches" may be often improved by a heavy dressing of gypsum or "plaster."

It is generally considered that a soil with less than 1 per cent. of lime is deficient, and requires liming. A very great percentage of our Queensland soils contain much less than 1 per cent., and we generally consider an amount of ½ per cent. as fair.

There can be no doubt that the great bulk of our agricultural lands would be greatly benefited by liming. In a few isolated cases we have reports on the effect of liming, and in all cases where sufficient lime was applied the results were excellent; therefore, we can strongly recommend our farmers to use lime in one form or another, according to the requirements of their soils.

From the "Queensland Mineral Index and Guide," by the Government Geologist, Mr. B. Dunstan, we find that limestone deposits are very widely distributed in Queensland, and the average annual yield (of five years, 1908-1912) was 129,000 tons, principally used as a flux in smelting operations, and the principal districts supplying limestones are:—Charters Towers, Chillagoe, Etheridge, Gladstone, Herberton, Cloncurry, Rockhampton, Stanthorpe, Star River, Warwick, &c.

In order to get some information on limestone deposits in this State, the various inspectors attached to the Department of Agriculture and Stock were asked to report on limestone deposits in their districts, and submit samples for analysis. Good deposits of pure limestone exist in various localities. The cheapest source at present is the limestone quarry at Marmor, which supplies limestone screenings at 6s. per ton loose in trucks, and at 10s. per ton in bags. At this price the limestone can stand to be carried a good distance by rail, and still be cheap enough to be used by the farmers. Burnt lime of high quality is obtainable from Calcium Siding, on the Charters Towers Line, at £2 per ton. Shell lime is collected in many places on the coast, but the cost, as a rule, is too high.

Interesting deposits of "calcareous sinter" exist in various localities on the Darling Downs, at various depths, underlying alluvial soil. Similar deposits are found near Springsure, and also near Mirani, in the Mackay district. These deposits are most probably due to the action of underground water on calcareous rocks, the solution is then drawn by capillary action towards the surface and the lime deposited.

Other samples of rock submitted as limestones contained only small amount of lime.

It is also interesting to note that the ashes of many of our native trees contain, contrary to the popular belief, very little potash, but large amounts of lime. A list of the analyses of limestones, shell sands, and timber ashes are given in the appended table:—

ANALYSIS OF—

Limestones :—

Lab. No.	District.	Lime (CaO.)	Calculated as Carbonate of Lime. ($CaCO_3$).	Magnesia (MgO.)	Iron and Aluminium Oxides. (Fe_2O_3 + Al_2O_3).	Potash. (K_2O).	Phosphoric Acid. (P_2O_5).	Insoluble Silicates. (SiO_2).	Remarks.
676	Repulse Bay	54·20	96·8	·56	·86	·10	·045	1·39	Burnt lime from sample contains 90·16% CaO ·63% MgO
1,817	near Roma State Farm ..	43·95	..	1·87	6·00	..	..	10·45	
1,818	Biggenden and Degilbo ..	56·00	100·0	trace	1·10	..	..	·35	
292	Parish Barmoya, portion 26v	55·56	99·3	·22	..	..	..	2·80	
293	Parish Barmoya, portion 2 ..	55·01	98·2	·43	..	..	..	·40	
294	Parish Fitzroy, portion 95v.	55·61	99·3	·25	..	..	..	·32	
295	Johansen's Cave Reserve ..	55·32	98·9	·31	..	..	..	·40	
1,644	Goodnight Scrub	54·90	98·1	·94	·22	..	..	·60	
1,645	St. Agnes	55·61	99·3	·67	·17	..	..	·52	
1,646	Currajong	55·23	98·6	·48	·17	..	..	·92	
1,647	Currajong	55·70	99·5	·58	·20	..	..	·53	
1,766	Ballandean	55·50	99·1	·29	·17	..	..	·46	
94	Marmor	39·04	69·7	1·51	3·46	..	·54	22·40	Screenings— Coarse (over 30 mesh) 38·1% Medium (under 30 mesh) 9·6%
697	Marmor	41·95	74·9	·83	3·44	·16	·46	19·75	Fine (under 50 mesh) 8·8% Very fine (under 100 mesh) 43·5%
1163	Goomeri	55·28	98·7	..	..	..	..	1·89	
970	Gayndah Line	54·10	96·6	·99	·52	..	..	2·26	
1,443	Gladstone	54·64	97·6	·58		..	..	1·00	

Reputed Limestones :—

Lab. No.	District.	Lime (CaO.)	Calculated as Carbonate of Lime. ($CaCO_3$).	Magnesia (MgO.)	Iron and Aluminium Oxides. (Fe_2O_3 + Al_2O_3).	Potash. (K_2O).	Phosphoric Acid. (P_2O_5).	Insoluble Silicates. (SiO_2).	Remarks.
78	Brooks Camp (Towers) ..	22·80	40·7	14·11	..	..	·25	20·62	
956	Roma State Farm, I. ..	20·35	36·3	..	..	..	..	55·0	Light blue grey rock, with fragments of shell (Desert sandstone)
	(100 ft. well sinkings, II. ..	1·25	2·2	..	..	..	..	81·84	Loose material (slate colour)
1,521	Beaudesert (Bouff Hill) ..	5·30	9·4	·08	..	..	·03	78·78	
1,522	Beaudesert (J. Cochrane) ..	1·23	2·2	·10	..	..	·28	70·65	
1.523	Beaudesert (Bromelton) ..	1·69	3·0	·16	..	..	·33	66·50	

Calcareous Sinter and Marly Deposits :—

1,943	Mirani	24·28	43·3	2·07	..	..	·071	34·19
1,944	Mirani	30·04	53·6	1·04	..	..	·095	33·68
1,945	Mirani	27·56	49·2	1·08	..	..	·085	33·63
1,425	King's Creek, Clifton ..	33·45	59·7	13·50	..	..	..	8·35
1,797	King's Creek, Clifton ..	32·00	57·2	2·38	11·60	..	..	15·77
1,865	Raglan	39·04	69·7	..	4·80	..	..	16·36
1,468	Springsure	34·24	61·2	..	..	..	..	35·00
1,424	Westbrook	15·10	27·0	5·60	..	..	..	45·83
1,436	Kaimkillenbun	28·30	50·5	15·14	..	..	..	17·00

Shell, Sand, and Crushed Coral :—

1,040	Bowen (Coral)	61·84	..	1·51	4·20	..	..	3·10
420	North Queensland	51·12	91·3	..	..	..	..	1·92
421	North Queensland	54·00	96·4	..	..	..	..	·78
1,628	Lucinda Point	4·34	7·7	..	..	..	..	12·52

Ashes :—

..	Belar (*Casurina lepidophloa*)	49·10	87·6	·84	..	4·95	..	..
..	Gidyea (*Acacia homolophylla*)	48·70	87·0	1·52	..	1·10	..	..
..	Brigalow (*Acacia harpophylla*)	54·40	97·1	1·61	..	·69	..	..
..	Apple Tree (*Angophora subrelutina*)	29·65	53·0	8·05	..	4·45	..	..
..	Bottle Tree (*Sterculia Rupertis*)	23·48	41·9	13·35	..	29·02	..	..
..	Brigalow and Sheoak ..	51·00	91·0	·87	3·35	·34	·357	2·73
..	Sisal Hemp	31·86	56·9	21·31	..	8·00	..	..
..	Lantana	16·95	30·3	4·39	..	13·96	..	..

APPLICATION OF LIME TO THE SOIL IN THE SOUTH BURNETT DISTRICT.

Mr. G. B. Brooks, Instructor in Agriculture, who recently paid a visit to the above district, reports:—

During my recent visit to the South Burnett district, the following information was secured in connection with the application of lime to the soil:—

Some two years ago, when on an instructional tour in the above district, samples of the various types of soils were secured for analysis. The analysis, which showed a slight deficiency of available lime, was made known to the farmers with the result that a number decided to carry out some experiments in the application of this substance to their crops. A cheap form of lime, known as "screenings," was used, the cost of which was 8s. per ton in bags, or 5s. per ton loose. The railage—a heavy item—amounted to 20s. per ton.

It may be mentioned that lime is generally applied to the soil with the object of correcting acidity, improving its mechanical texture, &c. In the above instance, however, the idea was simply to supply plant food. It was not expected that any marked improvement would be shown in the crop grown on the limed areas, owing to the seasons being unfavourable to the production of a full crop or what may be termed maximum yields.

Four areas were inspected, particulars of which are as follow:—

C. LARSEN, EDENVALE.

Date of application, September, 1912. Area treated, 30 acres. Amount applied per acre, 6 cwt., harrowed in.

Soil: Very friable scrub loam, volcanic origin, very deep.

Crops grown: Three crops of potatoes have been harvested from limed area; fourth crop in ground.

Results.—A small strip in field was left unlimed. Mr. Larsen reports that so far there is no apparent difference between treated and untreated portions. A patch was also top-dressed at the rate of 5 cwt. per acre, but no improvement was noticeable. Crops from the respective areas were not weighed. The land is in excellent tilth.

C. CHRISTENSEN, HORNLEY.

Date of application, September, 1912. Area treated, 18 acres. Amount applied per acre, 10 cwt., ploughed in.

Soil: Red volcanic forest, clay loam, with tendency to bake. Subsoil of clayey nature, also red in colour.

Crops grown: One crop maize harvested; another now maturing.

Results.—No unlimed or check area in field. Mr. Christensen states that no beneficial effect was noted in last season's crop, but considers the present one, which promises a heavy yield, very much improved.

Previously, this forest area gave very low returns. He also reports that the action of the lime on the soil has been most marked, the mechanical texture being very much improved. Hitherto the land broke up hard and lumpy; now it turns over quite loose and friable, reducing the cost of preparation very considerably. It may be mentioned that Mr. Christensen is a very enthusiastic and up-to-date farmer, and one who believes in thorough cultivation. He has done a lot of experimenting with fertilisers, green manure, and dry-farming methods.

I was shown a field of maize, the greater portion of which was treated with a mixture of superphosphate and potash at the rate of only 1 cwt. per acre. The difference between the manured and unmanured crops is most pronounced, a large increase in yield being expected from the fertilised area. This result is in conformity with the analysis of this particular soil, which shows a decided deficiency of phosphoric acid, and bears out the remarks appended by the Agricultural Chemist, who stated that good results would be likely to follow an application of superphosphate.

C. FRASER, EDENVALE.

Area treated, 5 acres; 2 cwt. applied to the land previous to planting a crop of oats; also top-dressed a patch of lucerne with the same amount per acre.

No results; top-dressing too light to be of any value.

C. O. PETERSEN, KINGAROY.

This test is also of little value, the application being far too light. A few acres of potatoes, maize, and lucerne were treated at the rate of 3 cwt. per acre. Mr. Petersen states that there has been no apparent difference between limed and unlimed.

Two other farmers—Messrs. Hansen and Larsen—also carried out tests. Time did not permit my visiting them, their farm being a long way out. I was, however, informed by Mr. Larsen's brother that in neither case had any benefit been derived from the lime applied.

Later on, if opportunity offers, further data will be secured on this matter.

ONION-GROWING IN THE SOUTH BURNETT DISTRICT.

By G. B. BROOKS, Instructor in Agriculture.

In a previous report mention was made of the possibilities of this portion of country for the raising of onions; also, the obstacles that would be likely to retard such from becoming an important industry.

While several farmers had small patches, the only large area was that on the farm of Mr. A. B. Postle, Memerambi, who has 30 acres under this crop.

In the raising of small areas the cost of production is seldom recorded, but in the case of a 30-acre paddock the cultivating, keeping clean, &c., is such a large item that the grower can form a pretty correct estimate as to what the outlay would amount to per acre. Particular attention was, therefore, for this reason, directed to the field owned by Mr. Postle.

Soil.—The soil in which the crop was grown is typical of the district. It may be described as of volcanic origin, chocolate in colour, very deep and friable, and naturally well drained. Approximately, one-half the field was originally scrub; the other, forest. That the soil is a very fertile one, is shown by the following analysis:—

	Nitrogen.	Phos. Acid.	Potash.	Lime.
Total elements in soil, per cent. ..	·298	·543	·319	·890
Total elements in lb., per acre ..	10,430	19,005	11,165	31,150
Available plant food, per acre ..	10,430	154	1,876	15,044

The physical properties are very good.

Varieties.—Twenty-four acres were planted with the "Long-keeping Brown Spanish," while 6 acres were under "Early Globes." These were planted during the latter end of May, in rows 20 in. apart; 2 lb. of seed being used per acre.

Climatic Conditions during Period of Growth.—As far as the growing of ordinary crops was concerned, the season was undoubtedly very adverse. The nearest meteorological station, where records of rainfall are kept, is Kingaroy, 7 miles distant. The following table shows the amount of rain that fell while the crop was in the ground. The points registered for the two months previous to planting are also included:—

SIX YEARS' AVERAGE RAINFALL FOR RESPECTIVE MONTHS.

1913.	—	1908–1913.	—
March	1·14	January	5·86
April	0·49	February	3·35
May	3·03	March	4·03
June	4·04	April	1·22
July	0·63	May	0·60
August	0·12	June	2·28
September	1·98	July	1·42
October	0·39	August	1·13
November	0·45	September	1·26
December	2·73	October	2·81
		November	2·04
1914.		December	3·44
January	1·85		
February	3·56	Average, 6 years	28·9

It will be seen from the above records that conditions were very favourable at planting time and during the early stages of growth, the rainfall being a good deal over the average.

From July to November, however, practically no rain fell to be of any benefit to the crop. Notwithstanding the long dry spell, when all other crops had withered up, the onions made fair growth, proving that, given a good start, they will withstand a lot of dry weather.

The Weed Problem.—That the soil and climatic conditions obtaining in this district are eminently suitable for the growing of a good quality of onion has been fairly well demonstrated; but the problem of keeping the weeds in check is a difficult one, and the solving, moreover, is likely to prove disastrous to many who are contemplating the planting of extensive areas during the coming season.

It will be found that the preparation of the land will prove a very important factor in successful onion-growing. Not only should it be put into the best of tilth, but every effort should be made to free the soil from weed seeds; this can only be done by frequent stirring for several months ahead of planting. In the Memerambi and other districts, where the soils are loose and friable and easy to get into condition, this constant working will, unfortunately, in many instances, be neglected.

The keeping of a crop clean, even when every precaution has been taken to rid the land of weed seeds, is a fairly expensive matter, but in dirty land it will, under present labour conditions, become almost prohibitive.

PLATE 43.—COMMENCING HARVESTING OPERATIONS ON MR. POSTLE'S FARM.

In onion-growing the eradication of weeds is generally performed by a system of hand-weeding (known as "crawling"), on account of the narrow space between the rows. Mr. Postle planted a good deal over the regulation width, so as to be able to use the horse scuffler. This system he is discarding, however. Next season, instead of sowing 20 in., he is to put in the crop in rows 9 in. apart.

Harvesting.—By the end of February the tops had withered down sufficiently to permit of being harvested. It was noticed that the scrub portion matured a little earlier and more evenly than the forest area. This was somewhat contrary to expectations, more especially in regard to ripening.

Unfortunately, the weather has been showery since harvesting operations commenced, and, therefore, unfavourable to the drying of the bulbs. A continuance of such at this stage will undoubtedly have a tendency to cause second growth to the detriment of quality.

To obviate the necessity of harvesting during February and March, when a good deal of hot moist weather is to be expected, the question of planting two months earlier—about the beginning of April—and selecting an early maturing variety to mature about December, would, I think, be worth consideration. From a perusal of the rainfall table, May is, in this district, practically a rainless month; therefore a good deal of risk is attached to the securing of a good germination by sowing at that time. If it should be found that May is the best month to put in the main crop, it might be of considerable advantage both in regard to

PLATE 44.—A FAIR SAMPLE OF MR. POSTLE'S CROP.

harvesting and market to have at least a portion of the crop coming in early in the season (December).

Yield.—So far only a few acres have been harvested, and from them a yield of 4 to 5 tons per acre of Brown Spanish and a ton less of the Early Globe has been secured.

Had the crop been planted, say, 12 in. instead of 20 in. apart, the yield would have been much greater. It was observed, where growing very thick in the rows, that the size was equal to where they were several inches apart.

Cost of Production.—The information secured in regard to cost of production is of little value, as the methods at present in use will, in all probability, be considerably improved upon next season. It may be mentioned that an experienced grower from Victoria, with a full equipment of appliances requisite for the onion industry, is commencing operations in the Memerambi district on a fairly large scale.

Probable Expansion of the Industry.—An endeavour was made to secure information as to the area likely to be put under onions in this district during the coming season. The following is a list of probable growers:—C. Jessen, 30 acres; H. Hannant, 20 acres; Evans Brothers, 30 acres; J. Graham (Victorian) and A. B. Postle, 25 acres each; H. Christensen, 10 acres; J. Coe, 12 acres; A. Stephens, 8 acres; S. Davis, 6 acres; M. Carmody, 6 acres; —— Hopkinson, 5 acres; J. Kurse, 5 acres; —— Burnham, 3 acres;—a total of 185 acres.

THE RELATION OF COTTON-BUYING TO COTTON-GROWING.

Above is the title of a very interesting and, both to growers and buyers of cotton, a most valuable Bulletin (No. 60) on the subject issued by the United States Department of Agriculture.

It is pointed out that "greater discrimination must be used in the buying of cotton before the farmers will put forward their best efforts towards the development of a new long-staple industry in the United States. The fundamental agricultural improvement that requires commercial co-operation is the preservation of superior varieties, so that a uniform product can be obtained. For manufacturing purposes, uniformity is an even more important quality than length of staple, and one that must be guarded continually in the production of long-staple cotton. It is much easier to breed new varieties than it is to keep them pure and uniform after they have passed out of the hands of the breeder into the field of commercial production. There is a misleading popular idea that varieties of cotton are bound to deteriorate, and that new seed must be planted every few years in order to maintain the crop; but such deterioration can be just as definitely avoided as wounds can be protected from infection.

"The most frequent source of the infection that causes a variety of cotton to degenerate is mixture of seed or crossing with other varieties. The planting of different varieties close together and the exchange of seed at the gin are the usual causes of contamination. When mixture with other kinds of cotton is avoided, it is still possible for a variety to degenerate in the sense of losing its uniformity, unless care be taken to remove the 'sports' or aberrant plants that continue to appear in even the most carefully selected stocks. To 'rogue' out these degenerate plants is as necessary as to prevent mixing with other varieties. It is only by observing these two precautions of avoiding mixture and roguing out the 'freaks' or 'sports,' as they appear, that varieties are kept from deterioration and made to serve the purposes of production for many years. In the case of Sea Island cotton, in South Carolina, in order to preserve the uniformity of fibre so much desired by the manufacturer, the Sea Island planter raised the crop of each year from seed derived from a single plant. In order to do this, it was necessary to select a superior individual three or four years in advance, and keep its progeny separate while the stock of seed was being increased; but, now that the system of buying has been changed, and special contracts are no longer made, the policy of strict selection is being relaxed. A rapid deterioration of the Sea Island crop is said to have taken place, and this is easily understood from the diversity that exists in many fields. Some of the planters have abandoned Sea Island cotton altogether, and are now planting Upland short-staple varieties. Hybrids between the Sea Island and Upland types are of frequent occurrence, thus adding another factor of diversity and deterioration. Farmers will not take more pains to grow good cotton merely for the satisfaction of knowing that the buyer can make more money out of it. The farmer must get at least enough advantage to induce him to grow the cotton, or the buyer loses his business, and the manufacturer also suffers when the farmer ceases to produce the necessary raw material. It is not what the manufacturer pays for the cotton, but what he gets for it, that determines production. The general underlying fact is that most farmers are unaccustomed to take the precautions that are necessary to preserve uniform stocks, and have no adequate conception of the need of such precautions. The work of the Department of Agriculture is of an educational character; but the information that the Department can give the farmer is not likely to be used when it means additional care and effort without any corresponding advantage.

"When the farmer asks how much more his long-staple crop will bring if he pulls out all the short-staple plants in the field, he can get no direct assurance. He can be assured that his cotton will be worth more, but not that he can get more, for the chances are that the buyers will be unable to detect the admixture of short cotton; but, if the farmer knew that his field was to be inspected, and that the presence of short-staple plants would be detected and would result in his receiving a lower price for his crop, he would not hesitate about taking the trouble to pull them out. Farmers are willing enough to adopt easier methods or crops that can be raised more cheaply; but the production of good cotton requires additional attention—something beyond what the farmer has been accustomed to give in raising short staples—and some positive inducement becomes necessary or the extra care will not be taken. The present system of buying without adequate discrimination means the same average price for lots of cotton that differ greatly in value. Doubtless it is an easier and more convenient system for the buyers to take their cotton at flat prices and classify it afterwards into the different qualities required by their various customers; but, whatever the commercial advantages of this system, it is certainly unwise and unjust in its relation to the farmer. It takes what belongs to the good farmer and gives it to the poor farmer. The farmer who raises cotton above the average in quality is mulcted to make up for the loss on cotton that is below the average. When the nature of the system is considered, it is easy to understand that the general tendency has been toward the growing of inferior cotton rather than to the taking of extra pains from which no advantage could be gained.

"It is not a question of paying more for the cotton, but of paying more to the farmers who produce good cotton and less to those who produce bad cotton. This simple expedient would do more than any amount of exhortation to increase the proportion of farmers who would take the care that is necessary to produce good cotton. Buyers who really have the powers of discrimination that are needed in their business would have no serious difficulty in learning how to determine the value of the crop in the field much more reliably than they can determine it by drawing samples from a bale. The risks they now take in trusting to bale samples alone could be avoided almost entirely by learning how to judge the cotton in the field.

"UNIFORMITY BEST DETERMINED BY FIELD INSPECTION.

"Uniformity in the length and strength of the fibre is one of the most important factors in determining the value of long-staple cotton to the spinner. One of the most serious defects of the present system of buying on the basis of samples drawn from the bales is that it is not adequate for the determination of uniformity. Buyers commonly fail to detect an admixture of 5 or 10 per cent. of short cotton; and even 15 to 20 per cent. often 'gets by.' The buyers, of course, are not inclined to admit this, but the fact is well known to manufacturers.

"By field inspection admixtures of 1 or 2 per cent. are quite as easily and definitely detected as percentages of 10 or 20 per cent. A buyer or inspector having sufficient familiarity with a variety could establish definite percentage grades of purity of stock for all of the cotton of a neighbourhood, and these percentages could be used as a basis for buying.

"The short-staple plants or inferior individuals stand out very distinctly, so that they can be seen at a glance by those who have sufficient familiarity with a variety, and they can be pulled out or counted as easily as the same number of weeds that a careless farmer might leave in his field.

"In failing to make use of the opportunity of judging cotton in the field, the present system of buying becomes wasteful and inefficient."

We regret that space will not allow of the republication of Mr. O. F. Cook's report (Bionomist in Charge of Crop Acclimatisation and Adaptation Investigations) in full; but we think enough has been said to show conclusively that, to ensure a good price to the farmer for his cotton, the best course of procedure is—not to depend upon the value of the cotton as per samples from the bale of ginned cotton, but to see that the cotton fields are free from admixtures. We have seen both in the old and the present days of cotton-growers in Queensland a woeful admixture of long and short staple and sport cottons in the fields, and we have seen mixed seed—black seed, woolly, green, and white seed—all sown just as it came from the gin. This was all very well in the days of the cotton boom during the American Civil War, but to-day the manufacturers demand a uniform long-staple or a uniform short-staple cotton, and it is imperative that cotton-growers—*i.e.*, farmers—should be clear on the point that mixed varieties cannot command the price payable for those of a uniform character. Anyone conversant with any one variety can go into a field or cotton and pick out the "rogues" from the other plants even when the bolls have not yet opened.

The Queensland Department of Agriculture is now prepared to buy cotton from farmers who are wise enough to know that a cotton crop will pay them better than many other crops, and yet leave them six months of the year to grow other crops on the same land. As shown in the Bulletin quoted, the reason of low prices is often caused by the admixture of long and short staple in the same field. If a farmer elects to plant long-staple, but also plants on the same field short-staple, the result is that he gets a low price; but let him plant a uniform long or short staple cotton, and in the former case eradicate the short, and in the latter the long staple variety, then he can command the highest price. This all goes to show that field inspection is the best method of ensuring to the farmer the best price (or the lowest) for his crop. Neither the grower, buyer, nor manufacturer has, at present, any familiarity with cotton in the field—either with the plants as they grow or with the fibre as it comes from the bolls.

"A certain amount of time is required to become familiar with the plant and lint characters, as they have to be judged in the field, but anybody who is able to make the fine discriminations necessary in classing cotton in the bale would have no serious difficulty in learning to distinguish the different kinds of plants in a mixed field or in recognising differences in the lint while still on the seeds. Indeed, the recognition of such differences is really much easier than the classification of cotton in the bale, because the differences are greater and more obvious, and because it is seldom necessary to depend upon one character alone. Varieties differ, usually, by many characters, and even in the same variety several characters are likely to be changed under a different set of external conditions. If the lint is shortened by adverse conditions, the bolls and leaves are likely to be smaller and the whole aspect of the plants will be different. Sufficient familiarity with the characters and behaviour of a variety enables one to tell in advance with considerable confidence the length and strength of the lint before taking it in hand, or even before the bolls have opened.

" OTHER CAUSES OF UNEVEN FIBRE.

"It is true that mixing varieties and diversity among the plants in the field are not the only causes of inequality in the length and strength of cotton fibre. Unless the conditions of growth are favourable, even the best variety may yield only inferior cotton. Adverse conditions during a part of the crop season may render the fibre uneven, notwithstanding the care that may have been taken to keep the stock pure. As a result of differences in the soil, one part of a field may grow good fibre while another part of the same field may yield only inferior fibre. When one side of a field is allowed to grow up in weeds, an adverse effect on the fibre is often apparent. Inequalities of soil or moisture supply are often shown in a striking manner in the growth of the plants.

"Any sudden change of conditions of growth, such as checking the plants by drought or forcing them into very rapid development by heat and moisture, is likely to affect the quality of the fibre as well as the yield. The crop is reduced by the shedding of floral buds and young bolls. Bolls that are farther advanced are not so likely to be shed, but they often fail to reach normal maturity and produce weak inferior fibre. Thus, long and short fibre or strong and weak fibre are often to be found on the same plant.

"Some varieties have a tendency to inequality in the length of lint, the fibre at the base of the seed often being much shorter than that at the top. This difference of length sometimes amounts to half an inch or even more, giving the so-called 'butterfly' outline, when the fibre is combed out from the sides of the seed. This factor of inequality may be avoided by choosing varieties that do not have the undesirable butterfly tendency. The new Durango type of long-staple cotton is unusually free from this defect.

"There are other factors of inequality in addition to the mixing of varieties or the failure to continue selection. A farmer who has planted pure seed may still have only inferior cotton if his soil is poor or his methods are careless either in raising or picking the crop, or if the fibre is damaged by rain during the harvest season. The condition of the cotton must be taken into account apart from the quality. Good cotton may be in bad condition, but poor cotton cannot be made good by careful handling at the end of the season. The farmer who plants mixed seed cannot produce uniform fibre, no matter how favourable the conditions or how careful the methods in other respects. Quality is best determined by field inspection, for any form of inequality can be detected in the field much more easily than in the bale."

It will be obvious that, although the Bulletin above referred to deals principally with long-staple cotton, the remarks therein are equally applicable to a crop of short-staple Upland. In either case uniformity of staple is the desideratum, and this can be attained only by the careful farmer. Furthermore, it can easily be understood how inspection in the field, just as in the case of sugar-cane, must be a far better guide to the value of the crop than an examination of samples taken from bales of ginned cotton.

CLEARING LAND BY MACHINERY.

A demonstration of clearing land of trees and stumps by the aid of the Trewhella horse and hand power winches was given on Thursday afternoon, 2nd April, on the Murarrie Estate, near the Murarrie Station, Cleveland Railway.

A large number of persons interested in such work and machines were present, including the Hon. J. White, Minister for Agriculture, and representatives of various Government Departments, &c.

The hand power or "monkey" winch was first attached or anchored to the bottom of a red stringy-bark tree, and the pull rope passed round another tree of about 2½ ft. diameter about 60 ft. away. A snatch block doubling the power of the winch and a rope grab to grip the pull rope at the required distance were used. The attachments are most ingeniously designed, are so simple that anyone can handle them, and they can be fixed in position in a few seconds. Mr. J. T. Trewhella, who was operating the machines, then took a few strokes with the handle upon the fast gear (pump-handle motion) to tighten up the tackling. By using this fast gear the strain is got on quickly, and no time is wasted. The handle was then transferred to the power gear, which is the pawl and ratchet mechanism of their (Trewhella) jacks applied to a winding drum, and a powerful strain put on. An assistant now lent aid on the handle, and in a short time the tree being pulled was seen to bend forward, cracking sounds were heard from the base of the tree, and the ground for some feet around was seen to heave upwards. The motion forward increased in rapidity, and in 3½ minutes from the beginning of the pull the tree crashed down to the ground.

The pull rope was then fastened to a gum tree of about same diameter and same distance away, the time taken to bring that down being shorter than was taken in dealing with the first tree.

Those present then asked that the horse power winch should be put in operation on a solid looking stump about 3 ft. high and 2½ ft. in diameter at the top. This machine had a more powerful appearance, was mounted on runners instead of wheels as was the hand power winch, and was anchored to the tree that had served the same purpose for the smaller winch. The ropes were of a greater diameter, although similar snatch blocks and rope grabs were used. The tackling being adjusted, a horse was brought up and attached by traces to a thin wire rope, which worked round a wheel upon the top of the winch, this rope being pulled out by the horse until the other end, which had been lying loose stretched out on the ground, was drawn up to the wheel. The horse was then unhooked from the end of the rope which had been drawn out and taken back to the winch. The wheel round which the rope passed was now turned over, the traces hooked to the short end of the rope, and the horse pulled out as before. This was repeated three or four times and the stump drawn completely out. After the first pull, the roots were heard cracking and the soil around began to heave upwards. When the third pull was made, the roots came out carrying a large mass of soil with them, and with the next two pulls the stump, roots and all, was pulled right clear of the hole.

The spectators expressed their entire satisfaction with the work done, and agreed that these winches were the most powerful "forest devils" which had come under their notice, and gave the opinion that there was a great future before them in Queensland.

As the afternoon was passing away, a good many left to catch their trains, but a number remained and requested that, as a final test, the horse power winch should be attached to another red stringy-bark tree which was of greater size than that which had been used as an anchor. The attachments were quickly made, the pull rope being placed about 8 ft. up the trunk. That tree was hauled out even quicker than the stump, but in this instance no time was lost in explanations and only strict business attended to. The spectators remaining were unanimous in agreeing that that was the best effort of the day, and illustrated the power of the winch in a very effective manner.

Mr. A. Robinson, the Queensland representative of Messrs. Trewhella Bros. Pty., Ltd., was in attendance, and assisted to make the demonstration satisfactory to those who were present by finding what was desired to be done and answering questions regarding the machines, their equipment, &c.

Other demonstrations are to be given at different centres in Southern Queensland during the next two months, and those desiring to be present are advised to communicate with Mr. A. Robinson, Petrie's Bight, Brisbane.

THE WORLD'S PRODUCTION OF COTTON: THREATENED SOURCES OF SEA ISLAND VARIETY.

The "Agricultural News," Barbados, takes the following pessimistic note on the probable fate of Sea Island cotton in the United States from "The West India Committee Circular" of 27th January, 1914:—

Professor John A. Todd, who visited the cotton-growing areas of the United States last summer, gave the members of the Royal Philosophical Society of Glasgow, on 13th January, some impressions of his visit. Over 60 per cent. of the cotton production of the world was, he said, drawn from the United States, and to that percentage Texas alone contributed one-third. In 1831 the production by the United States amounted to 1,000,000 bales, and in 1911 it had increased to 16,000,000 bales. There was a cotton area of 450,000,000 acres, but the acreage under cultivation was only 35,000,000 acres. Statistics showed that the tendency had been for the price of cotton to rise, and there were two principal reasons why the area of production in the United States was not largely increased. One was that the amount of labour required was very heavy and that the cost of negro labour was going up enormously. Cotton was selling at 12 cents per lb., and the cost of picking alone was 2 cents, or a sixth of the selling price. Mechanical pickers had been introduced, but so far these cost as much as hand labour.

The other cause limiting the area of production was the ravages of the boll weevil, a plague which had been allowed to spread probably largely owing to the inefficiency of negro labour. The weevil was now threatening the area in which Sea Island cotton, the highest quality of cotton, was grown in the United States, and the chances were that this crop might also disappear. In that case there were only two parts of the world which could supply the defect, the West Indies and Egypt.* Professor Todd, in conclusion, hazarded the view that there were only two things that the United States could do—either improve the quality

* Queensland can produce and has produced as good Sea Island cotton as any other country in the world, and a cotton expert from Texas, U.S.A., now in Queensland, has, after examination of the country in the Central districts, given it as his opinion that there are tens of thousands of acres along the Central Western Railway Line and on the coast which will produce Sea Island and Uplands cotton to perfection.

and value of its crop, or give it up and let other countries which had cheap labour take up the burden of growing cotton. As it was at present, the cost of labour was so great as to make cotton-growing approach the non-profitable, and, if things did not change, the chances were that the great supply of cotton for the world in the future might come from other countries, and these countries mostly British possessions. A large number of lantern views were thrown on the screen, these illustrating among other things the great wastage of cotton by the American method of handling.

COTTON FROM AUSTRALIA.

From the report of the work of the Imperial Institute, for 1912, we take the following note on samples of cotton sent from Western Australia and Queensland for valuation. The report is certainly satisfactory to a certain extent, both as regards Western Australia and Queensland, the cottons of which States were examined with the results that a sample of "Durango" cotton from Western Australia was valued at 9d. per lb., with "middling" American at 6·37d. per lb., and "good" Abassi at 11d. per lb. A sample of Sea Island cotton from the same State proved to be coarser than ordinary Sea Island cotton, but was of good colour and length and was valued at 13d. per lb., with "choice" Georgia at 12½d. per lb.

A sample of seed-cotton from Queensland yielded a rather coarse, harsh, weak lint, which was classed as "barely good middling" and valued at 6·80d. to 6·90d. per lb., with "middling" American at 6·46d. per lb. Two samples of Egyptian cottons from Queensland were under examination at the close of the year.

A NEW POTATO DIGGER.

Ever since potatoes have been grown in this and other States of the Commonwealth, the farmer has laboriously turned out his potato crop by the aid of the digging fork and the long-handled shovel, and the man who could dig 1 ton of potatoes in a long day was considered a "ringer" at the work. Numerous have been the attempts by agricultural mechanics to produce a machine which would do away with the laborious work of digging and substitute mechanical power for hand labour. Amongst those who have at various times placed their machines in evidence, or rather on trial, is Mr. Daniels, who has for some years devoted himself to the evolution of a satisfactory machine, with varying success. He has now evolved a machine which was tried on Wednesday last (15th April) on Mr. Willmann's farm at Bannockburn, a few miles from Beenleigh. This machine was built under Mr. Daniels's supervision at Mr. Bloomer's foundry at Beenleigh, and it embodied all the latest improvements shown to be needed by the old machines.

The potato field chosen on Mr. Willmann's farm was one, the crop on which was almost invisible owing to the dense growth of weeds of various kinds which, owing to the wet weather, had grown to a height of over 2 ft. If the machine could do clean work in such a tangle it would be a marvel, and the visitors and farmers assembled gave it as their opinion that no machine at present invented could go five yards without clogging. Mr. Daniels's machine weighs 8 cwt., and was drawn by two horses. The rows of potatoes were some five chains in length. Once started, the end of a row was reached in about three minutes. On looking back, it was seen that the potatoes were all lying in the middle of the row. All the weeds were completely buried and the land left perfectly level. No cut potatoes could be found, nor was any potato, after diligent search, found undug. From what we saw, we considered that the machine had a very severe trial, with a most satisfactory result. It is calculated to dig 4 acres a day. The soil was a rich sandy loam.

We understand that further demonstrations will be given in various potato districts, of which due notice will be given.

TEFF GRASS.

Of late much interest has been taken in Queensland in Teff Grass, a native of North-east Africa. In the last issue of this Journal, Mr. G. B. Brooks, Instructor in Agriculture, drew attention to the fact that this is essentially a hay grass of no great value for grazing, and also that it is an annual. The "South African Gardening and Agriculture," from which journal we take the following note on the grass, practically views its value in the same light as does Mr. Brookes:—"The usefulness of Teff as a fodder crop is well known. It is an easy crop to get during the rainy season, grows quickly, stifles weeds, and makes excellent hay. Sowings can be made during the present month by broadcasting 5 to 6 lb. per acre and lightly hoeing the ground. It must not be expected that it will stifle weeds that have become established before the Teff is sown. Teff should be looked upon as a grass for the high veld, and not one which can be expected to do well in warm districts. Its popularity is, no doubt, due to the fact that it gives an immediate return, and is very inexpensive to raise, but it does not add to the permanent value of a farm such as is obtained by the sowings of many other grasses of a perennial character. Though it is, no doubt, an excellent farm crop, yet it is quite possible we shall consider it overrated in a season or two when other grasses are better understood."

EXPERIMENTAL FEEDING OF STOCK ON ZAMIA LEAVES.

A correspondent comments as follows on a paragraph in Mr. Burton Cleland's paper on "Experimental Feeding with some Alleged Poison Plants of New South Wales," which appeared in the "Agricultural Gazette of New South Wales," and subsequently in the March issue of the "Queensland Agricultural Journal":—

Re General Notes, I notice, by experiment at Milson Island, a cow was fed with Zamia leaflets for five months without producing "rickets."

QUEENSLAND AGRICULTURAL JOURNAL

VOL. I. APRIL, 1914. PART 4.

Agriculture.

THE PHILOSOPHY OF SOIL.

INOCULATION FOR LUCERNE.

It is a simple proposition, and yet to a great many farmers it looks so remote and mysterious that they do not clearly understand it, and so they cast it aside as some crank notion or humbug. Yet, it is the absolute keystone that holds the arch. The principle is this: All of those plants that are called legumes, like all of the clovers and lucerne, including peas, beans, and vetches, require the deposit on their roots of certain bacteria. These deposits are in the form of small colonies and are called "nodules."

Dig up a healthy clover or lucerne plant, and shake the dirt gently from the roots, you will see these nodules clustering on the finer roots about as big as a small pin head. The microscope discloses that these nodules are filled with certain bacteria that have the power to absorb the free nitrogen of the air, and change it over into plant nitrogen. What makes lucerne or clover valuable as a feed is its percentage of protein, which is another name for nitrogen. Milk and meat and the bodies of all animals require a great deal of nitrogen.

So we see that the soil must be in that condition to create and make a home for these bacteria, or else the clovers and lucerne will not live and flourish well.

Go into some fields of lucerne, and you will note spots where the plants look unhealthy, yellow, and starved out. Dig down to the roots, and you will find no nodules there. Why? Possibly, and very probably,

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF MARCH, 1914.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lady Melba	Holstein	6 Mar., 1914	1,243	3·4	46·77	First calf.
Lavinia's Pride	Ayrshire	11 Dec. 1913	803	4·5	40·62	
Madame Melba	Holstein	10 Nov. ,,	985	3·6	39·40	
Butter ...	Shorthorn... ...	27 Sept. ,,	719	4·8	38·90	
Glen ...	,, ...	27 Oct. ,,	670	4·7	35·76	
Pauline ...	,, ...	8 Oct. ,,	671	4·6	34·67	
Nellie II. ...	,, ...	5 June ,,	697	4·4	34·62	
Bee	Jersey	7 July ,,	507	6	34·5	
Daisy ...	Holstein	14 Feb. ,,	696	4·4	34·37	
Honeycombe	Shorthorn... ...	7 June ,,	603	5	34·04	
Miss Lark ...	Ayrshire	27 Dec. ,,	732	4	32·71	
Miss Jean ...	,, ...	13 Jan. ,,	655	4·4	32·35	
Cocoatina ...	Jersey	19 May ,,	438	6·4	31·50	
Queen Kate	Ayrshire	4 Jan., 1914	791	3·5	30·69	
Lady Loch...	,, ...	31 Aug., 1913	764	3·6	30·56	
Conscience...	,, ...	30 Jan. ,,	616	4·4	30·52	
Miss Bell ...	Jersey	25 Sept. ,,	619	5·2	30·50	
Burton's Lily	Shorthorn... ...	29 Dec. ,,	645	4·2	30·34	
Countess of Brunswick	,, ...	22 July ,,	555	4·8	30·02	
Silver Nell...	,, ...	26 Sept. ,,	637	4·2	29·96	
Burton's Lady	,, ...	23 June ,,	511	5	28·84	
Sweet Meadows	Jersey	20 Aug. ,,	328	7·6	28·50	
Bluebelle ...	,, ...	13 July ,,	413	5·8	27·20	
Miss Melba	Holstein	22 Jan. ,,	642	3·8	27·18	
Bella ...	Ayrshire	16 Dec. ,,	574	4·2	26·99	
Rosine ...	,, ...	27 Nov. ,,	645	3·7	26·54	
Lennie ...	,, ...	1 Sept. ,,	619	3·8	26·24	
Gem... ...	Shorthorn... ...	8 Aug. ,,	470	4·6	24·31	
Lonesome ...	Ayrshire	26 Oct. ,,	498	4·2	23·54	
Miss Edition	Jersey	19 July ,,	282	7	22·50	
Miss Morton	Shorthorn... ...	14 Oct. ,,	598	3·4	22·48	
Skylark ...	Ayrshire	2 Feb., 1914	467	4	20·87	First calf.
Lady Brunswick	Shorthorn... ...	27 Oct., 1913	476	3·8	20·15	ditto

The cattle were fed on natural pasture only.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, MARCH, 1914.

The following are the final figures for the 1913-14 Egg-laying Competition :—

Competitors.	Breed.	March.	Total.
Moritz Bros., S.A.	White Leghorns ...	124	1,564
A. H. Padman, S.A.	Do.	94	1,536
Loloma Poultry Farm, N.S.W.	Do.	118	1,514
J. R. Wilson	Do.	82	1,483
T. Fanning	Do. (No. 2)	92	1,472
R. Burns	Black Orpingtons (No. 2)	116	1,453
E. A. Smith	White Leghorns (No. 2)	109	1,435
Range Poultry Farm	Do.	66	1,405
J. F. Coates	Do.	89	1,382
O.K. Poultry Yards	Do.	58	1,376
R. Burns	Black Orpingtons (No. 1)	98	1,366
T. D. England	White Leghorns ...	79	1,365
E. A. Smith	Do. (No. 1)	109	1,360
H. Tappenden	Do.	83	1,353
W. D. Bradburne, N.S.W.	Do.	84	1,346
Mrs. Munro	Do.	84	1,338
F. McCauley	Do.	55	1,315
S. E. Sharpe	Do.	49	1,311
A. F. Camkin, N.S.W.	Do.	85	1,310
Yangarella Poultry Farm	Do.	86	1,301
Jas. McKay	Do.	41	1,301
H. Hammill, N.S.W.	Do.	92	1,298
A. T. Coomber	Do.	58	1,294
Cowan Bros., N.S.W.	Do.	64	1,292
Mrs. Sprengel, N.S.W.	Do.	67	1,280
J. Zahl	Do.	33	1,279
Doyle Bros., N.S.W.	Do.	43	1,265
T. Fanning	Do. (No. 1)	89	1,264
Mrs. Craig	Do.	79	1,255
R. Jobling, N.S.W.	Do.	63	1,232
J. Archibald, N.S.W.	Do.	74	1,225
C. Leach, N.S.W.	Do.	61	1,218
J. Murchie	Brown Leghorns ...	49	1,218
J. Gosley	White Leghorns ...	73	1,193
D. Grant	Do.	47	1,132
A. C. Collis, N.S.W.	Do.	73	1,161
Mrs. Bieber	Brown Leghorns ...	57	1,139
T. Stephens, N.S.W.	White Leghorns ...	55	1,118
J. Andersen, Victoria	Red Sussex	57	1,112
A. Schbrowski	Brown Leghorn	40	1,109
Totals	...	2,988	52,420

GENERAL REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, 1913-1914.

The tenth egg-laying competition was brought to a close on 31st March, 1914. Owing to the large number of entries received, 10 additional pens were erected. In all, 42 pens were entered; but, owing to 2 withdrawals, only 40 competed. These were made up as follows:—White Leghorns, 34 pens; Brown Leghorns, 3 pens; Black Orpingtons, 2 pens; Red Sussex, 1 pen; making a total of 240 birds. The number of eggs laid during the twelve months was 52,420, an average of 1,310·5 per pen, or 218·4 per bird—constituting a new world's record. The birds were a splendid lot of layers, otherwise the above results could not have been obtained, and the competitors are to be congratulated on the general improvement. There were 129 broodies recorded—a very large percentage; but, fortunately, they were very easily put off.

FEEDING.

The morning feed consisted of equal quantities of bran and pollard (by measure, not by weight), together with 1¼ lb. Sunlight oilcake and ¾ lb. of desiccated meat, mixed into a crumbly mass with hot water in winter and cold in summer. Three-quarters of a pint of this was fed each morning, about 6.30, except on Sundays, when oats were substituted. At 9 o'clock the pens were again visited to see if all the food had been cleaned up, and to give more to pens that needed it. This was found to be a better method than giving the full amount at once, with the result that perhaps some food would be left to clean up. This system was followed throughout, except during January, when, desiccated meat being unprocurable, it was omitted from the ration, and the laying fell off somewhat in consequence. At midday chaffed green lucerne was fed, a good handful to each pen, and a little soup meat when available (about twice a week), also a handful per pen. The evening meal consisted of wheat, as much as the birds would eat up clean, about 1 pint more or less according to the capacity of the birds, as all pens do not eat alike. Great care was taken throughout to get all birds to eat as much as possible, without leaving any. Fresh clean water was given every morning, and shell grit was at all times available in the pens.

The houses were cleaned out once a week. The birds were in splendid health all through, the mortality being 10 deaths during the year, for the most part from ovarian trouble.

The following are the prize-winners:—	£	s.	d
First—Moritz Bros., Kalangadoo, S.A. (W. Leghorns) ..	7	7	0
Second—A. H. Padman, Pirie street, Adelaide, S.A. (W. Leghorns)	4	4	0
Third—Loloma Poultry Farm, Rockdale, N.S.W. (W. Leghorns)	2	2	0
Monthly prizes of 10s. for the largest number of eggs each month—			
Moritz Bros.—October (1/3), November, December, January, March	2	3	4
A. H. Padman—April, May, June	1	10	0
R. Burns—July, February	1	0	0
J. R. Wilson—August, September	1	0	0
E. A. Smith—October (1/3)	0	3	4
J. Archibald—October	0	3	4

Competitors.	Breed.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Grand Totals.
Moritz Bros., Kalangadoo, S.A.	White Leghorns	73	115	114	127	145	142	154	158	152	143	117	124	1,564
A. H. Padman, Pirie street, Adelaide, S.A. ..	Do.	137	148	139	79	130	142	145	142	138	133	109	94	1,536
Loloma Poultry Farm, Rockdale, N.S.W. ...	Do.	60	121	133	144	132	143	152	146	140	119	106	118	1,514
J. R. Wilson, Eudlo, N.C. Line	Do.	107	131	114	139	156	147	152	127	130	113	85	82	1,483
T. Fanning, Ashgrove, Brisbane	Do. (No. 2) ...	100	140	110	133	140	130	136	137	140	126	98	92	1,472
R. Burns, Sladevale, Warwick	Black Orpingtons (No. 20)	45	90	107	151	135	140	150	131	144	123	121	116	1,453
E. A. Smith, Hawthorn street, Paddington ...	White Leghorns (No. 2) ...	109	110	67	112	142	136	154	136	137	111	112	109	1,435
Range Poultry Farm, Toowoomba	Do.	36	128	115	147	149	142	142	138	140	115	87	66	1,405
J. F. Coates, Rockhampton	Do. ...	75	124	97	117	134	126	140	132	138	119	91	89	1,382
O.K. Poultry Yards, Toowoomba	Do.	110	122	112	135	144	133	140	129	124	95	74	58	1,376
R. Burns, Sladevale, Warwick	Black Orpingtons (No. 1)	28	85	121	132	138	144	149	137	137	95	102	98	1,366
T. D. England, Brisbane	White Leghorns	89	113	112	141	131	128	128	128	134	104	78	79	1,365
E. A. Smith, Paddington	Do. (No. 1) ...	77	79	48	106	147	146	148	142	140	115	103	109	1,360
H. Tappenden, Barton street, Maryborough ..	Do.	90	101	97	125	130	122	136	136	121	115	97	83	1,353
W. D. Bradburne, Bexley, N.S.W.	Do.	64	91	70	98	139	141	151	142	143	126	97	81	1,346
Mrs. J. R. D. Munro, Sunnyside, Warwick ...	Do.	100	91	64	113	127	127	141	137	134	118	102	84	1,338
F. McCauley, Clifton	Do.	117	119	86	140	127	121	124	110	113	110	93	55	1,315
S. E. Sharpe, Childers	Do.	36	133	133	146	136	122	121	116	119	110	90	49	1,311
A. F. Camkin, Kogarah, N.S.W.	Do.	46	87	90	109	128	121	141	146	135	117	105	85	1,310
Yangarella Poultry Farm, Indooroopilly ...	Do.	86	86	65	89	142	125	148	136	130	118	90	86	1,301
Jas. McKay, Gatton	Do.	86	107	92	102	129	137	140	127	119	114	104	44	1,301
H. Hammill, Kogarah Bay, N.S.W.	Do.	33	77	71	135	152	133	144	128	132	116	85	92	1,298
A. T. Coomber, Bundaberg	Do.	61	79	97	114	141	142	143	141	139	109	70	58	1,294
Cowan Bros., Burwood, N.S.W.	Do.	119	102	68	121	119	127	133	128	123	106	82	64	1,292
Mrs. Sprengel, Coranbong, N.S.W.	Do.	100	119	58	94	126	131	134	123	119	127	82	67	1,280
J. Zahl, Boonah	Do.	74	115	118	116	125	121	130	128	140	120	59	33	1,279
Doyle Bros., Merrylands, N.S.W.	Do.	51	94	102	117	132	132	145	136	130	97	86	43	1,265
T. Fanning, Ashgrove, Brisbane	Do. (No. 1) ...	0	50	100	125	136	127	148	134	135	128	92	89	1,264
Mrs. Craig, Miriam Vale	Do.	33	88	68	83	126	129	140	141	133	131	104	79	1,255
R. Jobling, Wallsend, N.S.W.	Do.	58	123	91	97	127	120	120	123	115	97	88	63	1,232
J. Archibald, West Maitland, N.S.W.... ...	Do.	21	71	88	84	136	140	154	141	130	92	94	74	1,225
C. Leach, Bexley, N.S.W.	Do.	50	53	63	101	136	131	150	134	135	109	95	61	1,218
J. Murchie, Childers	Brown Leghorns	81	88	31	54	132	141	148	140	138	121	95	49	1,218
J. Gosley, Childers...	White Leghorns	63	95	93	118	118	114	115	110	120	99	75	73	1,193
D. Grant, Boonah	Do.	70	92	60	114	129	129	137	123	121	91	69	47	1,182
A. C. Collis, Rookwood, N.S.W.	Do.	47	46	30	69	127	141	150	144	128	110	96	73	1,161
Mrs. Bieber, Childers	Brown Leghorns	65	58	31	51	129	140	147	137	132	104	88	57	1,139
T. Stephens, Blacktown, N.S.W.	White Leghorns	36	64	89	87	126	135	139	113	119	87	68	55	1,118
J. Andersen, Mordialloc, Victoria	Red Sussex	49	68	61	97	118	123	127	114	105	93	90	67	1,112
A. Schbrowski, Childers	Brown Leghorns	37	68	101	100	129	129	129	114	121	77	64	40	1,109
	Totals	2,719	3,871	3,506	4,462	5,345	5,300	5,625	5,285	5,223	4,453	3,643	2,988	52,420

State Farms.

ROMA STATE FARM.

For March, 1914, the Manager reports:—

Meteorology.—Exceptionally warm weather has been experienced for the season of the year, and vegetation of all descriptions has made wonderful growth, in consequence of which a large drain on the moisture contents of the soil has been experienced.

The maximum temperature recorded was 95, average 87·1; the minimum temperature recorded was 51·5, average 66·9; rainfall, 115 points, representing three wet days.

Vineyard.—Operations herein have consisted of one scarifying and one harrowing. The work of chipping portions not capable of being dealt with with horse implements is in progress.

Orchard.—Some of the early oranges and mandarins will probably be fit for marketing towards the close of the month. The lemons responded to the rains of last month better than was anticipated, and a few cases of good quality fruit will be marketed in the course of a few days.

Replants for last season's misses have been received and placed as required in the citrus portion.

The deciduous fruits in most instances have an autumnal appearance.

Olives.—These trees look exceptionally well, and demonstrate that they are sufficiently hardy to prove suitable for planting either for shade or other purposes in this portion of the State. Advantage was taken during the fruiting season to pickle a few of the Piccolina in the green state for show purposes.

Silage Crops.—These have been cut and placed in the galvanised iron lined silo. Only a poor yield of material was obtained. The following crops were placed therein:—5 acres cowpeas, 5 acres maize, 3 acres of sorghum, and 1 acre lucerne.

Teff Grass.—The small area sown in the garden in the early part of the season has been harvested for seed. The plot on the alluvial country, area about 1/16 acre, will be fit for the same purpose within the coming month. All things being equal, a small quantity of seed should be available for distribution next spring. A great drawback in connection with this grass is it liability to lodge; but, should it continue to prove as successful in the future as it has this season—and there does not seem to be any reason why it should not, seeing the number of the same family which thrive here—selection with the object of improving field characteristics could be entered upon.

Rhodes Grass.—This is now fit for cutting with the binder, and will be gone on with as soon as the more important field operations will permit.

Cultural Operations.—The final preparation of the land for 1914 wheat crops is in progress. This work was considerably delayed by silage operations, and it is feared that such will be noticeable in the yields, as the weeds made such progress as to prevent the working of implements which could cover the ground in the shortest time, with the result that the ground had been practically drained of moisture in the surface layers before they could be removed. This only serves to further illustrate, where sheep are not kept, the necessity of turning over the land in the shortest space of time possible to ensure there being sufficient moisture in the soil for the requirements of the subsequent crop.

General.—Between 50 and 60 varieties of grasses have been collected for show purposes.

Orders for seed wheat are not coming in so freely as in previous years, due no doubt to the increase in price and the ability to obtain seed of the varieties offered by us in the district where intending purchasers reside.

Stock have held their own during the month, which is as much as could be expected, notwithstanding the abundance of feed, as the flies by day and mosquitoes at night keep them continually on the move.

NOTES FROM KAMERUNGA STATE NURSERY.

The manager (Mr. C. E. Wood) reports that the rainfall for the month of March was 17.76 in. and the number of wet days 23, making the total rainfall since 1st January 64·68 in. This, taking the average for the previous twenty-one years for the same three months, is this year 13·50 in. over the average.

With regard to growing crops, cowpeas, so far as seed goes, have not been a success, as, owing to the pods ripening during a spell of wet, most of the seed sprouted in the pods.

The few rows of black cowpea have proved a failure, owing to nematode worms attacking the roots—yet other cowpeas within 20 ft. and on the lower side have not suffered. This opens up the possibility that certain cowpeas may be either nematode-resistant or partially so, and the plot with the diseased plants will be prepared and replanted with black and iron cowpea to test the exact superiority, if any, of the iron cowpea as a nematode-resisting variety. With regard to the diseased crop of black cowpeas, these plants were not left on the ground or allowed to mature, but were all dug up with a digging fork, carefully gathered up, and all plants burned while still quite green. By this means a great number of nematodes will have been kept from going back into the ground. The replanting of black cowpeas on the same ground is necessary, as, owing to the diseased plants containing large numbers of worms having been burned, the ensuing crop, no matter how susceptible to the attack of this worm, may prove for the time being to be equally as free as the iron cowpea, even presuming this latter proves resistant to the attacks of nematodes.

Cardomom (*Elettaria cardomom*): The photograph shows a single stool or plant of Cardamom and clearly depicts the manner in which the flowering stems spring from the root stock and lie close along the ground, varying in length from 1 ft. to 2 ft. or more. These plants were put in two years ago, but had it not been possible to supply them with a certain amount of water they would hardly have survived the dry conditions prevailing during a large proportion of the last two years. The Cardamom revels in a good rich soil with plenty of moisture.

PLATE 45.—CARDOMOM PLANT, SHOWING FLOWERING STEMS, AT KAMERUNGA STATE NURSERY.

The fruit now being borne is likely to prove very small owing to the adverse seasons.

A second photograph showing the plants growing under scrub conditions was not suitable for reproduction.

WARREN.

The Acting Manager reports for the month of March:—

Weather Conditions.—The monthly rainfall for March amounted to 432 points, representing twelve falls. On one occasion 100 points fell in twenty minutes, doing much harm to the cultivated areas. We are now in urgent need of more rain.

Cereals.—Fifteen acres have been planted with cereals—namely, Kubanka wheat, Californian feed barley, and Huguenot wheat.

Kubanka.—The seed was excellent in every way, and gave a good germination test. It was planted under good conditions, and germinated well; it is now about 6 in. above ground, and in need of moisture.

Huguenot.—This seed was very pinched, and gave a poor germination test. As a result of this, and on account of its poor stooling nature, it was sown very thickly. It is not showing a good growth, and has germinated very badly.

Californian Feed Barley was planted under ideal conditions, and is now showing a remarkable growth. It was sown fairly thickly, and promises well.

Manchurian Millet.—This crop, although not of any height, has seeded well, and will be reserved for seed.

Maize.—We have four varieties of maize growing, namely:—Boone County White, the best of the four varieties. Has cobbed very well, the grain being full and even in size. A variety well adapted to this district. Johnson County White, a variety imported from America. Has not yet been acclimatised, and has not been a success. Sydney Red has grown well, the cobs being well shaped, with good seed. Early Leaming: This variety has been acclimatised, but the season's crop is not what was at first anticipated. The cobs are few and badly shaped, the grain being pinched.

Lucerne.—The growth of lucerne is remarkable, and a record cutting is expected.

Potatoes.—The potato crop will not be a pronounced success. They have grown very unevenly, and are inclined to run to top. It is yet early to pass judgment on the crop as a whole, although I do not feel optimistic as to the resultant crop.

Sweet potatoes have been planted for pig feed. Practically every cutting has struck, and sufficient winter feed is assurred.

The Orchard.—Five rows of fruit trees have been taken out owing to the unsuitability of the soil. The roots were so firmly embedded in the clay subsoil that a plug of gelignite had to be used to loosen them.

The Dairy.—Dairying proper has now been started on this farm. I am convinced that, provided some grass like Rhodes is grown, dairying in this district will pay handsomely. Our pastures are mostly of Rhodes grass, and the stock are all in excellent condition. We are now supplying cream to the local factory three times a week.

A PERFECT FERTILISER.

Professor Bottomley's discovery of a perfect fertiliser is of intense interest to Australia. He has produced a bacterialised peat, which absorbs the nitrogenous wealth of the atmosphere. The exhaustion of nitrogen by crops is the cause of the decay and death of soils. For soils die just as do all other living elements in nature. They become senile, because of exhaustion. The purpose of fertilisers is to arrest that exhaustion, and to revivify the earth. Rain always brings down large quantities of the free nitrogen of the atmosphere; hence its incalculable value as a revivifier of the land. But much of the nitrogen thus brought down escapes. With a fertiliser such as that now discovered by Professor Bottomley, the nitrogen cannot easily escape before it becomes absorbed by the soil.—Exchange.

The Orchard.

FRUIT CULTURE IN THE BURNETT, GYMPIE, AND MAROOCHY DISTRICTS.

Mr. C. Ross, F.R.H.S., Instructor in Fruit Culture, who has just completed an extended tour through the Burnett district, has furnished the following interesting report on various portions of the district in respect of fruit culture:—

I was fortunate in being able to arrange with five different owners of spring carts to drive me in different directions.

As distances are great and roads rough, it was impossible to visit the Binjour Plateau, Reid's Creek, &c., on this occasion. The journeys were not easy, but a large area of country watered by the Burnett, Boyne, and Auburn Rivers, including the Copeland Group, was traversed. About 25 settlers were visited, to whom instructions and advice were given and gratefully received.

The township is situated on the Burnett River, and surrounded with fine country, where fruit-growing, general farming, and dairying may be profitably carried on, and at present very heavily grassed. The frontages to the abovenamed rivers consist of very deep, sandy, and warpy loams, well suited for the cultivation of all citraceous fruits; lemons may be specialised for the reason that the climate lends itself to the perfect curing and keeping qualities of the fruit. Many of the deep sandy ridges, free from clay, may also be utilised for the same purpose. Away from the box flats the timber is chiefly ironbark, bloodwood, gum, &c. The scrub soils are mostly heavy volcanic loams, better adapted to maize and other farm crops that to fruitgrowing. There is also much land suitable for cotton, lucerne, rosellas, tomatoes, grape vines, and passion fruit, all of which could be made highly remunerative. Strawberries might be enumerated if irrigation were applied, which also applies to garden crops. Apples grow exceedingly well, but crop returns are not likely to be profitable. The number of varieties best adapted for the climate is very restricted; but the following may be grown to a moderate extent for home or local supplies, viz.:—

> Greening, Canvade, Rome Beauty, Irish Peach, Jonathan, Ben Davis, with perhaps one or two others.

As a rule, I do not advocate growing any deciduous fruits where such fine opportunities exist for citrus culture. The danger of fruit flies is ever present in mixed orchards. The following, however, not being susceptible to fly attacks, may be grown with good results, viz.:— For damp situations: Walnut, Chestnut, and Date Palm. For drier situations: Pistachio Nuts, Almonds, Persimmons, Figs, Loganberry, Mulberry, Pecan Nut, Olive, and Cooking Pears. Avoid Guavas and all stone fruits where oranges are intended to be the main source of income.

Those who have already gone to the expense of preparing the land, and planted with trees, should immediately equip themselves with either a spraying or a fumigating outfit—*i.e.*, a spray pump or a few cyanide sheets. The district is now clean, and by proper attention it may be kept so. The citrus trees especially should be sprayed or fumigated at least once a year, beginning the first season whether there is any pest visible or not. If these operations are carried out in routine order, the same as cultivation and pruning must be, the expense and loss of time are reduced to a minimum; whereas, if pests are allowed to accumulate, it is always difficult to eradicate them and, in some cases, well nigh impossible.

My thanks the due to Mr. W. G. Parker, Secretary of the Mundubbera Farmers' Association, for kind attention; to Messrs. E. M. Berbe, Wm. McLennon, and H. V. Carmen for long drives; and Messrs. Jas. Nattrass and Salmi for shorter ones.

On returning to Gayndah, Mr. Geoffrey White drove me to his Glenora Orangery. This is an old and very notable orchard, planted over thirty years ago by Mr. Seeney; but the present owner has recently planted another 1,000 trees. The bearing trees are exceedingly fine examples of what can be done on these Burnett River lands; they are upwards of 30 ft. in height and 20 ft. in diameter. Oranges, mandarins, and lemons are carrying fine crops. The trees, both young and old, are remarkably vigorous and clean. On the largest trees a little scale is showing, and, as it is impracticable to fumigate such large trees, they should be sprayed at once after the crop is off. It is also desirable—in fact, important—that the young trees, although showing no sign of pests at present, should be regularly fumigated once a year. On the whole, this is one of the best-managed, cleanest, and best-cultivated orangeries I have seen.

I also visited Mr. Ben Nixon's Orangery. As regards cultivation and vigour of trees, the same remarks apply. About 200 trees grafted on lemon stocks are now coming into full profit. The selection of varieties is good. Scales have obtained a considerable hold, and fumigation operations should be the first order of the day—first, immediately after the crop is gathered; and again in spring, just after blossoming.

Both Mr. White and Mr. Nixon have wisely discarded all deciduous tree fruits.

I arrived at Gympie at midnight of the 13th idem. Early the following morning I was driven to Eel Creek and Pie Creek, and visited a number of settlers. I noticed sandstone ridges, well above frost line, on which for the cultivation of pineapples the soil is characteristic, and as suitable as that of Woombye. There are also slopes and plateaux of deep, sandy volcanic loams, and well-drained flats of a slightly heavier character, that would suit oranges, papaws, and passion fruit. Pines, &c., should be devoted to the slopes, away from the flats.

Pests have been allowed to accumulate to a serious extent. One very noticeable object lesson was pointed out where the relics of an old orchard, dying from neglect and disease, had communicated scale pests to a three-year-old plantation near by, causing the young trees to die already. The method of pruning to adopt was demonstrated, to be followed by cyaniding or spraying. By timely application of the instructions given, the pests will soon be eradicated. A yearly or a bi-yearly treatment, whether the pest is present or not, should not be neglected.

Much expense is required to establish these plantations, and it is very regrettable to notice, in some instances, how sadly neglected they become, regarding both cultivation and pests. The spray pump or cyanide sheets are just as necessary to the orange-grower as are the plough, the hoe, and the pruning knife.

I visited a very fine orchard site well up a gently sloping spur at Amamoor. Twenty-five acres have been cleared of dense jungle on an easterly aspect, from which is commanded a grand panoramic scene. The soil is a deep, rich, friable, volcanic loam, and as for quality, aspect, and situation it cannot be excelled. About 10 acres of bananas are now producing mother bunches averaging 10 dozen each, which, for a first produce, is considered good in the most ideal situations. The five-months old pineapple patch has made remarkable progress. Land is now being prepared for the reception of citrus trees. Papaws can be well grown, and, amongst other things, custard apples are recommended for this mountain range.

On a previous visit to Woondun I had recommended a site for bananas in the midst of dense, heavy forest. The initial cost on such country is very heavy, but, in my opinion, it is justified by the site and quality of soil. The character of the soil is similar to that of Takura and Nikenbah—a metamorphic limestone, which suits the banana to perfection. The aspect is easterly, and extends along the face of a spur which is to be planted quite up to the top of that part of the range. The west face is more abrupt, but, as it is well sheltered by other ranges and high dense forest, a few more chains in width could be utilised for citrus fruits and bananas. The quality of oranges grown on such country is first-class, and the skins are usually very thin. Five acres of bananas have just been planted, but being late in the season are not likely to make much growth before next October.

On the Friday I was driven to Goomboorian over the roughest and, in places, the most dangerous road in all my experience.

At Mr. Austin's farm the situation for a banana plantation is ideal, being planted on the slopes and surrounded by an arrangement of mountains that give one the idea of the trees being perfectly sheltered from high winds from any point. The bananas have been planted about sixteen months, and are now bearing mother bunches. The plants are luxuriant, except in one small patch, where I imagine a bar of impervious subsoil or rock approaches too near the surface. The application of explosives would no doubt improve its condition.

My former opinion of the country surrounding Gympie has been abundantly confirmed during this visit. There is no lack of choice regarding situations, aspects, quality, and variety of soils adapted to a wide range of field, garden, and orchard subjects.

I afterwards visited Maroochy, *viâ* Yandina, where I met and discussed fruit matters with several growers along the river. I do not remember ever seeing bananas more at home than in these river pockets. I saw seven-months old plants bearing their first bunches, and other stools under twelve months old that had produced six and seven remarkably robust, full-grown stems, some of which are throwing out bunches. Such a number of stems of enormous growth seems to knock one's calculations awry in connection with such young plants, when from three to five stems are usually considered sufficient for two-year-old stools.

In this instance, however, the end appears to justify the means. Whilst the Maroochy appears to be the home of the banana, oranges may be successfully cultivated on a few of the well-drained ridges, where there is no suspicion of a clay subsoil. The quality and keeping properties, however, may not be equal to the best citrus localities. Pineapples in suitable spots may be grown also, but the same remarks apply. The fruit would be watery and never develop the full rich flavour of more congenial localities.

I have to thank the following gentlemen for drives and courtesies, viz.:—Messrs. W. Sinclair, V. T. Pittel, A. Henderson, J. Cullinane, Mellor, T. Connor, Maynard, and A. C. Potter.

An addendum to the above has just been handed to us by Mr. Ross to the following effect:—

I have repeatedly recommended the more serious consideration of lemon culture in such localities as are suited to this product and, to further accentuate its importance, I quote a few figures just to hand of a recent consignment from Bowen to Sydney. The agent handling the shipment—a fairly large one—reports that the fruit arrived in excellent condition, and was equal in every way to the best imported Italian lemons, and realised 14s. per case containing 10 to 12 dozen. Washington Navel oranges, also from the Don Delta Groves (Messrs. Cotton and Adams), realised 2d. per orange *net*.

During my recent visit to Gympie I was shown the accounts of a consignment of seventeen cases of locally-grown pineapples just sold in the wholesale markets of Sydney which returned exactly 1s. per pine *net*. The pines grown in this district have good carrying qualities. The best districts for lemon culture are—The Don Delta, Burnett, the Central, west of Rockhampton, Toowoomba, and the West.

TWIN PINEAPPLES.

The two fine smooth-leaf pineapples here illustrated were grown on Mr. R. Morris's pineapple farm at Ormiston. These pines cannot be classed under the head of freaks, both being well-grown marketable fruits. Twin pineapples growing on the same sucker have been produced in North Queensland, and invariably from the smooth-leaf variety, none having been observed in the Ripleys or other rough-leaf pines.

PLATE 46.—TWIN PINEAPPLES ON ONE STALK.

Tropical Industries.

NOTES ON DATE-GROWING—IV.

[CONTINUED FROM APRIL ISSUE.]

CARE OF ADULT TREES.

Old Leaves Cut Away and Bases of Trees Cleared of Excess of Off-Shoots and Rubbish.—Adult trees require very little care or attention. Mr. Gaskin, Assistant for Commerce and Trade, Bagdad, informs me that the Arabs there prune the dead leaves from the palms three times a year—viz., (*a*) at the time of pollination; (*b*) when the fruit is well formed, but has not turned yellow; and (*c*) when the bunches of fruit are finally cut down. In many places where the date is cultivated, however, pruning is only done once a year. In spring, when growth commences, the leaves which are withering up and hanging limply, are cut away, and the bases of the trees are cleared of all rubbish and superfluous off-shoots. Four to six off-shoots are usually left on each tree to provide young plants for planting elsewhere. Off-shoots while attached to the parent tree obtain all their nourishment from the parent; therefore, the crop of fruit is diminished if a large number of off-shoots are allowed to remain attached to the tree. If a tree bears specially good fruit, and off-shoots from it are much wanted, a larger number of these may be allowed to grow at the base.

Ages between which Trees Produce Off-shoots.—Date trees usually produce off-shoots between the ages of five and twenty years. After twenty years of age, few or no off-shoots are produced. Young date plants grown from seed which have dropped around the trees, and all other useless plants growing around the bases of the trees, should be removed, as they take up water and food materials from the soil, which would otherwise have been available to the date trees.

Water Requirements of Adult Trees.—This has already been explained at length. No general rule can be given with regard to the amount of water to be applied artificially. It is, however, agreed that the palm requires more water in the fruit-developing period than it does at other times of the year. About three-fourths of the total number of waterings given in a year are usually applied in that period. If, therefore, sixteen waterings are given per annum, twelve of them would be given here between the 1st of May and the end of August approximately.

Excess of Water Injurious at Flowering Time.—At the flowering time, little or no water should be given as a general rule, as it is believed that an excess of water at this time prevents the proper setting of the fruit. Adult date palms may have the bases of their stems flooded for considerable periods without harm. In parts of Egypt water to a depth of from 3 to 4 ft. stands round the trees during September and October every year. Flooding will, however, kill newly-planted off-shoots by destroying their terminal buds if the water covers them for any length of time.

Cultivation of the Soil between the Trees where no Crops are Grown.—If no crops are grown between the trees, it would still be an advantage to irrigate the whole of the land and plough, harrow, or otherwise stir its surface up occasionally. The occasional irrigations would prevent alkali collecting in great strength on the surface of the land and washing it down and redistributing it in the soil; and the ploughings or harrowings would eradicate weeds and retard evaporation. (For crops grown between the trees see Part 3, in April issue of the Journal, under the head of "Auxiliary Crops.") Other attentions required are pollination of the flowers, thinning down the number of bunches of fruit, and protection of the fruits. These will be dealt with further on.

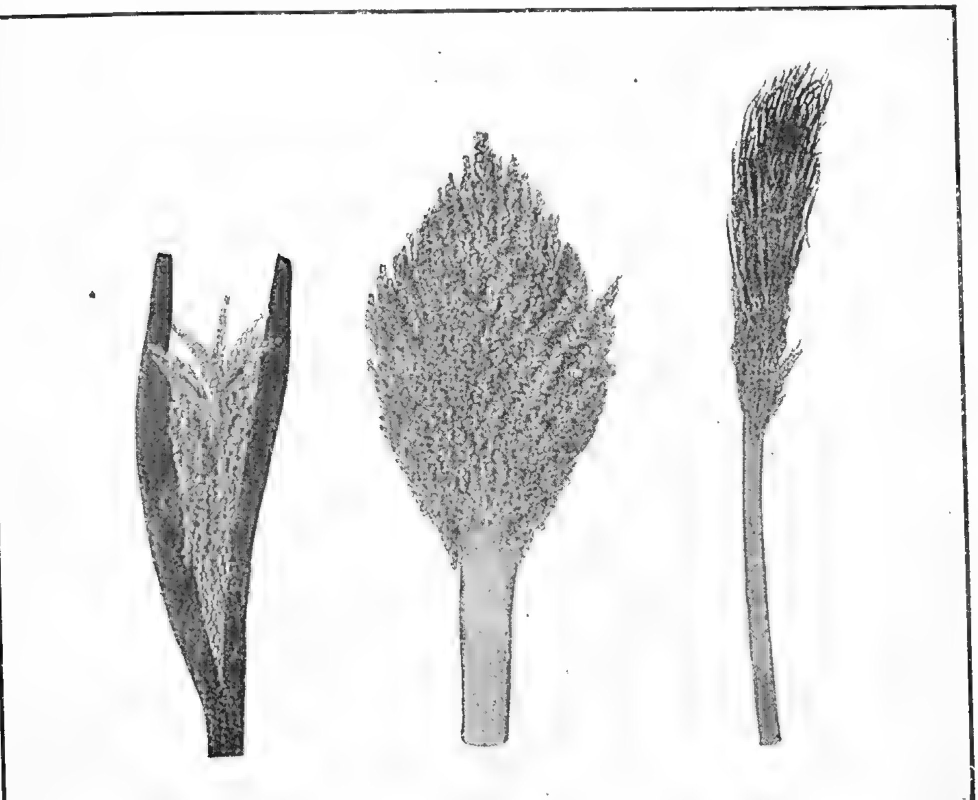
THE DIFFERENCES BETWEEN MALE AND FEMALE TREES.

Difference between Male and Female Suckers.—In purchasing suckers (off-shoots) one may be supplied with (1) male off-shoots, (2) female off-shoots from inferior varieties of trees, (3) seedling plants, in place of good female suckers.

Male trees have usually more thorny and stiffer leaflets than females, and every variety of female date plant differs to a greater or less extent in these respects from every other variety. Differences of this sort between females are fairly constant, as the particular varieties are propagated by off-shoots, but they are often very slight. Male trees are usually propagated by seeds; therefore, these characters differ considerably in males. To distinguish date suckers by their leaves and spines, therefore, is a difficult task. Only people who are very intimately acquainted with the date palms of a locality can hope to identify the cultivated varieties by these means, and very often even they fail to do so. The lower end of an off-shoot has a mark showing where it has been severed from its parent, while the lower end of a seedling has no such mark normally. Fraudulent people, however, very often cut a piece off the lower end of a seedling to make it appear like an off-shoot. A seedling plant usually has a straight stem, however; while that of an off-shoot usually has a slight bend at its base, where it curves inwards to join the parent stem. The direction of the cut with regard to the main axis of the plant and the angle at which it cuts the cap-conducting vessels of the wood also usually differ in the two cases. In the case of the off-shoot, the cut is made approximately in the plane of the main axis of the plant, and, owing to the base of its stem bending towards its mother, the cut will be more or less at right angles to the direction of the vessel at that point. In the seedling, if the cut is made at right angles to the direction of the vessels, it will be at right angles to the main axis of the plant; and if it is cut in a plane anywhere approaching that of the main axis of the plant, it will not be in the proper direction with regard to the vessels, and the cut end will probably show a more or less distinctive outline. Male off-shoots, female off-shoots from inferior trees, and seedling plants, if skilfully cut, are all extremely difficult to distinguish, even by the most experienced people; and as the trees will only be distinguished with certainty when they begin to bear flowers and fruits, five to ten years afterwards, I strongly advise that, where possible, the parent trees be marked when in fruit, and that the suckers be detached from their parents at the planting season under personal or reliable supervision.

Differences between Adult Male and Female Trees not in Flower.—Adult male trees, in addition to having more spiny leaves and stiffer leaflets, are said to have shorter stems and more leaves on their tops as a rule. Differences in thickness of stem and in the crown of leaves at the top of the trees are, however, less reliable than the other differences mentioned. Very frequently parts of old flower clusters remain attached to the tree after the flowering and fruiting seasons are over, and in such cases the sex of the tree can often be identified.

The Inflorescence of Flower Cluster.—In spring a number of structures, at first greenish, and later brown, and measuring 3 to 5 in. across, and 1 ft. or more in length, make their appearance at the bases of the leaves which crown the palm. These structures are called "spathes," and each spathe encloses a cluster of flowers. When the spathe has become brown in colour, and has attained something like the size mentioned above, it splits open and exposes the cluster of flowers which it contains (photos. Nos. 2 and 3). Each flower cluster consists



A B C

PLATE 47.

A—Inflorescence showing the dark-brown spathe just splitting open and showing the male flowers which it contains.

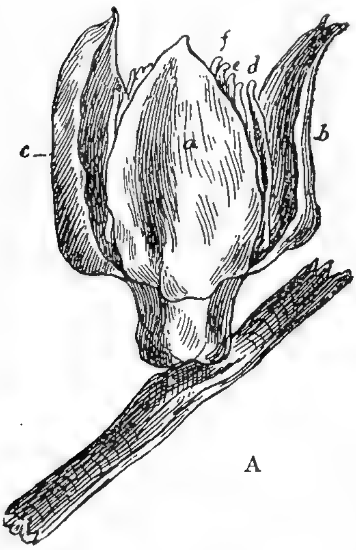
B—Male inflorescence free from the brown spathe.

C—A past year's male inflorescence showing the comparatively short lateral branches c owded near the top of the main axis.

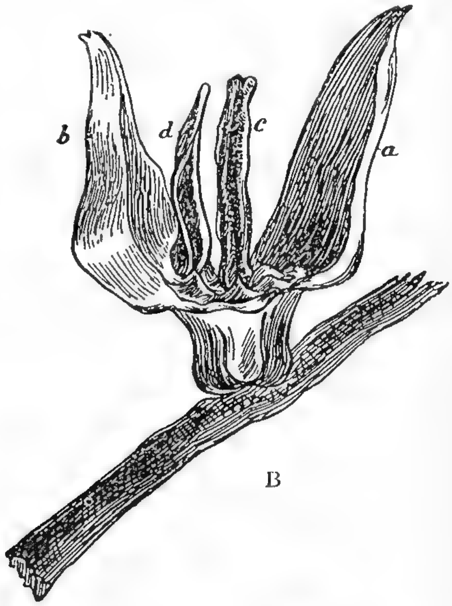
of a central stem with 100 or more branches radiating from near its end. Each one of these small branches carries on it a large number of tiny flowers, as shown in sketches A, B, C, and D, and photos. Nos. 2 and 3.

The Male Flower Cluster.—The small branches on the male flower cluster are about 6 in. long; and if the cluster is shaken about the time that the spathe splits open, a dense cloud of yellowish pollen dust will fall from it.

On examination, it will be seen that in every little flower there are six stamens standing up like little pillars, each composed of two little yellowish pollen sacs, and that it was the contents of these that formed the cloud of pollen dust. Around the six little pillar-like stamens are



A



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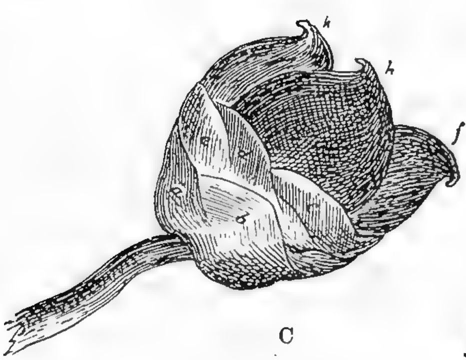

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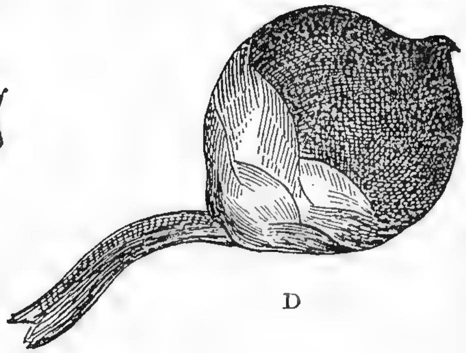


D

PLATE 48.

SKETCH A.—Male Flower—Scales (Sepals and Petals), *a*, *b*, and *c*; Stamens, *d*, *e*, *f*, &c.

SKETCH B.—Part of Male Flower—Scales, *a* and *b*; Stamens, *c* and *d*.

SKETCH C.—Female Flower—Scales (Sepals and Petals), *a*, *b*, *c*, *d*, *e*; Carpels, *f*, *h*, *k*.

SKETCH D.—Female Flower after two of the carpels have been shed. The single remaining carpel will form the date fruit.

(Four-fifths actual size.)

six waxy-looking, little, scale-like structures which represent the sepals and petals in familiar flowers. These scales close over and protect the stamens until the pollen sacs have matured their pollen grains, and are ready to burst and set the pollen free (photos. 2 and 4, and sketches A and B.) Very soon after the large brown spathe splits open, the scales (sepals and petals) which covered and protected the stamens open out, and the pollen sacs burst. The opening of the scales and the bursting of the pollen sacs are due to the cells of their outer or epidermal tissues drying and contracting under the heat of the sun. The pollen sacs usually open within an hour or two of the bursting of the spathe.

Female Flower Cluster (See photo. No. 5).—The spathe which encloses the female flower cluster is very similar to that which encloses the male cluster, and it bursts in the same way when the female cluster is ready for fertilisation. The small branches of it are, however, less confined to the end of its main axis, and are very much longer than the small branches in the male flowers cluster (see photos. Nos. 2 and 3). The female flower also differs very much from the male flower (see sketches A and C). It is an oval-looking body, and might at first be mistaken for a male flower in which the white scales (petals and sepals) had not opened out. On dissecting it, however, it will be found that the central and main part of the flower is formed of three solid bodies, closely applied to each other on their adjacent faces, and forming what appeared like one oval body. Each of these solid bodies is called a carpel, and contains a structure called an ovule, which, when fertilised by the pollen, gives rise to a seed, the carpel giving rise to the edible part of the fruit at the same time.

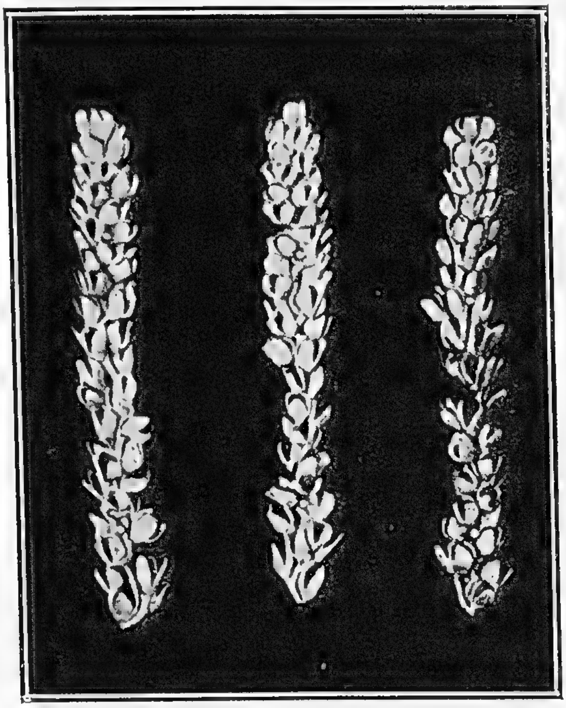


PLATE 49.—THREE SMALL BRANCHES OF MALE FLOWERS.

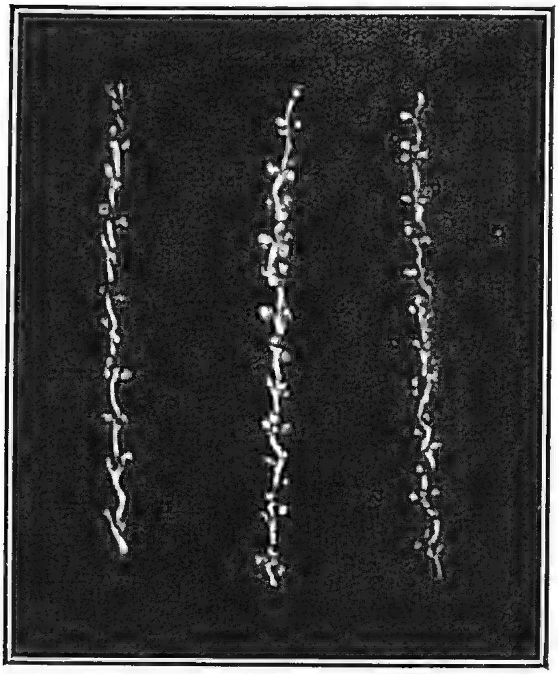


PLATE 50.—THREE SMALL BRANCHES OF FEMALE FLOWERS.

At the bases of the three carpels are six scale-like structures similar to the protecting scaly sepals and petals found in the male flower, but very much smaller and clinging closely to the carpels. A mass of female flowers, therefore, never has the very waxy white appearance which a mass of open male flowers has.

Brief Comparison of Male and Female Flower Clusters (Photos. Nos. 2, 3, 4, 5).—At a distance, therefore, the flower clusters may be distinguished by the fact that the small branches in the male cluster are about 6 in. long and densely clustered at the end of the axis, while those of the female are usually twice or more times that length, and less densely clustered at the end of the axis. When the flowers newly open, they may be distinguished at a distance by the white, waxy colour of the male flowers, and the more yellowish hue and less crowded appearance of the female flowers. If taken in the hand at this stage, a dense cloud of pollen dust will be produced from the male cluster by a slight shake, while none will come from the female cluster; also, six stamens with six comparatively large waxy-looking scales will constitute each male flower; while the female flower will be composed of three carpels closely applied to each other, and forming what looks like a single solid oval body, and having six very tiny scales closely applied to its base. The flower clusters can also be distinguished at that stage by their smell.

Monœcious Trees.—The above is the usual condition of affairs, but last date-flowering season I found a considerable number of trees in which one of the flower clusters was mostly composed of male flowers, while another flower cluster from the same tree was mostly composed of female flowers. When the sexes are in separate flowers, but on the same tree, the tree is said to me monœcious.

Hermaphrodite Flowers.—In other cases I found three more or less functional carpels and two to six more or less functional stamens in the same flower—*i.e.*, both sexes in the same flower. Where both sexes are in the same flower, the latter is said to be hermaphrodite. In the cases

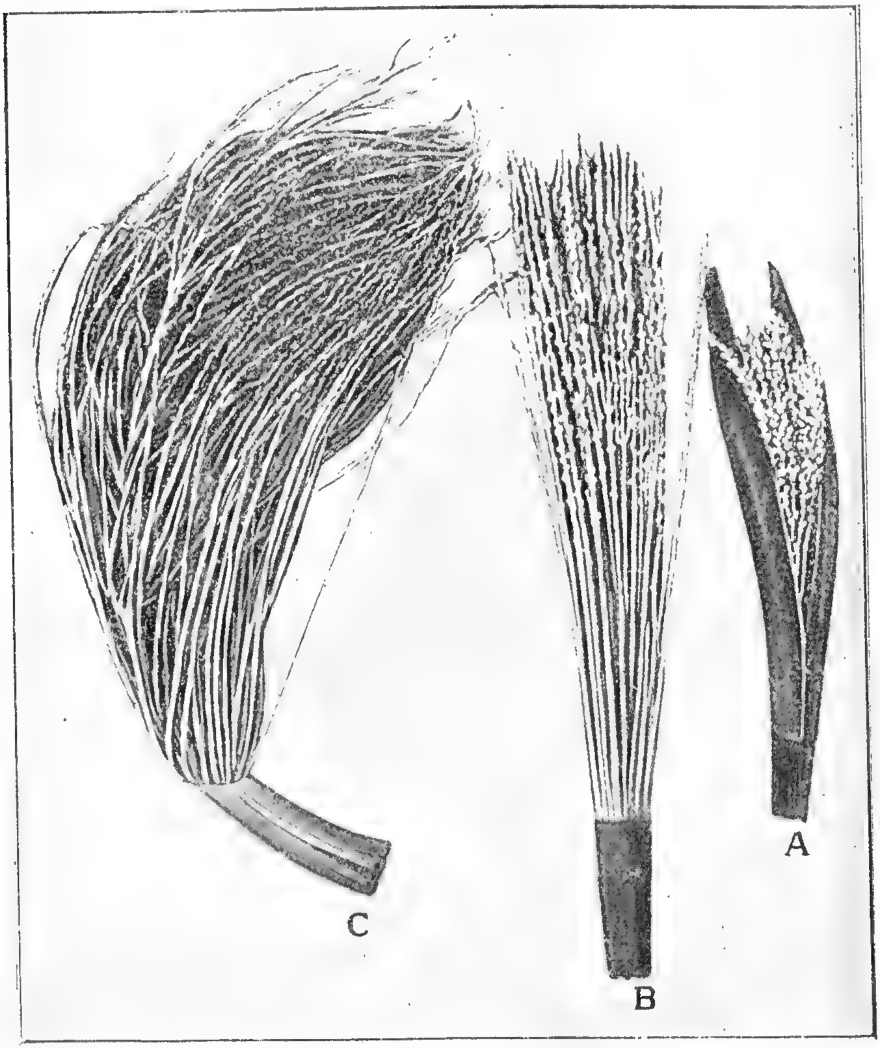


PLATE 51.

A—Dark-brown spathe just splitting open and showing the female flowers which it contains.

B—Female inflorescence free from the spathe.

C—A past year's female inflorescence showing the comparatively long lateral branches less crowded on the top of the main axis than in the case of the male inflorescence.

when the flowers were hermaphrodite the small branches of the flower clusters were midway in length between those of the ordinary male and ordinary female cluster. Other characters which can be detected at a distance were also rather mixed.

[TO BE CONTINUED.]

COTTON AT GOSSYPIUM PARK, CAIRNS DISTRICT.

By HOWARD NEWPORT, Instructor in Tropical Agriculture.

In continuation of his article on Cotton-ginning, &c., in North Queensland, published in the April issue of this Journal, Mr. Newport now gives some account of

THE USES AND TREATMENT OF COTTON SEED IN NORTH QUEENSLAND.

The seed of cotton after it leaves the cotton gin is by no means perfectly clean. The best of gins cannot separate all the lint, and, whatever the seed may be used for, a further cleaning is necessary. In large factories or oil-crushing mills a special machine is kept for the purpose, called a "linter," by which the small particles of cotton adhering to the seed are removed.

When required for crushing for cotton-seed oil, it may be put into the press as it is, or more often is redried, cleaned, and put through a hulling machine, which removes the outer black shell or putamen. The resulting meat or pure kernels of the seed give a higher percentage of oil of a purer and better quality than if the seed were crushed whole. Cotton-seed oil cake is one of the most valuable of cattle foods, and considered second only to cocoanut oil cake. The black husks are also used as cattle food in some countries, and are said to have a fairly high feed value. It is mixed with other foods, such as bran and pollard, for milch cows in Ceylon and India.

The return of oil is about 2 gallons for every 1 cwt. of seed crushed, but considerable power is required, as it is often necessary to obtain a pressure of 4,000 lb. to the square inch to obtain a satisfactory extraction. To do this, of course, hydraulic presses are necessary, and the primitive methods of wooden screw and rotary presses, especially if the seed is crushed without shelling, give a very much poorer extraction and would hardly be worth while troubling about in this country.

The crude oil is quoted now in London at £30 5s. per ton, and refined at £33 to £33 10s. per ton; while the oil cake of pure meat is worth about £8 per ton wholesale, and £10 or over retail. The coarse oil cake from the unshelled seed is seldom met with now, and it is not worth so much, though said to be somewhat higher in feed value.

The disintegrated oil cake is also a valuable manure, and is known in India as "poonac." There it is used to add bulk to artificial or chemical manures, and materially assists in the mechanical effects on the soil, besides having a high manurial value itself on account of the percentage of nitrogen contained.

The analysis of cotton cake or meal (disintegrated cake or poonac) is given by L. T. Addyman, B.Sc., London, as—

Moisture	10·81
Organic matter	82·49
Calcic phosphate	5·55
Alkalis	·55
Sand	·65

No crushing plant exists in North Queensland, which is a pity, as a press that could produce a ton of oil a day would only cost about £100, and could be used for many other oil-producing seeds and products besides cotton seed. As it is, this seed being worth only some £4 a ton, and freight being charged by measurement, there is scarcely sufficient margin to make it worth while shipping it to the Southern oil factories.

While the oil is valuable if extracted, its presence does not, however, reduce the value of the seed for either cattle food or manure. When the unpressed seed is so used, it is best crushed or broken, which can be readily done in almost any crushing machine. This has been done by the Director of the Gossypium Park Estates Company at Kamma, and excellent results obtained with the substance both as cattle food and as manure for cotton, cane, and other agricultural staples.

PLATE 52 (FIG. 1).—CRUSHED COTTON SEED (UNPRESSED) FOR FODDER OR MANURE.

Fig. 1 shows some of the cotton seed crushed (without the oil being abstracted), and in a form in which it can be used either as stock food or manure. When used as stock food, it is in this country mixed with chaff or "chop-chop," as is maize. In some instances, as indeed with grass-fed animals first fed with maize or silage, stock are shy of it until they become accustomed to the taste, but, once used to it, they eat it greedily with, in every way, excellent results. As a fodder, crushed cotton seed is worth about £15 a ton.

When prepared for manure only, the seed need not be so carefully cleaned as for feed, since the presence of sticks, sand, or dust to a small percentage does not matter. When used manurially, it may be mixed safely with most artificial manures, which may be done with the aid of a manure-mixing machine such as is depicted in the background of Fig. 1.

For purposes of propagation, the seed as it leaves the cotton gin requires considerable treatment. In the absence of a delinting gin, the seed must be put through a coarse wire sieve. When shaken lightly in this, the seed that has but little adhering lint is found to readily pass through and separate from the seed carrying lint, especially in the case of the Sea Island types of cotton, such as Caravonica, one of the characteristics of which is the clean skin of the seed except for a small tuft at the end. The cotton seed dealt with in the Northern parts of Queensland is practically all of this type. The first sieving process is found to produce from 40 to 60 per cent. of seed fairly free from linters. This seed, however, still includes the broken, discoloured, light or shrunken and malformed seeds which, though not worth while separating for pressing for oil or crushing for food or manure, are largely non-fertile and must be removed to obtain a sample of seed of a good

PLATE 53 (FIG. 2).—"GARBLING" COTTON SEED FOR PROPAGATION AT GOSSYPIUM PARK ESTATE, KAMMA.

percentage of germination and true to type. This can only be done by hand, for no machine can separate seeds that may differ only in colour. The process of removing the irregular seed is, therefore, the slowest and most expensive. Fig. 2 illustrates this process, which is technically known as " garbling," being carried out on the Gossypium Park Estates by aboriginal children under the supervision of the Director, Mr. J. Campbell.

Each of the varieties of cotton, especially the Sea Island types, have their own characteristics in the seed which are well known to the growers. In the case of Caravonica, any of the employees could pick out a typical seed at a glance; and the seed being spread out on a table, and being mostly pure, the aboriginals with their sharp eyes can detect and pick out all the seed that do not conform to the type, far more quickly than could a white person unless trained to the work. All the irregular seed, including the shrivelled, light-coloured (and generally hollow), and malformed seed, of which a percentage must always be found, are thus removed, and, after a final sieving in a fine sieve to remove sand and dust, the seed is ready for distribution to intending growers. This process is found to cost about 6d. per lb.; and while the seed of this valuable variety of cotton is disposed of, and may be obtained through the Department, from the cotton sent in by growers for treatment and realisation by the Government, at 1s. per lb. in the crude state—*i.e.,* just as it leaves the cotton gin—it is always advisable to obtain the properly selected and treated seed, which is available in fair quantity now at 2s. per lb.

A NEW EGYPTIAN COTTON PLANT.

According to the "Egyptian Gazette," "an extraordinary fine Egyptian cotton has recently been produced by careful selection on the estate of Mr. Pangalo at Mit Ghamr, in the Dakhalieh Province. We have examined a number of samples of this new variety, which is brown in colour and most silky in texture. The staple is probably the strongest of all varieties of cotton in this country, and one of the most characteristic features of the plant is its shortness, but the plant is covered with bolls, over 100 bolls having been found on a single plant. The return of cotton from this variety per feddan is higher than that of any other variety of cotton in Egypt yet, for sowing one feddan needs only four 'keles,' instead of six or seven 'keles,' as is the case with other varieties. Its other advantages are that it arrives at maturity very rapidly, and consequently is the less liable to the attacks of cotton pests, changes in the weather, and all other ills to which Egyptian cotton is subject. Some specimens are to be sent to the International Cotton Exhibition, which is to be opened in London during the coming summer. Messrs. Choremi Benachi and Co. have obtained the monopoly of this new variety. The seed of the Pangalo cotton is only sold by this firm and Messrs Pangalo on the condition that the crop is sold back to them, thus preventing the seed getting into the hands of outsiders. This year 2,000 ardebs have been produced, but, of course, the yield next season will be very much greater."—"Rubber World."

RAMIE.

Although ramie will thrive splendidly on our coast lands, and although the present price of the valuable fibre it produces is from £48 to £50 per ton, there is no inducement to grow the plant here, owing to there being, we understand, no machinery yet devised capable of extracting the fibre profitably. Various machines for the purpose have been invented, and numerous trials have been made with them, but, from all accounts, they have failed to fulfil the requirements. Thus ramie fibre still remains in the category of fibres which must be prepared by hand in lands of cheap labour.

The "Cyprus Journal," some time ago, published some particulars of the cultivation of ramie by Commander Richard Nivison, R.N.R., at Kyambu, near Nairobi, British East Africa, where that gentleman has been growing ramie for five or six years. In a letter to the "African Standard," of Nairobi, he says that, "without any machine or process for decorticating the fibre, ramie can be grown for export at a handsome profit on suitable land in the colony, the ribbons being stripped from the stems by native hand labour, which is readily obtainable. The ribbons fetch from £12 to £14 per ton in the London market, and Mr. Nivison says that the yield per acre is nearly 4 tons of dry ribbons in the second year and over 5 tons in the third year and for at least seven years afterwards. with sufficient manure. Allowing for the cost of labour, manure, freight to London, and incidental charges, Mr. Nivison says that the profit is at least £10 per acre the third year, and £14 thereafter. All the machinery required is a press. Experiments already made show that ramie will grow on irrigable land in Cyprus."

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

Date.	May.		June.		July.		August.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·17	6·30	5·0	6·39	5·3	6·30	5·18
2	6·14	5·16	6·30	5 0	6 39	5·4	6·30	5·18
3	6·14	5·15	6·31	5·0	6·39	5·4	6·29	5·19
4	6·15	5·14	6·31	5·0	6·39	5·4	6·28	5·19
5	6·15	5·13	6·32	5·0	6·39	5 5	6·28	5·20
6	6·16	5·13	6·32	5·0	6·39	5·5	6·27	5·21
7	6·16	5·12	6·33	5·0	6·39	5·6	6·26	5·21
8	6·17	5·11	6·33	5·0	6·39	5 6	6·26	5·22
9	6·17	5·11	6·34	5·0	6·39	5·6	6·25	5·22
10	6·18	5·10	6·34	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6 34	4·59	6·39	5·7	6·23	5·23
12	6·19	5·9	6·35	4·59	6·39	5·8	6·22	5·24
13	6·20	5·8	6·35	4·59	6·38	5·8	6·22	5·24
14	6·20	5·8	6·36	4·59	6·38	5·9	6·21	5·25
15	6·21	5·7	6·36	4·59	6·38	5·9	6·20	5·25
16	6·21	5·6	6·36	5·0	6·38	5·10	6·19	5·26
17	6·22	5·6	6·37	5·0	6·37	5·10	6·18	5 26
18	6·23	5·5	6·37	5·0	6·37	5·11	6·17	5·27
19	6 23	5·5	6·37	5·0	6·37	5·11	6·16	5·27
20	6·24	5·4	6·37	5·0	6·36	5·12	6·15	5·28
21	6·24	5·4	6·38	5·0	6·36	5·12	6·14	5·28
22	6·25	5·3	6·38	5·1	6·36	5·13	6·14	5·29
23	6·25	5·3	6·38	5·1	6·35	5·13	6·13	5·29
24	6·26	5·3	6·38	5·1	6·35	5·14	6·12	5·30
25	6·26	5·2	6·39	5·1	6·34	5·14	6·11	5·30
26	6·27	5·2	6·39	5·2	6·34	5·15	6·10	5·31
27	6·27	5·2	6·39	5·2	6·33	5·15	6·9	5·31
28	6·28	5·1	6·39	5·2	6·33	5·16	6·8	5·31
29	6·28	5·1	6·39	5·2	6·32	5·16	6·7	5·32
30	6·29	5·1	6 39	5·3	6·32	5·17	6·5	5·32
31	6·29	5·0	...	...	6·31	5·17	6·4	5·33

PHASES OF THE MOON.

Date	Phase	H. M.
3 May	☾ First Quarter	4 29 p.m.
10 "	○ Full Moon	7 31 a.m.
17 "	☽ Last Quarter	8 12 "
25 "	● New Moon	12 35 p.m.
2 June	☾ First Quarter	12 3 a.m.
8 "	○ Full Moon	3 18 p.m.
16 "	☽ Last Quarter	12 20 a.m.
24 "	● New Moon	1 33 "
1 July	☾ First Quarter	5 24 a.m.
8 "	○ Full Moon	12 0 "
15 "	☽ Last Quarter	5 32 p.m.
23 "	● New Moon	12 38 "
30 "	☾ First Quarter	9 51 a.m.
6 Aug.	○ Full Moon	10 41 a.m.
14 "	☽ Last Quarter	10 56 "
21 "	● New Moon	10 26 p.m.
28 "	☾ First Quarter	2 52 "

Vegetable Pathology.

A GUMMING DISEASE AFFECTING LEMON FRUITS.

REPORT BY E. JARVIS, Assistant Government Entomologist.

In his report to the Under Secretary for Agriculture and Stock (31st March) on the above subject, Mr. Jarvis gives the result of an investigation of a disease affecting lemons on Mr. W. Horacek's selection at Brookfield, conducted on the 5th March.

The malady (he says) is of a serious nature, and occasions the loss of about 50 per cent. of fruit.

Mr. Horacek purchased his stock in 1906 from nurserymen in New South Wales and Queensland, procuring 300 trees from the former State and 200 locally.

These trees (which comprise the varieties "Villa Franca," "Genoa," and "Lisbon") are worked on rough lemon and mandarin orange stocks, and planted 25 ft. by 30 ft. on a steep hillside with a north-easterly aspect, the soil being red volcanic resting on a subsoil containing ironstone.

Four years after planting, when harvesting his first crop, Mr. Horacek noticed that a number of lemons were diseased, but attributed it to the trees being young, and trusted that the trouble would disappear in time.

He tells me that they have never shown indications of suffering from want of moisture, and at present they certainly look remarkably well and are making good growth.

Injurious Symptoms.

Apparently these are confined exclusively to the fruit, which, to an ordinary observer, appears healthy, but when examined is seen to be more or less diseased internally.

(1) External—

Lemons affected with this disease lose their brightness, and the skin assumes a peculiar dead look, the green surface of the peel appearing almost whitish in certain lights.

There is no conspicuous discoloration of the stem-end or any other portion, but such fruit is usually undersized and ripens prematurely.

(2) Internal—

Early Stages.—If one of these lemons be cut in half, the peel will be found discoloured in places with pale brownish-yellow more or less cloudy-looking blotches or darker brown markings, which, in some instances, extend into the fruit pulp.

Advanced Stage.—Later on, the central core may be dark brown in colour (very noticeable when a fruit is cut down the middle lengthwise), or this central space may be filled with a transparent pale-yellow or white jelly, a thin layer of which also surrounds the pips. Occasionally a portion of peel next the fruit pulp breaks down into a gelatinous, rather sticky, dark brown fluid of the consistency of thick treacle, occurring generally in the form of an irregular patch of about the size of a penny, and very conspicuous when a lemon is cut in half transversely.

Final Stage.—This condition is very similar to the preceding, but further characterised by an abnormal dryness and more general discoloration of the internal tissue, and by the fruit assuming a faint yellow tinge and falling from the trees.

Cause of the Disease.

The absence of injurious insects or fungi likely to be implicated, and the fact that all trees examined appeared perfectly normal and vigorous, inclined me at first to imagine this disease to be entirely physiological in nature, and most likely due to unfavourable local conditions associated with adverse climatic influences—a supposition which seemed feasible in the light of the following additional evidence derived from personal observations:—

(1) The disease is of regular annual occurrence.

(2) It is invariably worse during late summer and autumn than at other seasons. [*Note.*—Mr. Horacek's main crop of lemons which sets about Christmas time is always far more "jellified" than the late crop, which sets in May and is harvested in November.]

(3) It occurs on different classes of soil.

(4) It is not confined to any particular variety of lemon, but affects all three of the above-mentioned kinds, leaving, as a rule, about the same percentage of good fruit on each.

(5) It attacks trees worked on different stocks.

I am glad to report, however, that Mr. C. J. Pound (Government Bacteriologist), to whom I submitted a diseased lemon for examination, has observed swarms of bacilli in the fruit gum, so that, strictly speaking, the disease under discussion must be provisionally regarded as bacterial, although at the same time other important factors—included under such headings as locality, soil, drainage, &c.—probably favour its appearance.

I may mention here that some lemons planted by Mr. S. C. Voller, at Enoggera, on granitic soil developed this fruit affection as soon as they came into proper bearing, but, curiously enough, the trouble did not appear on trees growing less than a mile away, at "Glen Retreat," where the soil was similar, but of greater depth.

Mr. Voller has noticed, too, that lemons on Macleay Island, near Cleveland, are subject to this disease.

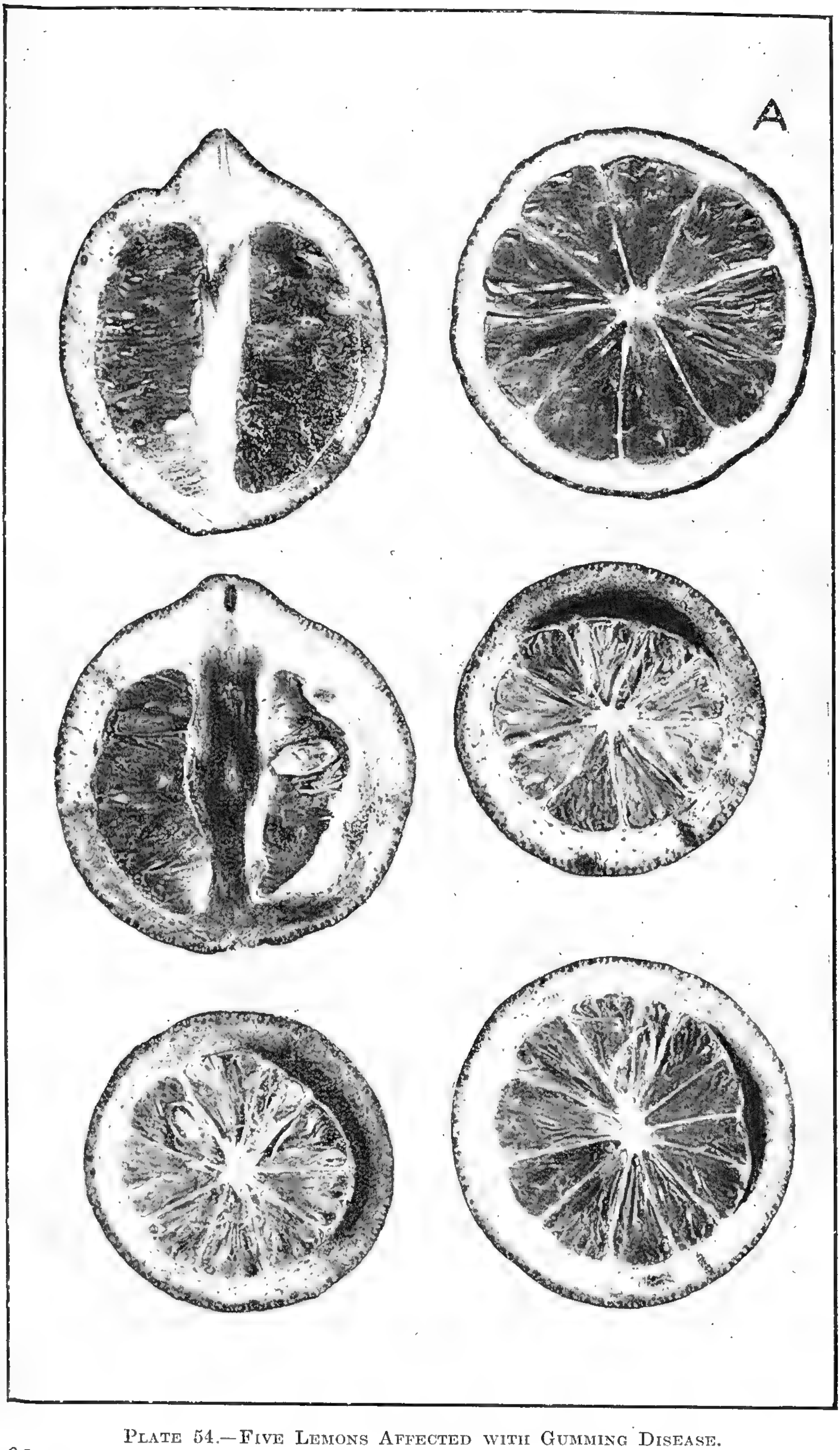


Plate 54.—Five Lemons Affected with Gumming Disease.
A—Healthy Lemon (Transverse Section.)

On the other hand, I understand that it is practically unknown to growers on the Blackall and at Buderim, where lemons do splendidly, and the soil is for the most part basaltic and of a heavy character.

It is, of course, impossible to report definitely with regard to effects produced by varying climatic and other influences, which may prove unfavourable to or tend to promote the occurrence of a disease of this kind, without first making an exhaustive study of such conditions; but, as the result of brief investigation, I am disposed to believe that unsuitability of climate may be primarily responsible, and that lemons planted in sheltered hot situations, on light badly-drained soils subjected to shallow cultivation, will be found to be more or less susceptible to this form of gumming disease.

Control Suggestions.

I am hardly justified at present in offering any decided recommendations with respect to the treatment of Mr. Horacek's trees, seeing that the subject under consideration requires much additional study from many standpoints.

A sample of his soil is being analysed by the Agricultural Chemist (Mr. J. C. Brünnich), and may yield valuable evidence.

In the meantime the bacillus observed by the Government Bacteriologist should be cultivated in some suitable medium, and a series of inoculation experiments conducted, for the purpose of determining whether it can be artificially transmitted.

It is highly important to settle this point, as, in the event of an affirmative result being obtained, it would be advisable to destroy all citraceous insect pests capable of conveying infection.

The more injurious of these are various large sap-sucking bugs which fly from tree to tree, and sometimes occasion serious losses by puncturing the fruit and tender foliage.

One of them, a big green species, known as the "Greater Horned Bug" (*Biporulus bibax*), occurred rather freely on these lemons, and, if able to carry this disease, its presence and activity during the hotter months might account for the percentage of diseased fruit being greater at that time of year than at any other season.

HIGH-PRICED BEEF.

Record prices, says the "Pastoral Review," for Queensland fat cattle were realised last month in Adelaide. Prime quality beef has mounted up gradually until it has now reached the high price of 45s. per 100 lb. Ten bullocks sent down from Cooper's Creek (Q.) made up to £19 2s. 6d. per head. A calf from the same station realised £8 7s. 6d. —the highest price ever paid for a calf in the Adelaide market.

Science.

THE PREVENTION OF MALARIA.

The following speech, descriptive of his fight against malaria on the rubber estates of the F.M.S., delivered by Mr. Malcolm Watson, appears in the "United Empire." After referring to the discovery that the mosquito was the carrier of many tropical diseases, Mr. Watson goes on to deal with his particular field of research, the malaria of the Selangor Coast. He says:—

"In studying this malaria, I found in a certain area there had been a steady rise from 1895 to 1899, and a fall from 1899 to 1902. The percentage of malaria treated at the hospital of the area had risen from 23 per cent. to 59 per cent., and then again fallen to 23 per cent. No one could account for either the rise or fall, but a study of official reports showed that the construction of a road parallel to the sea had interfered with drainage, and that the inauguration of a drainage scheme had been followed by improvement. This seemed a reasonable explanation, and I published an account of the observation. At this time there was considerable malaria at the Klang end of the road on the estates, and the planters complained that they could not drain their estates on account of the road. As a result of their representations, the Government voted 110,000 dollars for the Kapar drainage scheme, which provided for the drainage of 24,000 acres. From my point of view, this was an experiment on a large scale, and I did my best to profit by it. The first thing to be done was to get exact figures as to the amount of malaria present, and I accordingly made a series of blood examinations of children on the estates. A survey of the mosquitoes of the district was also made. To cut a long story short, it was found that malaria on the low alluvial coastal land was carried by a mosquito called *Anopheles umbrosus,* which breed in pools in the jungle; and that where the jungle was felled and the pools drained by open drainage, malaria completely disappeared, as shown by the health of the coolies improving, the admission to hospitals falling, the parasites disappearing from the blood of the children, and the percentage of children with enlarged spleens falling from 100 to 0. It was also shown that the percentage of children with enlarged spleens (called spleenrate) was in direct proportions to the proximity of their houses to the breeding-place of the mosquito—that is, the jungle pool.

"So we evolved a simple rule—that to avoid malaria on the low coastland we had only to house our coolies half a mile from the jungle. In some cases we moved coolies away from the jungle; in other cases, we removed the jungle from the coolies' houses. The results were absolutely certain. In fact health could be guaranteed, as has been demonstrated on many estates. To show how invariably this rule worked out I must give you two instances which at first were puzzling. An old-established estate became unhealthy: within eighteen months its labour force had fallen from 600 to about 300; the daily sick in hospital rose from 2 or 3 to 70 to 100—with a similar number of milder cases of fever on the estate. The spleen-rate rose from 3 to 58. The death-rate rose from 10 to 80. The labour force was so reduced that the rubber trees could not be tapped and the manager was 30,000 lb. short of the estimate. I was quite at a loss to account for the outbreak. The manager assured me none of the coolie lines (or barracks) were within half a mile of the jungle, and I could find no breeding-place near to the lines within the estate. Ultimately, I decided to walk over the whole estate, and round its boundaries. It was only then I found that the estate boundaries did not run as I supposed, but bent so as to come close to two new lines which had been built eighteen months before.

"There had been a redistribution of coolies, so that all the coolies were mixed up, and then at first I was unable to locate the trouble. Needless to say, the new lines were abandoned, and within a short time improvement began, and there is every prospect of a return to health. The spleen-rate dropped within eight months from 58 to 17 per cent. That outbreak cost the estate £10,000 sterling. In the other case, a division of an estate became healthy; the spleen-rate dropped from 50 to 5. Yet jungle remained some 16 chains away as before. I was non-plussed at first, but said to the manager: 'Something has happened to the jungle; mosquitoes are not breeding in it.' Then he remembered that that very jungle had been drained by the neighbouring estate in connection with its water supply, but the trees had been left standing. Finally, thousands of acres have been opened on some estates with hardly a case of malaria, as the labour has always been kept at least half a mile from the jungle face being opened. Now the importance of all this is that what was always regarded as the great stronghold of malaria collapsed almost without a struggle. The low-lying clayland, with a high subsoil water, was supposed to be the home of malaria, yet, as I have shown, we have the situation absolutely in our hands.

"Again, the victory was as complete as our wildest hopes had dreamed. But just as our victory had been complete in the low flat land, we were at first as completely repulsed where we least expected it—namely, in the hill-land. We had always been taught that it was desirable to live on a hill if we wished to avoid malaria. Yet in the Federated Malay States, this is just the thing not to do in 999 cases out of 1,000. And the reason is that malaria in the hill-land is carried by a mosquito which breeds in hill-streams, and cannot be abolished by open drainage. Its name is *Anopheles maculatus.* When convinced this was so, we decided to put these streams underground for a certain distance round the habitations on the estates. The exact distance is probably about half a mile—as we found it necessary to house coolies that distance from jungle breeding-places on flat land. But in the interests of economy, I consider each estate should begin with a smaller area and work outwards. Estates were at once forthcoming with the money; Seafield, Glenmarie and North Hummock were the pioneers. The result was a complete success on North Hummock, where the area to be done was small; while on the other two there has been a distinct improvement in health, but not as complete as we wish or intend to get.

"Then the Government drained an extensive area in the Federal capital, the result of which was excellent. In the words of the Principal Medical Officer's (Dr. Sansom) Annual Report:—'The results were immediate and completely satisfied the most sanguine anticipation. . . It may safely be claimed that general infection is now non-existent within the drained area.' This drained area was that occupied by the highest Government officials in the land and reserved for them. No fault could be found with their houses, food of the inhabitants, or general sanitary arrangements. Yet malaria had been an absolute scourge, sparing not even the highest. I have said enough to show that we are now on sound lines in dealing with malaria on hill land. Many details remain to be worked out, but we have already had enough success to encourage us to press on with the work."—"Rubber World."

THE ALGAROBA OR MESQUIT BEAN (*PROSOPIS JULIFLORA*).

Readers of this Journal may remember that in April, 1900, and also in April, 1901, Mr. G. B. Brooks, Instructor in Agriculture—then manager of the Kamerunga State Nursery—contributed two articles on this valuable tree to the Journals of those dates, to which we refer our readers. We have now received the following communication on the same subject from Mr. B. Harrison, Burringbar, New South Wales. Mr. Brooks was greatly impressed with the value of the bean as "a stock feed with a high fattening value. This value lies also in the pods being filled between the seeds with a sweet mealy substance which is very nutritious, and of which horses, cattle, and pigs are very fond, the Nursery stock bearing this out."

"This tree," says Mr. Harrison, "which is a native of Chile, South America, is a shady evergreen, much like our wattle, and grows from 30 to 40 ft. high. It yields two crops of beans annually, which make the finest food for horses, cattle, pigs, and poultry. In its native country immense quantities are gathered annually; and some years ago, on three estates alone, 15,000 bags were stored each year. The beans are encased in a small, thin, square covering inside the pod, which is very sweet and has a raisin-like flavour. By analysis they are exceedingly rich, and contain up to 28 per cent. of grape sugar, 17 of starch, and 11 of protein, and other nutritious ingredients. When crushed whole and mixed with hay or chaff, &c., they make a first-class fodder. The tree also yields a valuable gum, and the bark is used for tanning leather. The wood makes admirable furniture and fuel, and where timber is scarce the tree can be used both for shelter and line fences. This is one of the most valuable trees that farmers could plant, as it would furnish a supply of the richest fodder twice each year, and during the dry seasons, or periods of drought, when other kinds were not available, would prove of inestimable value."

General Notes.

HORSE WINCH.

The following particulars of the latest horse winch made by Trewhella Bros., Pty., Ltd., is published for the information of intending settlers on timbered lands:—

During the past few years more attention than formerly has been paid to preparing virgin land for agricultural purposes. This clearing means a large amount of hard work to the settler of new land, and to reduce labour costs to a minimum we have introduced a wire rope winch in which a horse does the work that was formerly done by manual labour. Having specialised in land-clearing implements for over twenty years. our latest horse winch embodies new features which tend to increase the strength, at the same time bringing about a reduction of the weight. This machine is manufactured under our own patents, the workmanship is first-class, and the materials used have proved (after numerous and severe tests) to be best suited for the puropse.

The frame of this machine is made of wrought material, and the gearing is all steel castings, the power being applied to the winding drum by two sets of gears, which in turn have the power applied by a horse wheel fitting on a pinion between the upper ends of the two larger gears. The central or floating pinion, as it is called, is not pivoted, and, therefore, where any irregularity occurs in the drum or pinion gearing, this floating pinion finds a centre between the gears, obviating the risk of breaking teeth through uneven bearing. The drum spindle is mounted at each end with eccentrics, allowing the drum to be thrown out of gear to facilitate uncoiling the drum rope preparatory to the next pull.

The horse pulls on a small rope having a turn round a grooved wheel on which a patent ball-bearing roller gripper is attached to press the rope into the groove and prevent slipping. At *each* end of the hub of the wheel is a clutch that fits a clutch either on the floating or main pinion. When in position, the horse pulls out the end of the rope until the other end is at the machine; then by turning the wheel over and pulling on the short end the strain is increased, and the stump or tree will be seen to gradually leave the ground. Two pulls on the slow gear are usually sufficient to displace the largest trees, and then the faster gear may be used. This method of applying the horse power to the machine enables the horse to pull in any direction that is open instead of continually crossing the ropes, as is usual with pulling machines.

We give a wide range of gears, the power of the horse being multiplied 16½, 33, 66, and 133 times; it will be seen that the machine is adapted to fast or slow pulling.

The snatch block for doubling the power of the machine is of the American lumberman's type, modified by us to suit the requirements of a stump puller. It is light, quickly manipulated, built to stand the most severe strains, and removable when not in use. The sheave is of extra large size, and the rope is well guided in it.

The rope grab or shortener (for accompanying varying distances between trees and taking up slack rope) can be attached, and will hold the rope (without damage) at any point and in any position. It eliminates the use of short pull ropes or the winding of long lengths of rope on the drum.

For couplings we supply hooks and loops of our own design. They are quickly coupled, handier to attach, and, being fixtures, cannot be mislaid among leaves, grass, &c.

In case of breakages the band and wedge answer the same purpose as a splice, being secure, light, and cheaper.

All cables are of the highest grade steel wire. Unless otherwise specified, we supply galvanised for pull ropes and black for drum rope. The standard equipment (which will work a radius from an anchor of 160 ft. with snatch block and 180 ft. with single rope) is supplied unless otherwise specified.

EQUIPMENT, JANUARY, 1914.

	£	s.	d.
Machine	£21	10	0
Sheave block	2	0	0
Grab	2	0	0
80′ 3½″ circ. galv. rope with hook, band, and wedge (pull)	4	5	0
40′ 3⅛″ circ. galv. rope with hook, band, and wedge (pull)	2	10	0
20′ 3⅛″ circ. galv. rope with 2 bands and wedges (anchor)	1	15	0
50′ 2½″ circ. blk. rope with ferrule, plug, hook, and wedge (drum)	2	10	0
100′ 1″ circ. galv. rope with thimbles and splices (horse)	1	1	0
	£37	11	0

Price complete, £37 10s.; weight complete, 8 cwt. 1 qr.

3⅛″ rope ord. lay, 11½d. per ft.; 2½″ rope langs lay, 7⅛d. per ft.

Rope, hook, and wedge, 10s.; band, 6s.; band wedge, 1s.; ferrule and plug, 2s. 6d.

THE INDESTRUCTIBLE TYRE.

Tyre inventions seem almost as numerous as tyre troubles; few of them in practice amount to much. If, however, a consensus of expert opinion in its favour does not mean that the Devereux indestructible tyre will enjoy better fortune, then we think we shall be a very long time before we materially improve on the present tube and tyre system. The idea of the indestructible tyre is one of sectional construction. In so many words, it is made in eight or nine sections, most ingeniously constructed; the worst puncture in any one section does not affect the running of the wheel. The invention, it is claimed—and expert opinion endorses the claim—will save a vast amount of money now spent on repairs and spare tyres, and, more important still, it will prevent the fatal accidents so often directly due to tyre bursts. Mr. Edward Robert Devereux, the inventor, is a French engineer, and if, as we hope, the tyre does in daily work what it has never failed to do in the severe tests to which it has been put, Mr. Devereux will be a benefactor, not merely to the motorist but to the public. Assuming its success, we do not see how any other sort of tyre can continue to exist. Like most revolutionary inventions, it is so simple that everyone must wonder with M. Henri Didier that it was not thought of before. Incidentally, it may mean big things for the rubber business. Everyone will want an indestructible tyre, and the demand for rubber will be augumented many-fold.—" Rubber World."

REMARKABLE GROWTH OF PINEAPPLES.

The favourable season for pineapples has been productive of some remarkable results in the way of the production of several marketable fruits on one stalk. Here we have, not two, but thirteen good fruits on one stalk, which were produced at Gooburrum on Mr. L. Holcroft's farm. These cannot be called " freaks," such as often make their appearance in a pineapple plantation, and which are worth nothing from a commercial point of view. The pines here illustrated are saleable fruits, of which it was only possible to show eleven in the photograph.

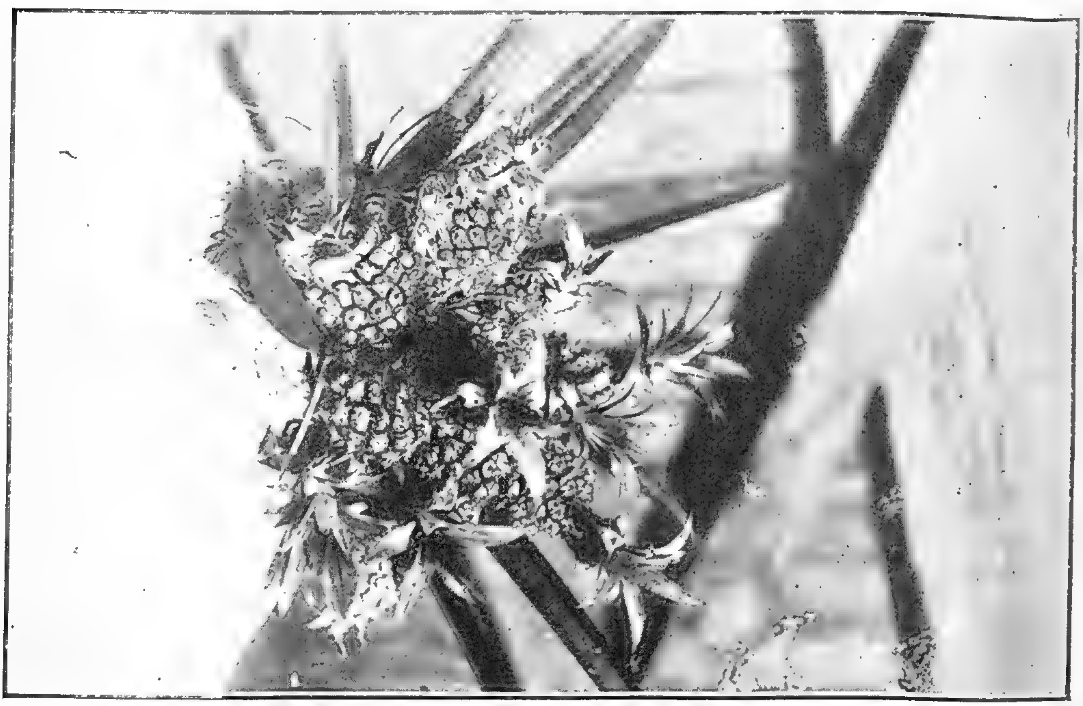


PLATE 55.—THIRTEEN PINEAPPLES ON ONE STALK, 4½ TO 6 IN. IN LENGTH AND 3 IN. IN DIAMETER.

COCONUTS, THE CONSOLS OF THE EAST.

In our February issue we mentioned that a second edition of Mr. Hamel Smith's book on "The Coconut" was issued last Christmas, the first edition having been rapidly exhausted. We have now received from Messrs. Angus and Robertson, Sydney, a copy of the new work, in the compilation of which Mr. F. A. G. Pape, F.R.G.S., F.R.H,S,, &c., collaborated with Mr. Smith. The whole subject has, in this work, been so exhaustively treated that it might almost be affirmed that the last word on coconut cultivation in all parts of the tropical world has been said.

In the "Foreword" by Sir. Wm. Lever, Bart., that gentleman says:—"Strong as was the case for the profitable outlook of coconut planting when I wrote the "Foreword" to the first edition, it is stronger to-day. . . . I know of no field of Tropical Agriculture that is so promising at the present moment as coconut planting, and I do not think in the whole world there is a promise of so lucrative an investment of time and money as in this industry." And he goes on to point out that, "given reasonable precautions and care, there is very little risk of failure in coconut planting. Experience has greatly increased in the last ten years, with the result that the possibility of failure is reduced to a minimum. A large amount of capital is not required if the planter is willing to grow and cultivate annual crops during the period that his coconut plantation is coming into bearing." The amount of capital, he says, should not exceed £10 to £12 per acre, including every expense except the planter's own labour and interest on capital, and the net income of an acre of fully-bearing coconuts would be £10 per annum, so that a comparatively small plantation of a couple of hundred acres would yield a net income of £2,000. In this necessarily short review, it is impossible to comment upon the numerous sections of the work, which deal clearly and admirably with every phase of the industry, from the selection of a site to the clearing and preparation of the land, the importance of a careful selection of seed nuts, to the care and upkeep of the plantation. The diseases and pests of the coconut palm are exhaustively treated on. Several pages are devoted to the methods of cultivation in various countries, to the utilisation of the waste products, which Mr. H. D. Gibbs, in the "Philippine Journal of Science" (June, 1911), sets down at eighty-three. Copra and its preparation is exhaustively treated, some sixty pages being devoted to this, the most important of all the products of the coconut. In a word, we consider this second edition of Messrs. Smith and Pape's work should be in the hands of every planter or intending planter in all countries, and we especially advise the present planters and settlers in Northern Queensland, where coconut-growing is rapidly increasing, to secure a copy of a work which will not only be of infinite value to them at the start, but will enable them to profit by and avoid the mistakes of past years. The book may be procured from Messrs. Angus and Robertson, Limited, 89 Castlereagh st., Sydney; price, 12s. 6d.,or 13s. 6d. post free.

Answers to Correspondents.

RIPE ROT DISEASE OF BANANAS.

F. WATTS, Kelsey Creek, Bowen—

The disease you mention as having attacked your bananas is known as the "ripe rot disease." The Jamaican bananas are not subject to it, but the Chinese varieties are very liable to be attacked. The Cavendish, however, appears to be less liable to the disease than others in this State. The best remedy is to destroy all fruit attacked and to handle the sound fruit very carefully, excluding all fingers marked with black patches, as the spores of the ripe rot fungus will settle on any bruised spot of the fruits and destroy them. You might try spraying with Bordeaux mixture to prevent the spread of the disease, but this will not save those already attacked. See "Queensland Agricultural Journal," vol. xxviii., page 285, April, 1912.

SAUERKRAUT AND CANNING VEGETABLES—PINEAPPLE WINE.

M. F. WATTS, Nudgee—

Mr. Charles Ross, F.R.H.S., Instructor in Fruit Culture, writes:—

The best work on the canning of cabbage and cauliflower is entitled "The Art of Canning and Preserving as an Industry," by Dr. Jean Pacrette, of Paris. It is necessary to carefully study the complete process if it is intended as a commercial commodity.

If preserved vegetables are required for home or local use only, any good recipe for making "sauerkraut" will be suitable. Most of our German neighbours are adepts in this connection.

For preparing, cooking (preserving), and canning, I recommend the following method, viz.:—The cabbage should be shredded as for ordinary pickling, and cauliflower, &c., cut into sections; place into a barrel, pressing each layer very firm. When the barrel is filled, cover with a board, heavily weighted. Between each layer sprinkle salt at the rate of 2½ lb. to every 100 lb. of vegetables. In a few days the liquor secreted will cover the whole mass, and constitute a pickle that will keep indefinitely. A few juniper berries should be added.

Before the above is cooked and canned, it should be washed in several waters, and then very slowly, but thoroughly, cooked in an enamel kettle with a close-fitting lid, with 2 to 3 oz. of goose fat or lard to the lb. and water up to the level of the sauerkraut. When cooked it must be moist, but not contain any water, and while still hot, just before canning, add 1 oz. of melted bacon per lb. and 1 pint of wine to every 10 lb. The whole is thoroughly mixed without breaking the fibres, and canned or bottled (leaving space for expansion), sealed down, and processed as follows:—The receptacles are placed on wire trays and immersed in the coppers, and boiled from ¾ to 1¼ hours according to size of vessels. The longer the cooking and processing, the better will be the product.

P.S.—Dr. Jean Pacrette's book is published by Jules H. Dommergue, 40 Lembeck Avenue, Jersey City, New Jersey, U.S.A. A bookseller, if instructed, could probably obtain it for you.

A recipe for making pineapple wine is as follows:—

Over the peelings of 2 pineapples pour 1 quart of boiling water; allow it to steep until cold, then sweeten to taste, strain, and bottle. Tie down the cork, and place the bottle on its side; if placed in a warm place, it will be ripe in 24 hours. A small piece of ginger placed in each bottle will improve the flavour. If made in large quantities, the whole pineapple chopped should be used.

WATERPROOFING COATS, ETC.

"WATERPROOF," Nanango—

Dissolve ½ lb. shredded yellow soap in 1 quart of hot water. Then stir in 1 gallon of boiled linseed oil and 3 oz. of turps. Give the material two or three coats of this. Beeswax is not needed.

Another good method of waterproofing is with alumina soap. This consists in passing the article to be treated first through a warm soap bath (1 lb. to the gallon); then through an alum bath of the same strength, followed by passing the stuff through the mangle. There will be no appearance of any coating, as the alumina soap is in the fibre itself. This metallic soap is excellent for the purpose.

In the good old days of sailing vessels, sailors used to make their own oilskins and sou'-westers when they could get the necessary materials from the slop chest. The jacket and trousers are made of strong canvas, cut to shape. The canvas is then treated with a thin coat of boiled linseed oil, and hung up to dry. When perfectly dry, apply another coat of oil and let that dry. Two or three coats of oil will be needed, each being allowed to dry before the next application.

POISONING TREES.

"ANXIOUS SUBSCRIBER," Gympie—

See "Departmental Announcements" on page VII. of the Journal, Part 13.

SHEEP ON THE COAST.

In reply to a correspondent at Wondai, asking for conclusive and definite facts on the subject of breeding sheep on coast lands, Mr. W. G. Brown, Sheep and Wool Expert, says:—

"I think the ground was covered by my lecture. The chief thing necessary to the successful keeping of sheep on the coast is that salt and sulphate of iron be given the animals. Unlimited quantities. They will not take more than they want. Conclusive and definite facts are as asked by your correspondent:—

"Worms may be eradicated—

1st. By burning off at a suitable time of year, and then sheep placed on the country whose worms have been expelled by suitable drenches.

By allowing paddocks to rest from sheep or cattle for not less than twelve months. Establish a rotation of paddocks, and in time worms will give little trouble. Advise your correspondent to get Dodd's Pamphlet on Wire Worms.

"I mentioned artificial grasses when I said emphatically that the natural grasses of the coast are quite unsuitable for sheep. Other than natural grasses are artificial—*i.e.*, cultivated.

"I shall go to Wondai as soon as these fly experiments are in full swing, and give practical demonstration."

In reply to another letter from Mr. P. W. Hart on the same subject, Mr. Brown says:—

1. Rhodes Grass is excellent sheep feed, especially if it is fed heavily. With a good stand it will run from 5 to 8 sheep per acre.
2. In the hot weather, sheep require a drink at least once in two days. In cold weather and on green grass, they may go without a drink for a week or more. I have seen sheep put in a dry paddock, and not watered for three weeks. The weather was cool, and there was abundance of green grass.
3. In a small flock 2 per cent. of rams is sufficient. In large paddocks 3 per cent. is usual.
4. I would advise for the coastal country Romney Marsh or Border Leicester rams.
5. A dog-proof fence is 3 ft. 6 in. rabbit netting, 6 in. in the ground, and, on top of that, 4 ft. marsupial netting, with a barbed wire at the junction of the netting. I would recommend, in the absence of netting, that all sheep should be yarded at night. Sheep get used to this, and come home at night regularly when once broken in. The dog-proof fence is expensive, but in the end will pay for itself. Bells should be placed round the necks of big, strong sheep. This will drive away dingoes and give an alarm to the owners of the sheep.

NOTE.—Mr. J. W. Matthews, sheep and wool expert of the N. S. Wales Department of Agriculture, writing on the same subject in "Dalgety's Review" (1st April), also recommends the Romney Marsh sheep for coast lands, but, as pure Romney ewes might prove in many cases too expensive, a good substitute would be a grade Romney. [Ed. "Q.A.J."]

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MARCH, 1913 AND 1914, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Mar.	No. of Years' Records.	Mar., 1914.	Mar., 1913.
North Coast.	In.		In.	In.
Atherton	9·02	11	13·10	17·87
Cairns	20·08	25	14·81	29·07
Cardwell	16·29	25	28·70	27·99
Cooktown	14·21	25	16·34	27·30
Herberton	8·73	25	14·01	10·57
Ingham	15·24	20	43·66	26·87
Innisfail	26·31	25	24·96	40·94
Mossman	25·26	5	32·31	27·03
Townsville	7·85	23	14·34	7·78
Central Coast.				
Ayr	7·69	25	11·24	14·19
Bowen	6·52	25	7·58	8·06
Charters Towers ...	3·95	25	4·09	4·68
Mackay	11·65	25	13·35	12·51
Proserpine	14·62	10	17·77	15·31
St. Lawrence ...	6·80	25	2·87	4·07
South Coast.				
Crohamhurst ...	13·62	20	16·92	3·98
Biggenden	4·89	14	11·09	1·34
Bundaberg	6·88	25	5·60	6·73
Brisbane	6·18	63	7·75	3·74
Childers	5·61	17	10·49	3·33
Esk	5·45	25	3·83	1·26
Gayndah	3·93	25	9·98	1·86
Gympie	7·46	25	9·73	1·37
Glasshouse M'tains	...	...	11·25	..
Kilkivan	4·94	25	8·93	1·07
Maryborough ...	7·21	25	12·74	1·73

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Mar.	No. of Years' Records.	Mar., 1914.	Mar., 1913.
South Coast—continued:	In.		In.	In.
Nanango	3·75	25	5·34	0·75
Rockhampton ...	5·51	25	5·53	5·50
Woodford	9·38	25	6·34	4·54
Yandina	9·19	19	14·06	4·02
Darling Downs.				
Dalby	3·72	22	3·55	2·75
Emu Vale	2·99	17	6·40	1·61
Jimbour	2·84	24	2·17	1·95
Miles	3·45	25	3·32	3·89
Stanthorpe ...	3·46	22	6·08	3·88
Toowoomba ...	4·64	22	4·28	1·73
Warwick	3·24	22	6·31	1·30
Maranoa.				
Roma	4·08	21	2·05	1·93
State Farms, &c.				
Gatton College ...	4·22	14	3·88	1·59
Gindie	3·06	13	3·00	1·08
Kamerunga Nurs'y	18·24	23	17·76	...
Kairi	...	.	11·46	...
Sugar Experiment Station, Mackay	13·53	16	12·49	...
Bungeworgorai ...	...	...	3·98	1·51
Warren	...	...	...	...
Hermitage ...	3·42	7	5·88	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for March this year and for the same period of 1913, having been compiled from telegraphic reports, are subject to revision.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR APRIL, 1914.

Article.		APRIL. Prices.
Bacon	lb.	7½d. to 9½d.
Bran	ton	£5 5s.
Butter	cwt.	100s.
Chaff, Mixed	ton	£3 15s. to £5 8s.
Chaff, Oaten (Victorian)	"	£5 10s. to £5 15s.
Chaff, Lucerne	"	£4 to £5 5s.
Chaff, Wheaten	"	£4 10s.
Cheese	lb.	7d. to 7½d.
Flour	ton	£9
Hams	lb.	1s. 2d.
Hay, Oaten (Victorian)	ton	£6 to £6 10s.
Hay, Lucerne (Prime)	"	£2 to £3 15s.
Honey	lb.	2d. to 3d.
Maize	bush.	4s. 7d. to 4s. 8d.
Oats	"	3s. 6d. to 3s. 10d.
Onions	ton	£9
Passion Fruit, per half-case	...	4s. to. 9s.
Pollard	ton	£5 15s.
Potatoes	"	£6 to £9 10s.
Potatoes (Sweet)	cwt.	2s. 6d. to 3s. 6d.
Pumpkins	ton	£1 10s. to £2 5s.
Wheat, Milling	bush.	...
Eggs	doz.	1s. 1d. to 1s. 8d.
Fowls	pair	2s. 6d. to 4s. 9d.
Geese	"	5s. to 6s.
Ducks, English	"	2s. 6d. to 4s. 6d.
Ducks, Muscovy	"	2s. 9d. to 4s.
Turkeys (Hens)	"	5s. to 7s. 6d.
Turkeys (Gobblers)	"	9s. to 15s.

SOUTHERN FRUIT MARKETS.

Article.	APRIL. Prices.
Bananas (Fiji), G.M., per case	17s. to 18s.
Bananas (Fiji), G.M. per bunch	4s. to 12s.
Bananas (Queensland), per case	
Bananas (Queensland), per bunch	6s. to 12s.
Mandarins (Emperors), per case	10s. to 12s.
Oranges (Navel), per case	8s. to 12s.
Oranges (other), (Queensland), per case	5s. to 8s.
Pawpaw Apples, per quarter-case	...
Passion Fruit, per half-case	9s.
Pineapples (Queensland), (common), per case	6s. to 10s.
Pineapples (Queensland), (Ripleys), per case	6s. to 10s.
Pineapples (Queensland), (Queens), per double case	8s. to 9s.
Pineapples (Rough), per case	7s. to 8s.
Strawberries	...
Tomatoes, per quarter-case	1s. 6d. to 3s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	APRIL. Prices.
Apples, Eating (American), per case	5s. 6d. to 7s. 6d.
Apples (Cooking), per case	5s. 6d. to 7s. 6d.
Apricots, per quarter-case	...
Bananas (Cavendish), per dozen	2d. to 3½d.
Bananas (Sugar), per dozen	2¾d. to 3¾d.
Cape Gooseberries, per quarter-case	6s. to 7s.
Cherries, per quarter-case	...
Citrons, per cwt.	...
Cocoanuts, per sack	13s. to 14s.
Custard Apples, per quarter-case	4s. 6d. to 6s.
Lemons (Local), per quarter-case	12s. to 14s. 3d.
Lemons (Italian), 160 Fruits, per case	20s.
Limes, per case	...
Mandarins, per case	6s. to 8s.
Mangoes, per case	...
Oranges (Italian), per case	17s. to 18s. 6d.
Oranges (Other), per case	7s. to 10s.
Papaw Apples, per quarter-case	2s. to 3s.
Passion Fruit, per quarter-case	5s.
Peaches, per quarter-case	...
Persimmons, per quarter-case	1s. 6d. to 3s.
Pears, per half-bushel case	5s. 6d. to 6s.
Peanuts, per pound	3d. to 3½d.
Pineapples (Ripley), per dozen	5s. to 8s.
Pineapples (Rough), per dozen	2s. to 5s.
Pineapples (Smooth), per dozen	1s 6d. to 4s.
Plums, per quarter-case	...
Rockmelons, per dozen	...
Strawberries	...
Tomatoes, per quarter-case	1s. to 3s. 6d.
Watermelons, per dozen	...

TOP PRICES, ENOGGERA YARDS, MARCH, 1914.

Animal.	MARCH. Prices.
Bullocks	£8 to £10 12s. 6d.
Bullocks (Single)	..
Cows	£7 to £9 5s.
Merino Wethers	25s.
Crossbred Wethers	26s. 6d.
Comeback Wethers	28s. 6d.
Merino Ewes	17s. 6d.
Crossbred Ewes	25s
Shropshire Ewes	23s.
Lambs	20s.
Pigs (Porkers)	39s. 6d.

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 tree 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.

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 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 overproduce 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. I. JUNE, 1914. PART 6.

Agriculture.

AN AMERICAN COTTON-GROWER ON QUEENSLAND AS A COTTON PRODUCER.

Last month we had several interesting interviews with an American cotton-grower and ginnery owner from Texas, U.S.A., Mr. E. E. Wood, who came to Queensland with the object of ascertaining the capabilities of Queensland as a stock-raising country, and particularly as a field for the cotton-growing industry. As far as the cotton industry is concerned, Mr. Wood has an experience in the United States of twenty-six years both as a grower and proprietor of a ginnery turning out 2,000 bales of cotton annually. During his stay in Queensland he has visited much of the country on the Western line as far as Dalby, Roma, Chinchilla, Mitchell, Dulacca, southwards to Texas and Goondiwindi, and along the Central line as far as Barcaldine. He also visited Springsure. His opinion of the Western country may be summed up in his own words to the effect that it cannot be surpassed by any cotton belt in the world, both as regards soil, climate, and rainfall. Queenslanders do not know what a magnificent asset they would have if this country were placed under cotton. In America the people do not know that such magnificent cotton can be produced here. He showed us several splendid bolls of Upland cotton which he gathered from bushes growing at the State school garden at Capella, and also at a farm near Dulacca. He has taken these back with him to America, and, as he said: "It will make the people in the States open their eyes when they see the finest samples of cotton which can be produced anywhere in the world. What is required to establish a vast industry is co-operative effort, and if the business were conducted by properly organised effort, Queensland within ten years could be producing 10,000 bales per annum." Mr. Wood was, however, rather surprised when we showed him that, according to the Government Statistician's figures, Queensland, in 1871, exported 2,500,000 lb. of ginned cotton, equal to 6,505 bales, and that crops had frequently been produced of from 1,200 to 2,000 lb. of seed cotton per acre, produced entirely by white labour on small farming areas. Should cotton-growing be once more established on proper lines, the output at the end of ten years would probably exceed 20,000 bales.

Mr. Wood explained that proper lines meant the introduction, first of all, of experienced American cotton-growers, to educate Queensland growers, then, such assistance as is given to sugar-growers to enable them to establish co-operative cotton and oil mills. He considered that it would be a paying business if the Queensland Government would set apart certain areas in the Central and in some southern districts on which to settle groups of cotton-growers, who he felt assured would not hesitate to come over when they heard what he had to tell them of the finest cotton-growing country on God's earth. Personally, he intended to return to Queensland bringing with him his family and most probably several experienced cotton-growers. It would take him about twelve months to settle up his affairs in the States. As far as labour was concerned, his opinion was, judging by the cost of white labour in Texas, where no coloured men are employed, the cotton could stand high wages far better than any other dry-land crop which could be mentioned. Sugar was not in it with cotton. The cost of picking need be no bugbear, and he mentioned an instance, which we have drawn attention to more than once in this Journal, of an American grower at Capella who picked 500 lb. of cotton in one day, thus earning, at ½d. per lb., over £1. No coloured men would do half as much.

One thing which struck Mr. Wood as being enormously in favour of Queensland as a cotton producer, was that there are scarcely any pests of the plant to contend with. The boll worm he did not consider would give any trouble, as it is easy to keep them away from the cotton plants by planting trap-crops of maize. The boll weevil, he said, is the great drawback to the American cotton industry. Over 50,000,000 dollars have been spent by the United States Government in endeavours to eradicate the weevil, but in vain, as the whole cotton belt is now ravaged by it, and this was where Queensland had its grand opportunity. As pointed out in an article in last month's issue of the "Queensland Agricultural Journal," the whole of the American sources of Sea Island cotton are threatened with extinction, and there can be no increase in the output of American cotton, the result being that many cotton-growers in that country are going out of the business and taking up other lines of agricultural industries. The ultimate effect, as stated by the American writer of the article above mentioned, will be that the future cotton supplies will be derived from British Dominions and colonies. On the subject of emigration from the States, Mr. Wood was emphatic in his statement that if equal facilities were granted by the Queensland Government to American farmers and farm hands as to those from European countries, there would be no possible doubt that while, within the last ten years, half a million of settlers went from the States to Canada, and many thousands to Mexico and the South American States, most of them, especially the latter, would infinitely prefer to come to a white man's country like Australia. Summarising Mr. Wood's remarks, they amount to this:—That Queensland offers unbounded inducements to the right class of immigrants. The soils, the climate, the rainfall, the liberal land laws, the assistance to new settlers by means of the Agricultural Bank, the wonderful salubrity of the climate, are all that could be desired, and if the Government took the matter energetically in hand, Queensland would be a great cotton producer, and a sort of paradise on earth for both farmers and farm hands.

VARIETIES OF KANSAS CORN.

We have received from Mr. R. S. Neville, now residing in Kansas City, U.S.A., who, for several years, laboured successfully to educate tobacco growers in Queensland in proper methods of cultivation of the plant, and who placed the tobacco industry on a firm basis, during his many years in the capacity of Tobacco Expert to the Department of Agriculture, the following interesting note on a seven-year corn test at the Kansas Agricultural College:—

"Kansas Sunflower, a variety of yellow corn, carried off first honours in a seven-year corn test at the Kansas Agricultural College. It gave an average yield of 58 bushels an acre every year. In the seven years' work 226 varieties and strains of corn were tried out. The results of this work, published this week in a college bulletin, "Corn," written by A. M. Ten-Eyck, formerly of the Agricultural College, show Kansas farmers what varieties may be depended upon to give the best yields in this State. Though the variety, Kansas Sunflower, is placed first in the list of the ten best varieties, it is only slightly superior to other good producing types, inasmuch as the best varieties vary in productiveness. No one variety of corn is best under all conditions, the test shows. Here are the other nine varieties which showed superiority over the many types tested, given in the order of their average yields for the seven years: Hogue's yellow dent, medium early; McAuley, white dent, medium late; Forsythe's Favourite, white dent, medium to medium late; Hammett, white dent, medium early; Leaming, yellow dent, medium early; Hildreth, yellow dent, late; Boone County White, white dent, medium to medium early; Reid's Yellow Dent, yellow dent, medium early; Legal Tender, yellow dent, medium to medium early."

FLAX AND LINSEED.

Amongst the diversified crops—tropical, sub-tropical, and temperate —which may be profitably grown in the different parts of the State of Queensland, one may be mentioned which hitherto has received little attention from farmers, and which yet will return larger profits, and at less outlay, than many which at present are the mainstay of the agriculturists. This crop is flax, not New Zealand flax, but the linseed producing and fibre producing plant which is largely grown in European countries, and to a considerable extent in Victoria.

There is a very large demand in the world's markets for linseed for oil-making and medicinal purposes, and seeing that the soils and climate of many portions of the State are eminently adapted to the production of this crop, not only for the seed but also for the valuable fibre, there appears to be no reason why the cultivation of the flax plant should not be entered upon in conjunction with other crops. The cultivation, the harvesting, the separation of the seed, and the extraction of the fibre are all very simple and inexpensive operations, and the profits of a flax farm, as has been long ago proved in Victoria, are larger than those of many other crops which at present engage the attention of our farmers. In Victoria, Messrs. Wolff Bros., of Traralgon, have been engaged in the flax industry for many years, and have conclusively shown that the net profit from an acre of flax averages from £8 to £8 10s. Their method of production, summarised from an article which we published in the "Queensland Agricultural Journal" in October, 1903, were as follows:—Returns from 120 acres of flax for seed and fibre, £2,000, or £16 16s. per acre, the profit, after paying all expenses of cultivation, harvesting, marketing, &c., being £8 to £8 10s. per acre. They stated that the seed could be left to ripen in the field, and that yet a good crop of fibre could be obtained, the price of the fibre as paid by Messrs. Miller and Co., Melbourne, being from £42 to £45 per ton. The average yield of seed was 14 bushels per acre, which readily sold at £14 per ton, or 7s. 6d. per bushel, the fibre averaging 5½ cwt. per acre, equal to £11 11s. Sown broad-cast, 1¼ bushels of seed is sufficient. The most profitable seed is the "Riga."

HARVESTING.

This is done with the reaper and binder with the knives as sharp as razors. The bundles are then placed in stooks for a fortnight and then threshed or stacked to be threshed at leisure. The threshing machine used by the Messrs. Wolff consisted of two wooden rollers, each 2 ft. in diameter, set one above the other, with a perpendicular play of about 2 in. This machine is driven by a 5 b.h.p. oil engine, at the rate of 140 revolutions per minute. The sheaves are fed into it without untying. The seed, when threshed, is passed through an ordinary grain winnower. Two men can thresh 2 to 3 acres a day. On contract, the price for threshing is 6d. per bushel of 56 lb., and 2d. a bushel for winnowing.

MANUFACTURING THE FIBRE (RETTING).

The sheaves, which have already been deprived of the seed and restacked, are carted out and spread thinly on grass land, 1 acre to 2 acres of flax, after untying the sheaves. With good rains and heavy dews, the flax should be ready for turning in about a fortnight. Then the swathes should be turned over and left out for another fortnight. Then gather into loose, thin stooks to dry for two or three days. When the dew is off and the weather dry, tie into handy bundles. When well dry, the "Breaker" comes into play. This machine costs £35. Its function is to break off the woody fibre. Then the "Scutcher" (price £40) cleans off the broken particles left, and the fibre is ready for market put up in 14-lb. bundles in bales of 5 cwt.

COST.

Spreading out, 7s. 6d. per acre; turning over, 2s.; stooking, re-tying, and carting, 10s. per acre. In the factory men are paid 10d. per stone of 14 lb., and another 2d. per stone is allowed for wear and tear. All the work is light. Boys can do the breaking at 4s. 6d. a day. Scutching hands get 7s. a day, and spreaders 5s. a day.

The crop is not easily injured by weather, and can be handled at leisure.

HINTS TO NEW SETTLERS, No. 7.

BY THE EDITOR.

The preliminary work of clearing, fencing, cropping, and house-building, as detailed in other parts of these notes, having been well advanced, the next need of the settler is live-stock of some description. A pair of good horses will now be found necessary, and, according to the class of country selected, a beginning may be made with a few head of good dairy cows, or sheep, if on Downs country, or on the coast under certain conditions, and a good strain of pigs. As far as cows are concerned, the best for milk production are Ayrshires, Holsteins, Illawarra, and Jerseys. If the farm is situated on the coast, it will be necessary to grow fodder for sheep, the natural grasses being quite unsuitable for them. Sheep have often been tried on the coast lands, but in all cases unsuccessfully, the mistake having been made of treating them as sheep on Downs country are treated—*i.e.*, allowing them to run on the uncultivated land and live on the natural grasses. In the western country, sheep thrive on the succulent grasses, herbs, salt-bush, &c., which abound there, but, as stated, the coast grasses are quite unsuitable for grazing sheep, hence some crops must be grown for them, such as lucerne, Rhodes grass, and other artificial grasses. Again, coastal sheep suffered much from stomach worm, so that what with them, a wrong breed of sheep (merinos), and the poor unnutritious pasture, the losses were too great to make them profitable. Now, however, Mr. W. G. Brown, sheep and wool expert to the Department of Agriculture and Stock, has shown how sheep can be profitably raised on coast country, and he recommends the Romney Marsh and Leicester as being the most suitable, merinos being out of the question. Mr. Brown has, during the last twelve months, written several articles on the subject in the "Queensland Agricultural Journal," and in the April, 1914, number of the Journal, will be found an admirable lecture on "Sheep on the Coastal Areas," given by Mr. Brown, which deals exhaustively with the whole matter.

The advent of stock on the farm, whether horses, cattle, sheep, or pigs, will necessitate additional buildings and yards, and consequently a considerable outlay, but in timbered country, materials for yards, fences, and buldings are all ready to hand in the shape of splitting timber. I have already described how posts, rails, slabs, shingles, and bark can be obtained, and the necessary buildings, &c., erected. In the case of dairy cattle more outlay is needed than with other stock, as the old rough-and-ready method of milking, setting the milk for cream, and churning have long since been abandoned. The farmer need no longer trouble himself to make butter. The numerous butter factories will do it for him. His business is to obtain as much cream as possible from his cows, and to enable him to do so he must have well-bred animals, feed them well, and provide them with shelter from cold winds and rain.

The necessary buildings will be the milking-shed with the usual bails, yards, gates, &c., a room at some distance from the yards, manure heaps, piggeries, &c., for the cream separator and milk cans. Later on, as the milking herd increases, hand-milking may be superseded by the use of the milking machine, which will necessitate a further but very profitable outlay.

I need not here describe any of the operations connected with the dairy, as these are all fully detailed in pamphlets and leaflets by the Government Dairy Expert, and which are issued free to dairy farmers. There is one building which no dairy farmer should be without—that is the silo. It is all very well to have good fodder crops, with plenty of grass in the paddocks, but experience has shown that there are regularly returning cycles of drought, or of exceptionally dry seasons, when the grass fails and the fodder crops refuse to grow. In such seasons, thousands of valuable cattle have been lost practically by starvation. In days not long gone by, there was no help for this disastrous state of affairs, but the advent of the silo enabled dairy farmers to keep their stock in fair order until the return of welcome rains. There were, and even still are, many farmers who still trust to luck and the seasons for the well-being of the stock which gives them a comfortable income. They cannot be made to see the enormous value of a silo, which can be filled during the good times, and in which the silage will retain its good qualities for many seasons. The result of this neglect has been to bring disaster on the unbelievers, whilst the wise men who made the provision in time suffered no losses when the inevitable drought found them unprepared. It is just the story of the wise and foolish virgins. The wise men would not and could not afford to sell silage to the improvident, who suffered accordingly. Silos can be built either very cheaply or very expensively, according to the needs of the stockowner, but a cheap silo, well constructed, is better than none at all. Even a silage stack is of very great value, and entails but small expense in its creation. Details of all kinds of silos and silage stacks can be obtained from the Department of Agriculture and Stock.

Closely connected with the dairying business is pig-breeding, which is very profitable, provided the most suitable breeds are kept. There is a very great demand for pigs by the bacon factories and butchers—so great, indeed, that the factories have the greatest difficulty in getting all they require. Pigs on a farm are not very expensive animals, and at six months old they are ready to sell. They are as good as cash in the bank, and the annual pig cheques, together with the cream cheques, make a good show in the farm returns.

Next we come to fowls. They are a source of considerable profit, as the principal part of their food is found on the farm. If fowls are bred for egg-laying purposes, a beginning should be made with the very best strains of Leghorns or Orpingtons. It would be instructive to read the "General Report on the Egg-laying Competition" at the Gatton Agricultural College which ended in March last, in the May issue of this Journal. It is there shown that 240 hens, mostly White Leghorns, laid 52,420 eggs during the year's competition, an average of 1,310·5 per pen, or 218·4 eggs per bird, which constitutes a new world's record. Besides the eggs, there would be many birds for the market.

With all this, there is no need to neglect other farm crops besides fodder crops, such are maize, potatoes, onions, &c. Many fruits can also be grown which certainly require some attention at times in the way of pruning and spraying. Oranges, lemons, bananas, custard apples, papaws, grapes, mangoes, &c., all mean additions to the banking account.

AGRICULTURE AND FRUIT-GROWING IN THE GLADSTONE DISTRICT.

The following very interesting report on the progress of settlement, farming, dairying, fruit-growing, soils, &c., in the above district was lately furnished to the Under Secretary for Agriculture and Stock by Mr. G. B. Brooks, Instructor in Agriculture, who recently made an extended tour through the various districts here described:—

RAGLAN.

It was found that a large proportion of the recently selected areas had been taken up by members of families of local farmers and residents. Very little development has so far been done, beyond fencing.

Scrub land in the district is limited; most of that recently thrown open was secured by the Creed family (Langmorn Station). A good deal of the forest country is only suitable for grazing purposes. The better portions could, no doubt, be profitably utilised for dairying.

In regard to the older settled portions along Hourigan, Raglan, and Langmorn Creeks, dairying, together with maize and fruit-growing, is receiving some consideration. Unfortunately, no provision is made for feeding the dairy herds during winter or a dry period.

A few small paddocks have recently been put under Rhodes grass. This has done so exceedingly well that most of the farmers in the district are either sowing or making preparation to lay down an area of this excellent pasture, and many inquiries were made as to the best method of substituting Rhodes grass for the native varieties in forest country.

A number of farmers on Hourigan Creek combine fruit-growing with dairying. There are several citrus orchards, varying in size from

300 to 600 trees, looking exceptionally healthy, and giving promise of a good yield. Spraying and cultivation, so frequently neglected, are well attended to in this district. Soil and climatic conditions are evidently favourable for citrus culture; one grower informed me that from a single lemon-tree last season he obtained over £8 worth of fruit.

Maize is not extensively grown. This season's crop is, owing to dry conditions, likely to turn out a failure. There are a few small patches of lucerne. The method of raising and handling this crop could be considerably improved upon.

The soil along Hourigan and Raglan Creeks is a well-drained alluvial brown loam. Given a heavy rainfall, portions would be liable to flooding, but only for a short time. Large areas of rich alluvial creek flats are still available for cultivation. The indigenous grasses growing on these lands are of excellent variety and quality, and are said to carry, in ordinary seasons, a beast to the acre.

The district is, on the whole, well watered, there being several creeks with a permanent supply.

MOUNT LARCOM.

The portion of the Langmorn Goldfield adjacent to Mount Larcom township which was recently made available for agricultural purposes is mostly occupied by a group of German settlers. This area is made up of gently sloping ridges covered with scrub, with an occasional patch of gum and box forest. In several localities the surface is very stony and broken. A limestone deposit extends over a considerable portion, and in many ridges it shows up to such an extent as to be a conspicuous feature of the landscape.

The soil is, on the whole, a comparatively shallow one, with a subsoil of a yellowish clayey nature.

A good deal of clearing has been done. Last year most of the settlers had a patch of maize, varying from 10 to 15 acres. This season a similar area has been cleared and put under the same crop. In almost every instance Rhodes grass has been planted along with the maize.

Unfortunately, this season's maize crop is likely to turn out a complete failure, owing to dry weather. Much of it is already beyond recovery, and even if rain falls soon the yield from the most promising fields will be light.

Several of the farmers have tried cane-growing, but although the yield last season was generally good, the expenses connected with handling the crop were too great. For example, the cost per ton was approximately: Cutting, 4s.; cartage to railway, 6s.; railage to mill, 7s. 6d. When the cost of planting and cultivating is taken into account, the margin left is exceedingly small. From a close study of the conditions obtaining in this portion of the Mount Larcom Scrub, known as the German Settlement, I am of opinion that the best use to which it can be put is dairying. This could, in many instances, be supplemented by the growing of such crops as broom millet, cotton, onions, &c.

That dairying is the coming industry of this district is being realised by many of the settlers who are laying down large areas under introduced grasses for this end.

There is evidently only one obstacle that is likely to keep this district from immediately developing into an important dairying centre, and that is the lack of permanent water for stock. Unfortunately, a good deal of uncertainty is experienced in sinking for such, more especially in the limestone area. While a few have been successful in procuring water at a comparatively shallow depth, others have put down deep wells with negative results.

Nearly every settler, without exception, has already sufficient Rhodes grass to carry a herd of at least ten cows, but having no water within miles of his selection is a tremendous handicap to successful dairying. The water problem is therefore of the greatest importance, and much will depend upon its solution.

Undoubtedly some assistance may be looked for through the agency of the Agricultural Bank. Nevertheless, it is just possible that much valuable time and money may be wasted through sinking in unfavourable situations. If it were possible to locate water near the surface with any degree of certainty, the value of such, to both settler and the State, would be inestimable. Very many instances could be given where the location of water, by means of "divining," has been proved beyond doubt: such as the finding of a copious supply within a few yards of where a dry well has been put down, &c.

When visiting districts where permanent water is scarce, I have very frequently been asked whether I could locate underground supplies by means of the divining rod. Although I have used it with apparently considerable success, still I don't advertise myself as an expert, for the simple reason that many people look upon this method of finding water as being a piece of tomfoolery, and the user as a crank.

It may be mentioned that the owners of some of the boring plants in the Western districts select sites for their operations by "divining," and also by the use of the mechanical water-finder, the one acting as a check on the other. That a mechanical water-finder form part of my equipment would, I think, be worthy of consideration.

In regard to noxious plants, it may be mentioned that the scrub lands are badly infested with poison peach (*Trewa aspera*). It is growing so luxuriantly on some of the roads as to almost render them impassable. One farmer reported losing three cows through eating this plant.

YARWUN.

The portion of country visited was that recently made available for selection on the south-western side of the township. The area occupied is mostly scrub, lying at the base of a rather high range of hills. The soil is light-brown in colour, of fair depth, good texture, and having a subsoil of a somewhat gritty yellow clay.

Maize, bananas, and citrus trees do well.

Large paddocks of Rhodes grass (30 to 90 acres) are to be found on most of the farms. This grass has made, in spite of the dry season, a most luxuriant growth. In several unstocked fields the fences were completely grown over. I measured the height in different places, the length of stalk being over 7 ft. Some of the farmers are saving the seed for market purposes. On some farms there has been difficulty in procuring water; hence the absence of stock.

Most of the settlers are actively engaged in dairying. The number of cows being milked by individual dairymen varies from 50 to 60. The only provision they make by way of winter feed is to plant Rhodes grass in a fresh area of scrub every season. On the farm of J. H. Holzheimer, it was observed that a disease had attacked his grape vines. Samples of the diseased roots were forwarded for examination.

BOYNE VALLEY.

It was found that very little development had so far taken place in the recently selected area along the Boyne Valley. A large number of the selections are at present used for grazing purposes, being held by teamsters and others deriving a portion of their living from outside sources. While many of the areas are only suitable for this purpose, others could be utilised for dairying and to some extent for crop-raising. Even by the older settlers the raising of crops is not practised to any great extent, while dairying is only emerging from its embryo stage. It is pleasing to note that one farmer in the district—Mr. S. J. Bull, Littlemere—is converting a maize crop into silage. I was able to point out to Mr. Bull a much more satisfactory and less laborious method of conserving this fodder than the one he had adopted.

A number of farmers have planted small areas of lucerne on the flats adjacent to the river, good cutting being obtained. One grower reported that dodder had appeared in the crop he planted last season from seed secured from a Brisbane seedsman. Very little maize is grown in the district; the crop at the time of my visit, 17th February, had reached the stage when rain is so necessary to ensure a crop.

The soil on the forest ridges varies in quality a good deal, according to locality, while a good deal of poor land is to be met with. There are areas of limestone formation which have good soil and are well grassed. There are no large areas of scrub along the valley. There is, however, a fairly extensive strip of alluvial flat on the east bank of the Boyne River; in fact, there are two distinct flats—an upper and a lower. The upper is evidently an old alluvial deposit composed of a poor quality grey clay soil, very close in texture. This is fairly heavily timbered with gum and patches of box.

Separating the upper from the lower flat, there is an old, well-defined river bank, some 25 ft. high, commencing near Many Peaks and practically extending the whole length of the river. This lower flat—without doubt an old river bed—varies in width from a few hundred yards to over a mile, the present course of the river being on the extreme western side. This area is heavily timbered with gum trees which have been ringbarked many years.

The soil is a brown, friable loam, of good depth and well drained. The subsoil is naturally a sandy one. Most of the river frontage is at present held on lease, which I believe expires in about seven years. This portion of country will cut up into a large number of valuable farms, giving each a portion of good alluvial soil. It will have the advantage of permanent water; in fact, it is probable that an unlimited supply of water, in addition to that in the river, could be obtained by sinking some 10 to 15 ft.

At present a 10-chain road runs along this flat from near Many Peaks, to a distance of some 24 miles, taking up a large area of valuable land. When cutting up for closer settlement, it would be highly desirable that the road be closed and another opened adjacent to the railway line, a few hundred yards off, and which runs parallel to the river. There are at least six small irrigation plants on the river—recently installed; and, as some doubt exists as to the suitability of the water for the raising of crops, I made arrangements with Mr. J. Henderson, Littlemere, to forward a sample for analysis. During my visit I was much indebted to Mr. J. Henderson (president, Port Curtis Agricultural, Pastoral, and Mining Association), who supplied a conveyance, and personally accompanied me over a large portion of the Upper Boyne Valley.

MOUNT LARCOM: MINING HOMESTEAD AREA.

In the information secured from the Lands Department, *re* Mount Larcom, no mention was made of the large settlement that had recently taken place in the mining homestead area. I am led to believe there are over 200 settlers in this locality, all on 80-acre blocks, and depending entirely upon the land for a living. Should this statement be correct, then this is probably the most closely settled agricultural district in the State.

I found it impossible to go through this portion, owing to having previously made arrangements to go to the Boyne Valley, on completing the German Settlement and Yarwun. This was unfortunate, as they were looking forward to my visiting them.

MARKET GARDENING.

WIRE WORMS.

For the past month or two many complaints have reached us about the ravages of the wire worm in the vegetable garden. Whole beds of lettuce, endive, cauliflower, &c., have been destroyed by them. The best way in which to get rid of the pests is to trap them in the following manner:—Cut up some carrots, beets, or sweet potatoes and stick them into the ground all over the beds to be protected. When these are taken up on the following day, it will be found that the worms have eaten their way into them. The traps should be lifted with a trowel, because many worms will be found in the soil around them. The only crop which the wire worm has an objection to is mustard; if, therefore, a crop of mustard be planted on land infested by the worm, it will perish from starvation.

THE GUADA BEAN.

This remarkable vegetable has, for some occult reason, received the name of bean, but it has nothing in common with that family of legumes, as it is really a gourd. For some time past it has been grown more as a curiosity than as an article of commerce. Botanically it is known as *Trichosanthes anguinea*, and was originally brought to Australia by a resident of New South Wales from the Solomon Islands, hence the name Solomon Islands Bean. It was fully described by Mr. H. Newport, Instructor in Tropical Agriculture, in the issue of this Journal for April, 1913. Mr. Newport says that it is by no means new to tropical Queensland, as it was growing at the Kamerunga State Nursery and in private gardens over twelve years ago. The fruit grows to a length of from 4 to 5 feet, and exceptional specimens have reached a length of 7 feet. It appears to thrive better in the South than in the North of Queensland, where both very wet and very dry weather hinder its full development. The bean is hollow, and when cut into lengths of 3 to 6 in., and stripped into slices about ¼-in. wide, it has, when cooked, all the appearance and flavour of the finest French beans. A vine, Mr. Newport says, bears, on an average, five to seven good pods, but many have a lot of blossoms and numerous small pods which do not come to maturity. It may be grown on a trellis fence, or bough shed, in the same manner as the choko or granadilla. In proof of the plant doing better in the South than in the North, a vine grown at Wondai, on the Nanango line, by Mr. D. Crumbie, produced several dozens of gourds, and at Raglan, on the North Coast line, Mr. B. Tweed grew three vines which produced 100 or more pods at the first cropping, with hundreds more coming on. The number of seeds per pod is about 90, and they meet with a ready sale. From this it would appear to be a vegetable well adapted for those who have only a small patch of ground available for vegetable growing. The best time to sow the seed is towards the end of September in Southern and Central Queensland.

Writing on the same subject, in April last, the Editor of the "Rhodesia Agricultural Journal" (S.A.) doubts whether the bean is likely to prove of any great commercial value in Rhodesia. As a stock feed it may be disregarded, and its sole use seems likely to be as a vegetable.

LABOUR IN PORTO RICO.

In Porto Rico, as elsewhere (says the "Journal of the Jamaica Agricultural Society"), the labour difficulty is dominant, and various methods of meeting the trouble have been tried. On one plantation the labourers were paid in full each night, which drew so much labour for a time, that other mills complained. One of the planters devised a plan of giving a numbered lottery ticket to each man who had worked six consecutive days in the canefields. At the end of the season there was a drawing for cash prizes, the grand prize being 100 dollars. Out of 2,000 hands only 150 had worked the six days in the first week; but matters rapidly improved under the stimulus of the lottery tickets.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF APRIL, 1914.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lady Melba	Holstein	6 Mar., 1914	1,023	3·4	38·5	
Madame Melba	,, ...	10 Nov., 1913	744	4·2	35·0	
Glen ...	Shorthorn... ...	27 Oct. ,,	644	4·7	34·08	
Nellie II. ...	,, ...	5 June ,,	421	4·6	31·78	
Miss Lark ...	Ayrshire	27 Dec. ,,	564	4·8	30·50	
Butter ...	Shorthorn... ...	27 Sept. ,,	567	4·6	29·80	
Lady Loch...	Ayrshire	31 Aug. ,,	535	4·8	28·94	
Miss Bell ...	Jersey	25 Sept. ,,	521	5·4	28·13	
Queen Kate	Ayrshire	4 Jan., 1914	629	4	28·11	
Rosine ...	,, ...	27 Nov. 1913	553	4·4	27·31	
Silver Nell ...	Shorthorn... ...	26 Sept. ,,	472	5	26·64	
Miss Jean ...	Ayrshire	13 Jan. ,,	492	4·8	26·61	
Lavinia's Pride	,, ...	11 Dec. ,,	595	4	26·59	
Burton's Lily	Shorthorn... ...	29 Dec. ,,	513	4·6	26·54	
Miss Melba	Holstein	22 Jan. ,,	543	4·2	25·54	
Lady Maud	Shorthorn... ..	17 Mar., 1914	650	3·4	24·46	First calf.
Conscience...	Ayrshire	30 Jan. 1913	493	4·2	23·19	
Countess of Brunswick	Shorthorn... ...	22 July ,,	348	6	23·7	
Lennie ...	Ayrshire	1 Sept. ,,	488	4·2	22·95	
Bella ...	,, ...	16 Dec. ,,	406	5	22·91	
Honeycombe	Shorthorn... ...	7 June ,,	439	4·6	22·71	
Daisy ...	Holstein	14 Feb. ,,	514	3·9	22·36	
Pauline ...	Shorthorn... ...	8 Oct. ,,	506	3·9	21·96	
Nina ...	,, ...	5 April 1914	538	3·6	21·52	
Bell	Jersey	7 July 1913	323	5·8	21·30	
Skylark ...	Ayrshire	2 Feb., 1914	477	3·9	20·75	

The cattle were fed on natural pasture only.

CASSAVA FOR PIGS.

Considering how easily the cassava plant can be grown in many parts of Queensland, especially in the Northern and Central districts, and the heavy yields of tubers it produces, it is remarkable that no attempts have been made to utilise the latter for stock food. Doubtless the knowledge that both the bitter and the sweet cassava contain a certain amount of hydrocyanic acid poison accounts for the neglect of this crop, so valuable in many tropical countries. In reference to its value as food for swine, the "Journal d'Agriculture Tropicale," Paris, writes: "In 1909 we drew the attention of our readers to the experiments undertaken at the Agronomie Station of Loire-Inférieure by MM. Gouin and Andouard, in feeding young stock, and particularly calves, with manioc (cassava) starch. Since then the process has become general, and a fairly large quantity of the cassava product is sold every year to French breeders. Following up their experiments MM. Gouin and Andouard have proved that cassava is a perfect substitute for the potato for feeding pigs, and this property makes it valuable in case of the potato season proving a failure, or when the quantity available finds a better market for human consumption.

The pig will eat the cassava either raw or cooked, digests it equally well in both cases, and utilises all the hydrocarbonic matter, amounting to about 80 to 90 per cent. of the total quantity consumed. All that is needed is soak the tubers for some hours in cold water, to obtain a food ready for immediate consumption, a food the nutritive value of which is equal to that of barley or rice meal. At the same time cassava must not be considered as a complete ration, as it is necessary to supplement it, for young animals at least, with food containing the phosphates and nitrates, which are wanting in cassava. The experimenters recommend for this purpose oil-cake and ground green bones, or, better still, degelatinised bones powdered.

The cassava for shipment should be as small as possible, the large coarse roots, which are too often exported, being not so saleable owing to the lengthened period required for soaking and the want of some instrument adapted for crushing the very hard pieces of root. One important grower in Madagascar has already taken up this matter, and sends regular consignments of cassava, reduced to the proper size, to many parts of Europe.''

CASSAVA AS A FOODSTUFF.

The article republished above from the French Journal makes no mention of the poisonous properties of the cassava tuber, but, doubtless, the soaking in water for several hours is for the purpose of eliminating the hydrocyanic acid contained in the tuber.

At the Florida (U.S.A.) Experimental Farm cassava was proved to be the best and cheapest ration which can be used for fattening purposes. As to the comparative cost between cassava and maize, the difference was two-thirds in favour of the former.

Both varieties—sweet and bitter—contain hydrocyanic poison. In the sweet, the poison is in the skin; in the bitter, it is in the skin and juice. If fed to pigs as dug the animals will be poisoned; 1 gr. of prussic acid will kill a human being, 16 gr. will kill a horse; and some quantity between these two will kill a pig. On some lands sweet cassava will turn to bitter. The change results from planting on a free level soil cuttings from plants grown on hilly stony land. The very productive variety known as ‘‘ Mexico'' is very apt to change in this way. To be safe, the tubers should be peeled and boiled before being fed to stock.

To determine how the material can be treated to render it safe as a stock food, Professor Carmody made a number of experiments. Treated with cold water for twenty-four hours, the amount of hydrocyanic acid left in the sliced green roots was 1·134 gr. per lb. Treated with cold water for twenty-four hours, water poured off, and treated with a second lot of water for another ten hours, the residue of poison was ·301 gr. These were young roots. When old roots were treated with boiling water for nine hours, and the water poured off, no poison was left in the roots. It was thus shown that by treatment, as above shown, the roots can be rendered quite safe for food purposes.

Hydrocyanic acid is a very volatile poison, and if the roots are sliced and left for a time in the sun, then most of the poison is driven off.

In an article published in the "Queensland Agricultural Journal," in January, 1903, by Mr. J. C. Brünnich and Dr. W. Maxwell, the following note on the poisonous properties of the tuber occurs:—

"The value of crops as feedstuffs can be very seriously interfered with by the presence of chemical bodies which are actually injurious to animal life. This applies, and also very seriously, to the cassava plant now under consideration. Already in 1877, Prof. Francis, the Government Chemist at Trinidad, reported on analyses of sweet cassava, and showed them to contain considerable amounts of hydrocyanic or prussic acid. Prof. Francis's work has been continued by his successor, Prof. Carmody, who shows in his yearly report (1901) that the sweet cassava contains nearly as much hydrocyanic acid as bitter cassava, with this difference: That in sweet cassava the poisonous principle is located in larger proportion in the outer skin and rind.

"It has, therefore, been necessary to study the cassava grown in Queensland also from the standpoint of its possibly being, in its natural state, a crop unfit for animal use. Most careful examinations have been made in order to determine the amounts of hydrocyanic acid in the Mackay samples. In the first place, an analysis was made of an average sample of the cassava roots, when so high a content of hydrocyanic acid was found that it was necessary to repeat the examination. Further samples were obtained, including portions of the very youngest roots and also of roots which were not less than three years old. The roots of these samples were divided into two parts—namely, the outside or rind and the inside, the really edible portion of the root. The amounts of hydrocyanic acid were determined in these samples respectively, and were found to be as follows:—

—		Hydrocyanic Acid in—			
		Natural Material.		Dried Material Calculated.	
		Per cent.	Grains per lb.	Per cent.	Grains per lb.
Young Cassava	Rind	·0434	3·04	·159	1·13
	Inside	·0227	1·59	·054	3·78
	Whole root	·0275	1·92	·071	4·97
Old Cassava	Rind	·0329	2·30	·110	7·70
	Inside	·0237	1·96	·060	4·20
	Whole root	·0256	1·79	·068	4·76
Average sample Cassava, whole root ...		·0292	2·04	·077	5·39

"To make the meaning of these percentages amounts more clear, the results are expressed in the form of a number of grains of hydrocyanic acid contained in 1 lb. of several samples of the green and also calculated on the dried material.

"So far as information is to hand, it is understood that 16 grains of hydrocyanic acid is a fatal dose for a horse, and again that 1 grain of the pure acid is fatal to a human adult. Data are not to hand to prove the doses which would be fatal to pigs, sheep, or cattle, yet from what is known of the power of these respective animals to resist the action of other known poisons it is reasonably concluded that doses ranging between that which is fatal to a human adult on the one hand and to the horse on the other hand would be fatal to animals with powers of resistance ranging between these extremes. Then, as is seen from the above table, a horse would only need to consume 3 lb. of the dry material, corresponding to about 8 lb. of the green roots, to obtain its fatal dose, whereas 3 oz. of the dry or 8 oz. of the green roots could contain sufficient of the poison to be fatal to a man. It is, therefore, quite necessary to warn farmers and any others producing cassava roots against its use either as a human food or as a feedstuff for animals in its natural state.

"The question is: How can the material be treated to render it safe as a food for either men or animals? Work along these lines has already been done by Professor Carmody. This laboratory considered the matter of importance enough to determine how the poison can be removed by such means as are possible to farmers and others who may wish to make use of cassava as a feedstuff. The material was, therefore, treated first in several cases with cold water, and, secondly, with boiling water. The amount of poison being left in the roots after the various treatments is shown in the following table:—

Mode of Treatment of the Sliced Green Roots.	Hydrocyanic Acid left in the Green Roots.	
	Per cent.	Grain per lb.
1. Treated with cold water for 24 hours, and water poured off (young roots)	·0162	1·134
2. Treated with cold water for 24 hours, and water poured off (young roots)	·0076	·532
3. Treated with cold water for 24 hours, water poured off, and treated with second lot of water for another 10 hours (young roots)	·0043	·301
4. Treated with boiling water for 9 hours, and water poured off (old roots)	Nil	Nil

"It is thus shown that while the cassava root in its natural state contains a highly dangerous amount of hydrocyanic acid, yet by treatment of the cut-up material with water, as shown above, it can be rendered quite safe for food purposes. As a practical suggestion, it is advised that the cassava roots, if used at all, should be cut up into pieces and boiled in the same maner as potatoes are boiled for pig feed, the greatest care being taken that the water shall be completely removed, and the material further washed out with additional water.

"Concerning the actual amount of hydrocyanic acid found in cassava root by different scientists and in different countries, the indications are very strong that the controlling factors will be found to be the nature of the soil and climatic conditions.

"The data furnished by Dr. Wiley—covering the analysis of Florida cassava and the analysis contained in this statement of Mackay cassava —show very clearly that the amount of hydrocyanic acid in cassava root is relative to the amount of nitrogen contained in the roots. Again, the amount of nitrogen is determined by the nature of the soil in which the roots are grown; the Florida cassava was grown in almost pure sand and contained a minimum of nitrogen, whereas the Mackay roots were grown in a loam and contained double the amount of nitrogen. The action of the nitrogen content of the soil and of the nitrogen contained in manures applied to the soil, upon the formation of hydrocyanic acid, will be subject of further investigations, these investigations being made to cover not only cassava root, but also several other feed crops, including sorghum, maize, sugar-cane, teosinte, &c. Preparations are now being made for the continuation of these investigations, with the purpose of being able to inform our farmers what forage plants and at what age in their growth they may or may not be used with safety as feedstuffs."

FEATURES OF THE CHEESE INDUSTRY.

By E. GRAHAM, Dairy Expert.

[Paper read before the members of the Cheese Manufacturers' Association, at their meeting held in Toowoomba on the 23rd April, 1914.]

The increase in the quantity of cheese manufactured during the season now terminating materially adds to the importance of this branch of the dairying industry.

A comparison of the quantities of cheese exported during the seasons 1912-1913 and 1913-1914 shows the marked expansion that has taken place in the volume of the oversea trade. The respective amounts and values being:—

	Quantities Exported.	Value.
1912-13	25,622 lb.	£640
1913-14	1,643,664 lb.	£43,000

Despite the praiseworthy efforts exerted on the part of those directly concerned to place the industry on a sound basis, there still remain further avenues for improvement, both in the methods under which the milk is handled on the dairy farms and treated by the manufacturing factories.

The production of milk suitable for cheese-making purposes, especially in the height of a Queensland summer, demands the observance of exacting care and cleanliness on the dairy farm, and as lucerne and other fodders with slightly tainting influences are utilised as food for dairy stock, it follows that the aeration of the milk on the farm becomes a necessity, while the warm nights require that the milk should be artificially cooled, and its temperature reduced to as near 50 deg. Fahr. as possible.

Fortunately, these processes can be effectually carried out in conjunction, and at the expense of little labour, by passing the freshly drawn milk over a combined milk cooling and aerating apparatus; an essential being that the work is performed in the purest of atmospheres. However, the cooling and aerating of milk is not generally adopted, although its usefulness seems to be fully recognised.

The grading of milk at factories, and the payments based in accordance with its quality, would do much towards establishing this necessary reform.

In deciding the quality of milk and discerning the dairy farm responsible for the delivery of milk of indifferent quality to the factory, I fear the reliable and accurate "fermentation" test has not been fully availed of by the managers of factories. The test is simple and decisive, and possesses the advantage that the dairyman can view the result, and see the abnormal behaviour of any milk of irregular character that he may be found guilty of supplying.

The whey from the factory is on occasions conveyed to the farms in the milk cans, and this practice is only to be accepted as one that positively detracts from the purity of the milk supply.

Colostrum or beastings are sometimes mixed with wholesome milk, and, if accepted at the factory, the result is the standard of quality of the cheeses made from the entire vat of milk is lowered.

Possibly the truest indication of the irregularities occurring in the production of milk and its subsequent manufacture into cheese is to be gathered from a study of the dominant faults exhibited by the cheeses submitted for export during the season.

Acid, bitter, and fruity flavours have been somewhat prevalent throughout the year, and signify in the first case that the milk was over-ripe at the moment the rennet was added (a defect readily overcome by cooling the milk on the farm) while in the latter instances bacteria and yeasts had gained access to the milk, probably being carried on dust particles from the yards, bails, &c., or fallen into the milk pail from the unwashed flanks, udders, and teats of the cows, or that an infection of the milk had taken place in the milk cans, previously used for the storage of whey, and the vessels not thoroughly cleansed. Defects in the body and texture of the cheeses, such as crumbly, rubbery, loose, open, and fisheye, were of frequent occurrence.

Maturing the cheeses in too high temperatures and in atmospheres containing insufficient humidity, together with exposure of the cheeses to hot temperatures in transit from factory to cold stores, are amongst the principal causes responsible for these imperfections.

In the examination of cheese prior to exportation, the strongest evidence of the hardship the cheese had suffered from abnormally high temperatures was provided by the fact that in innumerable instances the cavities in the body of the cheese were filled with melted butter-fat.

The isolated butter-fat soon becomes rancid, or assumes other equally disagreeable flavours, and the quality of the cheese is permanently destroyed.

As regards colour of the cheeses, mottled and unevenness were the most conspicuous features, the fault no doubt being due to an uneven development of acidity, and an irregular distribution of moisture in the curd. This trouble will assuredly continue until such time as manufacturers utilise the curd-draining racks, and entirely abandon the practice of allowing the slabs of curd to drain upon the bottom of the milk vats, where the curd becomes more or less whey-logged by the partially imprisoned whey.

DETAILED PARTICULARS AND QUANTITIES, AND CLASSIFICATIONS, OF THE CHEESES EXPORTED FROM QUEENSLAND DURING THE SEASON 1913-14.

Date of Sailing.	Name of Vessel.	Number Crates of Cheese.	Classification. Grade.			Percentage.		
			1st.	2nd.	3rd.	1st.	2nd.	3rd.
23 Sept., 1913 ...	"Wiltshire" ...	1,021	829	192	0	81	19	0
10 Oct., 1913 ...	"Shropshire" ...	1,456	1,252	204	0	86	14	0
20 Nov., 1913 ...	"Paparoa" ...	3,008	2,246	760	2	75	25	0
7 Jan., 1914 ...	"Waipara" ...	2,891	2,073	898	0	72	28	0
30 Jan., 1914 ...	"Argyllshire" ...	1,189	399	767	23	34	64	2
24 Feb., 1914 ...	"Limerick" ...	1,321	881	381	51	67	29	4

	1st Grade.	2nd Grade.	3rd Grade.
Mean average quality of consignments ...	69 per cent.	30 per cent.	1 per cent.
Mean average quality of consignments for former 3 months of season	80 per cent.	20 per cent.	...
Mean average quality of consignments for latter 3 months of the season	58 per cent.	40 per cent.	2 per cent.

From the figures quoted it is significant to note that cheeses produced during the earlier and cooler months of the season were vastly superior in quality to those manufactured in the warmer portion of the year. The consignment despatched by the "Argyllshire" at the time the heat was at its zenith appears in quality the least satisfactory of the season's shipments.

In discussing the influences at work in bringing about this rapid reduction in the quality of the cheeses, it is to be remembered that generally many of the factors to be accepted as controlling the quality of the cheeses were identical during the whole period under review.

Generally the milk was produced upon the same farms, and for the greater part yielded by the same animals, delivered by similar method to the factories, and there made into cheese by the same individuals, and finally the cheeses were classified by the same officers at the cold stores, prior to exportation.

There are quite a number of factors in common, but a great disparity is to be found by a comparison of the relative climatic conditions ruling at the different periods, and the fluctuations in the quality of the cheeses occur with such persistence and accuracy in agreement with the heat of the summer that the harmony existing between the high temperatures of the cheese-maturing rooms and the reduction in the quality of the cheeses becomes definitely established.

Each year is attended by a similar seasonable damage to the quality of the cheeses, which to my mind affords convincing evidence that an improvement in the present methods of maturing and marketing of cheeses is essential to the best interests of the industry.

In the work of remodelling the existing premises in which the cheeses are matured, the expenditure of a considerable amount of capital will be involved, but I think it may be shown that the outlay of the money requisite for the purpose is fully warranted.

The exposure of cheeses to high temperatures results alike in deterioration in its quality, and excessive loss in weight, the latter being due to the consequent heavy evaporation of the moisture of the cheese. Both factors have a direct influence upon the net returns to the factory and producer, and the excessive loss of moisture caused by the association of cheese with too high atmospheres may be set down as ranging from 3 to 7 per cent. of the total weight of the cheeses.

Analysis has shown the moisture content of some makes of Queensland cheeses to be as low as 28 per cent., which is considerably less than that held to be necessary for the proper maturing of the cheese.

The loss of weight by the abnormal evaporation of moisture from the cheese is, in the case of many factories, quite sufficient of itself to provide both interest and redemption on the capital requisite for the construction of an efficient cheese maturing room.

The matter of the temperature most beneficial for the proper maturing of cheddar cheese has long ago been investigated and decided, and it now behoves manufacturers to take advantage of the information at command and accordingly erect curing rooms that have incorporated in their construction every item of benefit.

Amongst other essentials the ideal curing room is one wherein both the temperature and the humidity of the atmosphere are under absolute control.

The finest flavoured cheddar cheeses have been matured at temperatures of 50 deg. Fahr., and slightly lower, with a humidity ranging from 75 to 80 per cent., and it has been proven that, within reasonable limitations, the lower the temperature and the higher the humidity of the curing room, the less is the loss in weight of the cheeses on the drying shelves.

Although comparatively low temperatures are effectual in the maturing of cheese of good quality, it is also to be recognised that the period occupied by the maturing process is considerably extenuated by the storing of cheese in temperatures below 50 deg. Fahr. However, experiment has shown that cheddar cheese is to be matured satisfactorily in temperatures not higher than 60 deg. Fahr., but the temperature of the curing room should at no time exceed 65 deg. Fahr.

I do not attempt to establish that high temperature of the maturing room is solely responsible for all defects discoverable in our cheeses, but rather to lay claim that the quality of the cheese is detrimentally influenced by its association with high temperatures, and that the heat invariably incubates faults in the flavour and texture which would have remained undeveloped, had the cheeses been held under cooler and more favourable atmospheric conditions.

The matter of a decision as to the best course to be pursued in order to improve the efficiency of the present curing room facilities, rests entirely in the hands of the directorates of the various cheese manufacturing companies, and the following suggestions are advanced as perhaps being worthy of consideration:—

(*a*) The consideration of the erection of a central curing room capable of containing the whole of the cheeses manufactured by factories.

(*b*) In the case of companies with branch factories, the storage of all cheeses at a common centre.

(*c*) The remodelling of the structures now utilised as cheese-curing rooms.

(*d*) Obtaining the required temperature by aid of refrigerating machinery.

(*e*) Obtaining the required temperatures by the adoption of the principle advocated by Mr. Morry, Surveyor to the Department of Agriculture and Stock.

THE SUGAR SEASON OF 1914.

For the information of willing workers who at this time of the year, find remunerative employment in sugar mills and on plantations at cane-cutting, and the multifarious operations during the crushing season, we republish from the "Queensland Sugar Journal" the approximate dates on which the various mills will commence crushing, as follows:—

Kalamia	15th of June.
Pioneer	Middle of June.
Inkerman	About 1st August.
Mossman	On or about 30th June.
Pleystowe	About middle of July.
Proserpine	About end of July.
Moreton	About second week in July.
Junction	End of July.
Baffle Creek	About end of July.
Bingera	About middle or end of July.
Mount Bauple	8th of July.
Nerang	First week in August.
Miara Mill	1st of August.
Gin Gin	About middle of July.
Marburg Sugar Co.	About 18th August.
Millaquin	About first week in August.
Fairymead	Latter end of July or beginning of August.
Goondi	Between last week in May and first week in June.
Macknade	About fourth week in May.
Victoria	About 25th May.
Invicta	Middle of August.
Pemberton	Middle of August.
Bonna	Middle of August.
Mulgrave	First week in June.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, APRIL, 1914.

The 1914-15 egg-laying competition started on 1st April, with forty pens of six birds each, making a total of 240 birds. Some of the competitors are very backward, whilst others look as if they had been laying for two or three months. The latter, as a rule, when sent on a journey to different surroundings and food, stop laying and frequently go into moult; some of them have done so this time. There has been a slight attack of chicken-pox amongst some of the birds, and this has had a tendency to check the laying, so that the number of eggs laid during the month is not up to that of the corresponding month last year. A. T. Coomber wins the monthly prize. The following are the individual records:—

Competitors.	Breed.	April.	Total.
A. T. Coomber, Bundaderg	White Leghorns ...	110	...
T. Fanning, Ashgrove, Brisbane ...	Do.	98	...
Kelvin Grove Poultry Farm, Brisbane...	Do.	84	...
George E. Austin, Boonah	Do.	77	...
Mrs. Bieber, Childers	Brown Leghorns ...	75	...
J. Kilroe, care of Finney, Isles, Brisbane	White Leghorns (No. 2)	72	...
R. Jobling, Wallsend, N.S.W.	Do.	67	...
J. Gosley, Childers	Do.	60	...
Range Poultry Farm, Toowoomba ...	Do.	58	...
Moritz Bros., Kalangadoo, S.A.... ...	Do.	58	...
Mrs. Munro, Sunnyside, Warwick ..	Do.	57	...
J. R. Wilson, Eudlo	Do.	55	...
J. Kilroe, care of Finney, Isles, Brisbane	Do. (No. 1)	54	...
Loloma Poultry Farm, Rockdale, N.S.W.	Do.	53	...
J. Zahl, Boonah	Do.	46	...
J. T. Coates, Rockhampton	Do.	45	...
A. H. Padman, Adelaide, S.A.	Do.	44	...
Cowan Bros., Burwood, N.S.W. ...	Do.	44	...
Mrs. W. D. Bradburne, Kogarah, N.S.W.	Do.	40	...
Loloma Poultry Farm, Rockdale, N.S.W.	R. I. Reds	40	...
F. McCauley, Clifton	White Leghorns ...	36	...
J. Murchie, Childers	Brown Leghorns ...	31	...
C. M. Jones, Rockhampton	White Leghorns ...	29	...
Derrylin Poultry Farm, Mutdapilly ...	Do.	29	...
J. D. Nicholson, Arncliffe, N.S.W. ...	Do.	29	...
Marville Poultry Farm, Moorabbin, Victoria	Do.	27	...
J. T. Coates, North Rockhampton ...	Black Orpingtons ...	23	...
E. Le Breton, Milton	White Leghorns ...	21	...
A. F. Camkin, Kogarah, N.S.W. ...	Do.	21	...
J. M. Manson, Brisbane	Do. (No. 1)	19	...
E. V. Bennett, Kalangadoo, S.A. ...	Do.	19	...
George Tomlinson, Boonah	Do.	19	...
J. Franklin, Coolabunia	Do.	18	...
R. Burns, Sladevale, Warwick	Black Orpingtons (No. 1)	17	...
R. Burns, Sladevale, Warwick	Do. (No. 2)	17	...
J. N. Waugh, Bankstown, N.S.W. ...	White Legeorns ...	17	...
Douglas Moreton, Coraki, N.S.W. ...	Do.	15	...
J. M. Manson, Brisbane	Do. (No. 2)	9	...
R. Burns, Sladevale, Warwick	S. L. Wyandottes ..	4	...
T. Fanning, Ashgrove, Brisbane ...	Black Orpingtons ...	...	...
Total	... ...	1,637	...

EGG-LAYING COMPETITION.

At the Burnley (Victoria) egg-laying competition a new world's record has been established by six white leghorns, owned by Mr. J. H. Gill, they laying 1,668 eggs in twelve months, or an average of 244 eggs per hen in 365 days. The 139 dozen eggs of the winning birds were sold at an average of 1s. 2d. per dozen, realising £8 2s. 2d., or £1 7s., per bird. The actual cost of food was 5s. 8d. per head, so that there was a net return of £1 1s. 4d. for each hen.

It is interesting to compare these good results with those of the Queensland Agricultural College competitions, of which the following particulars have been kindly supplied to us by the secretary, Mr. P. M. Pitt:—

We put up what was then the world's record in the 1907-08 competition, but did not hold it long, as the Western Australian people, whose competition concluded a few months later, beat us. In the competition just closed, we beat our own previous record with 1,564 eggs, as against 1,538 in 1908. I think the 1,600 mark has been beaten in New Zealand as well. I believe that we hold the record for the greatest average number of eggs per pen and highest number per bird for a whole competition, viz.—52,420 eggs for 40 pens and 240 birds—1,310·5 per pen and 218·4 per bird, in the competition just closed.

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

Date.	MAY.		JUNE.		JULY.		AUGUST.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·17	6·30	5·0	6·39	5·3	6·30	5·18
2	6·14	5·16	6·30	5 0	6·39	5·4	6·30	5·18
3	6·14	5·15	6·31	5·0	6·39	5·4	6·29	5·19
4	6·15	5·14	6·31	5·0	6·39	5·4	6·28	5·19
5	6·15	5·13	6·32	5·0	6·39	5·5	6·28	5·20
6	6·16	5·13	6·32	5·0	6·39	5·5	6·27	5·21
7	6·16	5·12	6·33	5·0	6·39	5·6	6·26	5·21
8	6·17	5·11	6·33	5·0	6·39	5·6	6·26	5·22
9	6·17	5·11	6·34	5·0	6·39	5·6	6·25	5·22
10	6·18	5·10	6·34	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·34	4·59	6·39	5·7	6·23	5·23
12	6·19	5·9	6·35	4·59	6·39	5·8	6·22	5·24
13	6·20	5·8	6·35	4·59	6·38	5·8	6·22	5·24
14	6·20	5·8	6·36	4·59	6·38	5·9	6·21	5·25
15	6·21	5·7	6·36	4·59	6·38	5·9	6·20	5·25
16	6·21	5·6	6·36	5·0	6·38	5·10	6·19	5·26
17	6·22	5·6	6·37	5·0	6·37	5·10	6·18	5 26
18	6·23	5·5	6·37	5·0	6·37	5·11	6·17	5·27
19	6·23	5·5	6·37	5·0	6·37	5·11	6·16	5·27
20	6·24	5·4	6·37	5·0	6·36	5·12	6·15	5·28
21	6·24	5·4	6·38	5·0	6·36	5·12	6·14	5·28
22	6·25	5·3	6·38	5·1	6·36	5·13	6·14	5·29
23	6·25	5·3	6·38	5·1	6·35	5·13	6·13	5·29
24	6·26	5·3	6·38	5·1	6·35	5·14	6·12	5·30
25	6·26	5·2	6·39	5·1	6·34	5·14	6·11	5·30
26	6·27	5·2	6·39	5·2	6·34	5·15	6·10	5·31
27	6·27	5·2	6·39	5·2	6·33	5·15	6·9	5·31
28	6·28	5·1	6·39	5·2	6·33	5·16	6·8	5·31
29	6·28	5·1	6·39	5·2	6·32	5·16	6·7	5·32
30	6·29	5·1	6·39	5·3	6·32	5·17	6 5	5·32
31	6·29	5·0	...	...	6·31	5·17	6·4	5·33

PHASES OF THE MOON.

			H.	M.
3 May	☾	First Quarter	4	29 p.m.
10 „	○	Full Moon	7	31 a.m.
17 „	☽	Last Quarter	8	12 „
25 „	●	New Moon	12	35 p.m.
2 June	☾	First Quarter	12	3 a.m.
8 „	○	Full Moon	3	18 p.m.
16 „	☽	Last Quarter	12	20 a.m.
24 „	●	New Moon	1	33 „
1 July	☾	First Quarter	5	24 a.m.
8 „	○	Full Moon	12	0 „
15 „	☽	Last Quarter	5	32 p.m.
23 „	●	New Moon	12	38 „
30 „	☾	First Quarter	9	51 a.m.
6 Aug.	○	Full Moon	10	41 a.m.
14 „	☽	Last Quarter	10	56 „
21 „	●	New Moon	10	26 p.m.
28 „	☾	First Quarter	2	52 „

State Farms.

KAMERUNGA STATE NURSERY.

Rainfall for the month 9·06 in., which fell during sixteen days. The first half of the month being dry, it was possible to get a good deal of watering done and also to make the nursery look more ship-shape after the wet season. Unfortunately, the dry weather did not last long enough, and, continual rain setting in, a good many of the legumes which were just ready for harvesting had their seed spoilt owing to sprouting in the pod.

An exhibit was taken to the show at Herberton, this being the first show of the season. The coffee, vanilla, coconuts, and rubber exhibits occasioned interest, as many questions were asked concerning same, while the samples of Gros Michel bananas were greatly admired. In connection with these latter, I may mention that while of fair size, much larger ones should be obtained on new scrub land, though I doubt if the quality could be improved upon. The plants were grown in a soil with a large proportion of sand which had shown itself anything but good; however, with continued cultivation and the application of one of Mr. Brünnich's formulas for manuring bananas, excellent results have been attained with this Gros Michel variety; but, as pointed out on previous occasions, it does not do to have the plants bearing to any extent during the cyclone season, as owing to its height and the weight of the bunches the plants are apt to snap off, unless in a very protected position. Fortunately, this is not, as a rule, the time of year for the best market, but by careful pruning out of suckers, plants can be brought along so as to come into bearing whenever required.

BUNGEWORGORAI.

The manager reports for the month of April:—

Meteorological.—Rather warm weather for the period of the year has been experienced, consequently vegetation has not only retained its summer appearance but has continued growing. Though in some respects not desirable, it has resulted in a plenteous food supply in the pastures for the stock during the winter.

The maximum temperature recorded was 88; average, 82·0.

The minimum temperature recorded was 44; average, 53·8.

Rainfall.—194 points, representing five wet days.

Vineyard.—This portion of the farm is assuming an autumnal appearance, some of the vines presenting a fine sight. The warm weather in conjunction with the showers experienced has necessitated keeping the hoe busy.

Orchard.—The oranges and mandarins have not ripened off as quickly as was thought at time of submitting last report, nevertheless, a few will furnish fruit in a sufficiently forward condition for exhibiting at the Roma show next week.

Lemons.—The fruit have made fair growth, but a large percentage are worthless, due to the gumming disease mentioned in last month's issue of the "Queensland Agricultural Journal." Last year practically the whole of the crop was worthless.

Olives.—These trees are making splendid headway, and before next season, if not too costly, a small press for the extraction of oil should be secured. This season, with the exception of 3¾ cases sold, and a few ripe and green gathered for pickling for show purposes, the fruit was wasted.

Cultural Operations.—These have been proceeded with as the weather permitted, about 5 acres of the wheat area to be devoted to experiment work this season remaining to receive its final treatment preparatory to sowing. The peculiarities of this season have necessitated more tillage than has previously been required.

Sowing.—To date, 11½ acres Bunge No. 1, 2½ J. Brown, 2½ Warren, and 5½ of Amby have been sown, and are above ground. The sowing of the 13¼-acre manurial experiment blocks will be completed to-day.

Cow-peas.—Owing to the fact that the ground wherein the crossbred plants are growing is badly infested with the nematode, there is every appearance of some valuable data being forthcoming as to the resistance and susceptibility of the different plants in similar crosses.

General.—Two silage demonstrations were attended to by Mr. Page during the month, and assistance rendered in another instance. A report on this will be furnished when the data as to cost, &c., have been secured. Applications for seed wheat have come forward a little more freely, and, notwithstanding that the season is a little advanced, they are still being received.

Stock.—Live stock of all kinds look exceptionally well, notwithstanding that the flies are very troublesome.

WARREN.

Manager's report for April:—

Weather Conditions.—The month of April proved very dry, only 238 points of rain being registered, this representing three days' fall. This rain only served to stimulate the growth of weeds, and proved of little benefit to the crops. Exceptional heat for this time of the year has been experienced.

Cereals.—The cereal crops have experienced very trying weather, no rain having fallen until twenty-two days after planting. Weeds proved very troublesome, and required much harrowing to keep them in check. As a result of this, much surface moisture has been lost, and the cereal crops have been thinned considerably. Two acres have been sown with seeds specially selected by the Department. These wheats are now growing excellently.

Twenty acres of lucerne have been cut and converted into excellent hay. This was stacked. The lucerne paddocks were cultivated after cutting.

The Orchard.—During the month the orchard was ploughed and cultivated between the trees. Towards the end of the month, the citrus fruits ripened well, and a quantity of fruit has been marketed. The section of the orchard from which the citrus trees were taken has been cultivated and planted with mangolds. These are now in need of rain.

Potatoes.—The potato crop, although not a pronounced success, has done well, and a good yield of potatoes will be the result. Up-to-Date variety has proved the best, each plant bearing excellent tubers. Brownell's Beauty have grown unevenly, and some of the plants have few or no tubers. The Defiance potatoes, imported from England, have set well, and will be reserved for seed. The Carmen potatoes have grown badly, most of the plants running to top.

Maize.—The maize crop will soon be ready for harvesting. Numerous orders for Early Leaming seed maize have been received, showing the popularity of this variety in Central Queensland. The white varieties, although excellently suited for this district, do not seem to be appreciated, the farmers "fighting shy" of them.

The Dairy.—We have now nineteen cows milking. All are milking well and giving good returns, considering the dry weather. Rhodes grass is our great mainstay. All the other grasses present a very dry appearance, but the Rhodes grass is quite green and fresh-looking. The cool, sharp mornings are now forcing us to rug the milkers, and thus prevent a decrease in butter fat. The young stock are all in splendid condition.

Clearing operations have been commenced, gelignite being used to blow up the stumps. We have already disposed of a considerable number of stumps and trees per means of this explosive, the cost of clearing being greatly reduced.

GINDIE.

The Manager reports for the month of April:—

The weather this month has been unseasonably hot, which led us to hope that we would get a good fall of rain, but I regret to say we were disappointed. We had five falls during the month, totalling 131 points. Parts of this district have been much better treated in this respect. The maize, which we hope to put into the silo about the end of next month (May), is looking well.

The greater portion of the month was occupied in assisting at the experiments in connection with the fly trouble, and I trust some definite benefit will be derived from these experiments. We find the flies are troublesome to the farm sheep that are carrying eight months' wool, and we have to give them a great deal of attention. At present it looks as if it will be necessary to crutch twice a year.

FROST PREVENTION.

The time is approaching which brings the most serious danger to the vine for the whole year—*i.e.*, the danger of spring frosts, which destroy in a few hours the young vegetation and coming crop, as happened in October, 1899, all over the Downs. The danger is a very serious one, and well worthy of being provided against, as, if the frost is severe, the destruction is complete; not only has all hope of a crop to be abandoned, but frequently the vine will be mutilated with dead wood to such an extent as to require its complete re-formation. The great frost of October proved very destructive to the vines at the Westbrook Experimental Farm,* many being killed down to the ground, and a larger number having the young wood killed. The result was a copious growth of suckers from below ground, which necessitated much labour to remove them, as others grew as fast as they were taken off, and at least 30 per cent. of the vines had to be re-formed on a sucker, which throws the vine back and destroys the symmetry of the vineyard. Of course no crop was secured, and in all probability the havoc done to the vines at Westbrook was experienced in many other vineyards, so that vignerons would do well to prepare for a possible repetition of such a frost. An illustration is given of the effect of the frost on one or two vines at the Westbrook Farm.

There are two ways of preventing the young shoots from being affected by frost. One is to protect them with mechanical appliances, and the other is to protect them with smoke. The first-named is easier, more certain, but more costly, and consequently can only be considered in cases of small vineyards or a few vines for household purposes. The appliances used are sheeting and matting of various materials stretched over the vines on frames, and they should be placed in position in the evening and removed in the morning when frost is threatening. Another good protector is to heavily mulch the soil beneath the vines with old straw, hay, cornstalks, or similar material; this prevents the radiation of heat from the soil and consequent lowering of the temperature. But these systems entail expense and loss of time in applying them, and, as observed above, can only be used on a small scale.

There remains the system of prevention by smoke, which is almost universally adopted in the larger vineyards in Europe. By interposing a stratum of smoke between the vines and the sky, great radiation of heat from the soil is prevented and the consequent lowering of the temperature to a dangerous point. This sounds easy of attainment, but is not so in fact, for the vigneron has not only to be alert to create his smoke at the right time, but he has also to arrange that the smoke shall not preserve his neighbour's vines while his own are being frosted. Some have an idea that the damage is caused by the subsequent thawing of the frosted vines by the sun, and that if the sun could be kept off the vines the shoots would not be injured. This view is quite erroneous. The freezing of the cells in the green parts of a plant causes them to

* Westbrook is no longer a State Farm under the Department of Agriculture and Stock.—Ed.

expand and burst. From that moment the affected part is dead, and, sun or no sun, will never come to life again. If, therefore, the experi-

PLATE 56.—EFFECT OF THE FROST OF OCTOBER, 1899, ON THE VINES AT WESTBROOK STATE FARM.

ment of shading frosted vines from the sun has succeeded, it was due to the simple fact that the cells had not been killed.

Now with regard to the time to apply the remedy. It is generally recognised that about daybreak is the most dangerous period for the vines, although very frequently the damage has been done earlier. From 3 a.m. to sunrise may be looked upon as the critical period. It is obvious that, unless there is command of an unlimited supply of fuel, the fires must be lighted before the above-mentioned time, and there the difficulty comes in, as few have the steadfastness to get up at that hour in cold frosty weather every time danger is threatening. It is done once or twice, but generally given up on the very night supervision is most needed. Even if a large supply of fuel is obtainable and the fires be lighted early, the vigneron must be up and on the watch, as, should the wind change a few points during the night, the neighbour gets the benefit of the smoke, and the protected vines are frosted. It therefore comes to this: That if the vineyard is to be insured against damage, the vigneron must, on those nights when frost is threatening, be on the alert all night or set an alarum to the early hours and get up.

Next comes the choice of materials. What is required is something that will make a good cloud of smoke, and yet burn slowly. Such materials as tar-barrels, &c., make plenty of smoke, but burn too quickly, and would be likely to pass out just at the time they were most required unless a large supply were at hand. The material which has given most satisfaction is damp straw, half-dried weeds, &c., heaped upon a foundation of burning logs or brushwood. It makes a big smoke, burns slowly, and is very inexpensive. All the litter of straw stacks, the harrowings of cultivation paddocks, corn stems, and similar rubbish will come in admirably for the purpose, and be the better for being got rid of. The materials, if dry, should be well damped and laid in heaps on the headlands round the vineyard, not too close together,—a few chains apart will be sufficient if the heaps are of fair size. If the bush is alongside the vineyard some fires could be kept going permanently for the fortnight the danger threatens, but, of course, they would only be of use when the breeze is from that quarter, and must not be relied on.

Damp sawdust mixed with sufficient tar to slightly coat all the material will create a dense smoke, but this not nearly so efficacious as the damp weeds and other rubbish recommended by Mr. E. H. Rainford in this article. It is necessary to have heaps in readiness all round the plot to be protected, as the wind may change, and blow all the smoke on to the neighbouring farm, leaving the to-be-protected crops at the mercy of the frost. But by having heaps ready for such an event this difficulty can be overcome. But, as Mr. Rainford says, the farmer must be on the alert from 3 a.m. to sunrise. The smoke production is, of course, suitable for bananas and other tall-growing crops such as sugar-cane, as well as for vines. Pineapples may be protected by a covering of grass or hay.

The Orchard.

FRUITS SUITABLE FOR THE HIGHLANDS OF QUEENSLAND.

By CHARLES ROSS, F.R.H.S., Instructor in Fruit Culture.

As I am in receipt of a considerable volume of correspondence, embracing the far North to the Southern border, relative to varieties of fruit suitable to the various districts, I offer a few notes, comparisons, and selections which may assist prospective planters as to what and where to plant.

The altitude of the Southern tableland at Stanthorpe is 2,656 ft., and where the widest range of pomaceous and stone fruits succeed. The climate, however, is too severe for citrus and other evergreens as well as deciduous trees like persimmons, but certain oranges, if grafted to the trifoliata stock, would resist many degrees of frost, and in favoured spots may be grown with success for local use.

The altitude of the tropical tableland at Herberton and Tumoulin is higher, so also is the mean temperature higher by about 10 degrees than Stanthorpe; consequently a more limited selection of deciduous fruits is adapted. Other parts of the plateau at Kairi, Malanda, &c., being lower than Stanthorpe and warmer than Herberton, the selection is still further restricted. There are, however, many subtropical fruits that may be substituted.

Deciduous fruits, as a rule, are not recommended to be extensively planted in the far North at a lower altitude than that of Herberton, and in no case where citrus culture is to become the main source of income.

The following is a list of some deciduous fruits best adapted to the Northern tableland and kindred districts, viz.:—

Apples.—Astrachan, Red June, Hoary Morning, Irish Peach, Peasgood Nonsuch, Ben Davis, Fall Pippin, Rome Beauty, Greening, Carrvade.

Pears.—Keiffer's Hybrid, China, Stone, Vicar of Winkfield. These are not of high quality. The best dessert varieties are not suitable.

Apricots.—Royal, Moorpark (about Evelyn and Tumoulin only).

Figs.—Blue Provence, White Adriatic, Castle Kennedy, Brown Turkey.

Grapes.—Black Hambro, Syrian, Doradillo, Royal Ascot, Gordo Blanco, Concord, Dr. Hindley, Goethe, Iona, Wilder.

Peaches.—I am not keen on recommending peaches, they being so subject to fruit-fly, it is next to impossible to keep an orchard free in such a climate, but if people will plant, I advise the very earliest, viz.:—Sneed, Flat China, Downing, Edward VII., High's Early Canada, Early Newington.

Plums.—Wright's Early, First, Wickson, October Purple. The "Wild Goose" is also a useful plum where other varieties do not bear well, but should always be worked upon peach stocks.

Oranges.—For fairly strong volcanic loams: Navel, Jaffa, Joppr, Sabina, Homossasa, Valencia Late.

Oranges.—For lighter loams of granite, limestone or sandstone origin: Jaffa, Mediterranean Sweet, Parramatta, Queen, Siletta Valencia.

Mandarins.—Emperor (Canton) is the best for the North, but Beauty of Glen Retreat and Ellandale Beauty may be included.

Pomelos.—This much-neglected fruit is likely to become popular in a very few years. The seedless types of Cochin China and Siam are said to be excellent, but not so full-flavoured as some of the Floridian and Californian varieties. See Mr. Howard Newport's interesting pamphlet on this subject.

Lemons of fairly good keeping quality should also be grown at some distance inland. Limes and citrons will do better on the seaboard.

Persimmons.—Tanenashi, Haychi Ya, Nightingale's Seedless.

The following fruits are worthy of trial most of which will do well on some parts of the tableland, although all may not be profitable lines to grow, viz.:—Passion fruit and Pecan Nut (at Evelyn), Papaws, Tree Tomato, Olives, Avocad, &c.

A considerable number of the above varieties may be successfully cultivated in the Charters Towers region if irrigation could be applied. The remarks on citraceous fruits apply to the districts of the State generally.

A paper dealing with fruit specially adapted to the seaboard of Queensland will be published in a future issue.

GIRDLING FRUIT TREES WITH A ZINC BAND.

In the January and February issues of the Journal, we published some notes on cincturing fruit trees and grape vines, by Mr. C. Ross, Instructor in Fruit Culture, and cited some experiments made at Renmark, by the manager, Mr. C. H. Katekar, in the use of a wire girdle as preferable to cincturing (ringing). In a most valuable publication ("Second Progress Report on Bitter Pit Investigation") by D. McAlpine, 1912-1913, we find the following remarks on "Girdling with Zinc Band":—

"Ringing and wiring are not being recommended as matters of horticultural practice, but they have simply been employed to test the effect on Bitter Pit of restricting the flow of sap. Although no definite results have hitherto been obtained, yet they are sufficiently encouraging to cause a continuance of the experiments, and if the same results can be attained without the risks and troubles attendant upon the ordinary practice, then it may come within the range of the ordinary operations of the orchard. It is a common practice with the orchardist to surround the stem of his apple trees with a zinc band for the purpose of preventing the root-borer beetle from ascending the tree to lay its eggs, and if a slight modification of this is used, constricted in the middle by means of wire, then the same effects are produced as in ringing without any wounding of the tree, and it may be moved or replaced as desired."

This method of girdling for fruit is strongly recommended by Poenicke on account of the good results obtained by adopting it. The "fruit-girdle," as he calls it, consists of a thin zinc band fastened tightly round the trunk of the tree, or, in strong-growing trees, around the principal branches. It is notched along its upper and lower margins, and the corresponding tooth-like projections gradually bend outwards in a sloping direction as the stem or branches increase in diameter. In this way the swellings of the cortex are allowed to expand without enveloping the fruit-girdle by its exuberant growth.

This is a very simple arrangement, and its chief advantage is said to lie in the products of assimilation being accumulated and stored up in the formative sap in the most perfect manner conceivable. It regulates the composition of the sap, and thereby enables the formation of wood and fruit to proceed in their proper proportions. It is said not only to improve the yield and quality of the fruit, but even to hasten the ripening in many of the early sorts. How far all these advantages favour or hinder the development of Bitter Pit remains to be seen. The relation between wood-growth and fruit-growth is no doubt an important one, and if there is a nice even growth in the apple, and the tree itself not making too much wood, the conditions are favourable for the production of healthy fruit; but, if the tree is making too much wood, and not supplying sufficient nourishment for the fruit, the physiological balance is disturbed. If the sap is controlled so that the fruit is regularly and properly nourished, there is little danger of Bitter Pit making its appearance.

The fruit-girdle can be removed when necessary, but it was found that it could be left in the same position for two or three years without injury to the tree.

Poenike sums up as follows, after having given the system a trial for a number of years:—" The fruit-girdle represents an extremely simple and perfectly reliable expedient, based upon the most recent scientific investigations. It simplifies the cultural methods in the orchard exceedingly, while it increases the yield and makes it far less dependent upon special knowledge and accidents. At a trifling cost, the fruit-girdle allows of a remarkable saving in current expenses.

" It is simply a means of constricting the stem or branch without running the risk of wounding them, in trees which have reached the fruit-bearing stage. In vigorous trees there is a surplusage of wood-growth that has to be removed by much labour at pruning time. If the fruit-girdle can be used to lessen this surplusage, without unduly impairing the vigour of the tree, and at the same time promoting fruitfulness, it may turn out to be a valuable device."

UTILISATION OF POOR SOILS.

At the late Chinchilla A. and P. Association Show in April last, some very splendid oranges were exhibited by Mrs. McSweeney, of Baking Board. They were grown on what Mr. J. Smith, Inspector of the A.J.S. Bank, describes as the "poorest soil in Queensland." Yet here Mrs. McSweeney has over 100 citrus trees in bearing, and, as Mr. Smith says, they beat the coastal fruit for flavour. These trees must have become immune to frosts, which are severe on the Downs, as the trees bear heavily, grow to a large size, and are of excellent flavour. Having seen most of the up-to-date orangeries on the coast, both on the Blackall

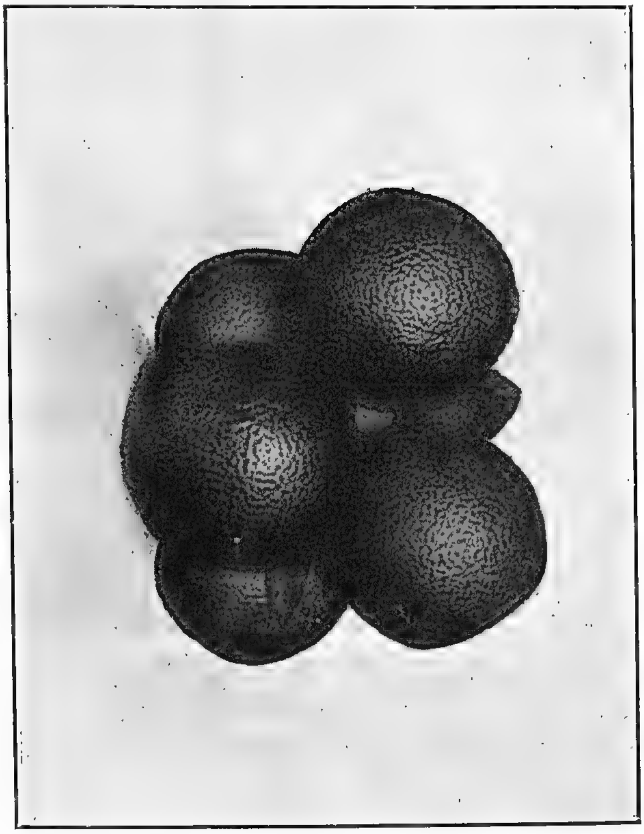


PLATE 57.—CLUSTER OF ORANGES GROWN AT BAKING BOARD.

Range and at Buderim Mountains, our informant says that this orangery in the wretched Baking Board soil beats them hollow. It is said that a good gardener can produce splendid crops on a bed of flagstones, and the results obtained on this orangery go to show what can be done by careful selection of trees, a knowledge of how to treat them, and constant care and attention under all circumstances. We have received a photograph of a cluster of five of these oranges on one stem, which formed part of Mrs. McSweeney's exhibit at the show. We shall probably hear more of this orangery when the Inspector in Fruit Culture, Mr. Ross, makes his next visit to that part of the country.

BANANA MANURING EXPERIMENTS AT BUDERIM MOUNTAIN STATE SCHOOL.

By the courtesy of Mr. J. D. Story, Under Secretary, Department of Public Instruction, we have received the accompanying report by Mr. R. G. Bartlett, Head Teacher of the State School at Buderim Mountain, Woombye, on the results of the work of his pupils in the cultivation of bananas. The instruction given them during their school days is of great value, and the results show what can be done in our country schools under intelligent and enthusiastic guidance.

RETURN OF RESULTS FROM 1ST MARCH, 1912, TO 28TH FEBRUARY, 1914.*

—		No. Manure.	Incomplete Manure.	Complete No. 1.	Manure No. 2.
No. of stools ...		7	7	7	22
No. of bunches		15	16	20	53
No. of dozen ...		206	242	303	819
Average per bunch ...		13·7	15·1	15·2	15·4
Average per stool		29·4	34·5	43·2	37·2
Value at 3d. per dozen	per stool	7s. 4d.	8s. 7½d.	10s. 9½d.	9s. 3½d.
	per acre†	£123 6s. 8d.	£150 18s. 9d.	£188 17s. 1d.	£162 12s. 1d.
Cost of manure	per stool	...	6½d.	8½d.	1s. 4d.
	per acre	.	£9 8s. 6d.	£12 6s. 6d.	£23 4s.
Increase due to manure	per stool	...	1s. 3½d.	3s. 5½d.	1s. 11½d.
	per acre	...	£27 12s. 1d.	£65 10s. 5d.	£39 5s. 5d.
Gain after paying for manure	per stool	...	9d.	2s. 9d.	7½d.
	per acre	...	£18 3s. 7d.	£53 3s. 11d.	£16 1s 5d.

* The bananas were planted in September, 1911, and have been in full bearing for the twelve months under review. † Count 350 stools per acre.

MANURES.

Incomplete. { 2 lb. dried blood. 1¼ lb. superphosphate.

Complete No. 1. { 2 lb. dried blood. 1¼ lb. superphosphate. 1 lb. sulphate of potash.

Complete No. 2. { 2 lb. nitrate of lime. 2 lb. sulphate of potash. 4 lb. superphosphate.

These quantities are supplied to stools every six months.

TREATMENT OF POTATOES FOR IRISH BLIGHT.

In England, in the preventive treatment of potatoes for Irish blight, the dry spraying or dusting of a specially prepared Bordeaux mixture, in the form of a very dry powder on to the potato haulms, has recently received a good deal of attention. Great saving in labour is accomplished in this way, and there is little fear of the under side of the leaves not being covered with the powder. The machine generally used costs about £30, but for experimental purposes the small hand-worked sulphur blower will serve. The best time to dry-spray potatoes is on a calm evening, for the least wind will carry the powder a long distance.

Viticulture.

CULTIVATION AND PRUNING OF THE GRAPE VINE.

In response to a request from Mr. Allan E. Moore, Marlborough, for information as to pruning grape vines, and on their culture generally, the Department, in the absence of Mr. C. Ross, Instructor in Fruit Culture, requested Mr. R. E. Soutter, manager of the State Farm, Bungeworgorai, who has had much experience in grape culture, to furnish a full reply to Mr. Moore's question, to the following effect:—

" The vine will, being a very hardy plant, grow in almost all kinds of soil. The most suitable, however, is a porous, easily worked loam, deep and well drained, subsoil sufficiently retentive to hold moisture to carry plants over a dry spell.

" In districts of heavy rainfall (torrential rains) and dry districts, too much slope is not advisable, as in one the soil is liable to wash and in the other too much exposure and drainage is present; therefore, a level or slightly undulating site is better.

" The preparation of the land should be begun in autumn, and the ground should be thoroughly stirred to a depth of 16 in. or 18 in., according to locality and quality of soil. Where gravelly subsoil is closer than this to the surface this depth is not necessary. The depth advocated can be reached by ploughing to a depth of 8 in. or 9 in. and then stirring up the bottom of the furrow another 8 in. or 9 in. with a subsoiler or plough with mouldboard removed following immediately.

"After this the weeds should be harrowed off and the ground permitted to lie during the winter, sufficient working being given to prevent crusting and growth of weeds. Cross plough in the spring and harrow, and, if necessary, cultivate or roll to bring the soil to the desired tilth.

The soil having been thoroughly prepared, the next thing to be done is to lay out the vineyard. This should be done with a view to overcome disadvantages of the site, to mitigate as far as possible the damage resultant from hail, and to facilitate working. If a level site or slightly undulating one, as previously recommended, this will present little difficulty.

" If on a slope, the vineyard should be laid out across the slope, the longer the rows being the less turning for the teams, making working less costly. Should hailstorms come from south-west then the rows should run north-east to south-west. In setting out the vines, the distances apart are governed by the climate and method of growing adopted. For a dry district, 8 ft. by 8 ft. if grown on stakes, and 8 ft. by between 8 ft. and 6 ft. in the rows if trellised—this will give, allowing space for roads, 650 vines per acre; 7 ft. by 7 ft. for staked and 7 ft. by 6 ft. for trellised vines in medium dry districts; whilst for the moister districts, 6 ft. by 6 ft. is sufficient.

"The planting in square is recommended as, if on the bush system, vines can be worked two ways leaving very little to be done by hand.

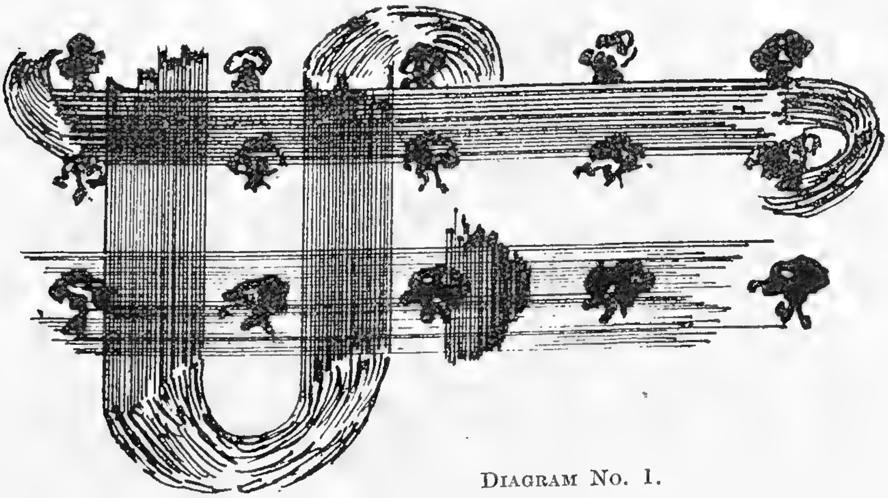


DIAGRAM No. 1.

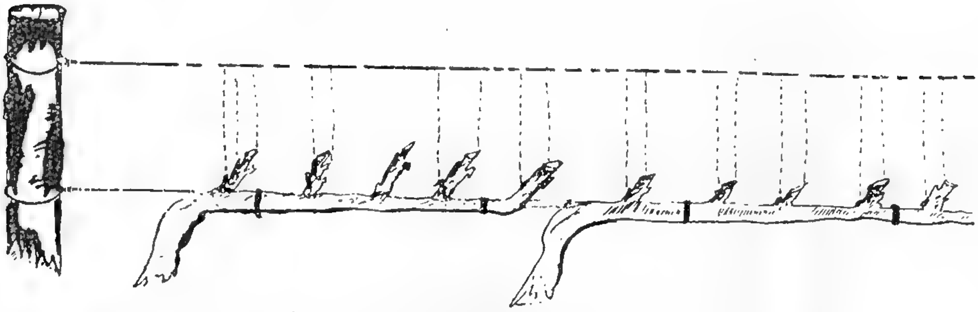
"If narrow rows are planted, it will be necessary to have roadways throughout the vineyard for removal of produce, prunings, &c.

"The most economical way to stock a vineyard is by using cuttings, though not so reliable as the putting in of rooted plants. The cuttings, which should be about 15 in. long, should be put in the ground slightly slanting, leaving only one eye exposed, the ground be well firmed round the cutting to within one-third of the top. Following the setting out, it will be necessary to keep weeds down and keep surface of the soil loose to prevent evaporation. Tie up young shoots as they reach a sufficient length to stakes to prevent being broken off by wind, &c. Prune low the first winter and late as possible.

Winter Pruning.—No fixed time can be stated as when to prune, though June and early in July is preferred by most. In warm districts it should be early, and in places where late frosts are likely to occur it should be delayed as long as possible. The methods in vogue are many, and are adopted according to variety (see pamphlets), climatical conditions, and mode of growing.

DIAGRAM No. 2.

DIAGRAM No. 3.



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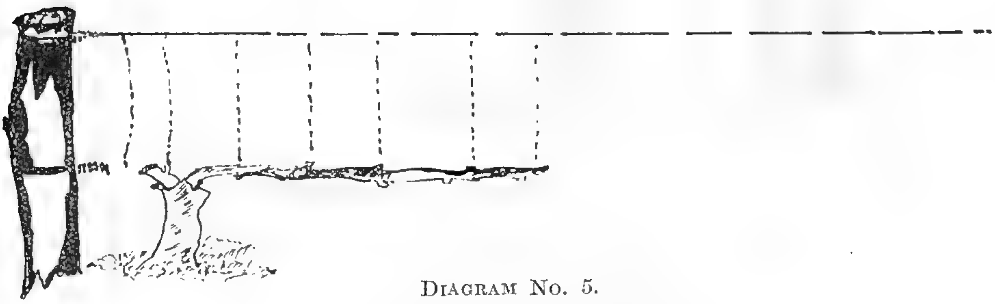


DIAGRAM No. 5.

"These are a few of the recognised best methods for Queensland culture.

"*Summer Pruning.*—Suckering and disbudding: Suckers are those shoots which spring from the old wood and are generally unfruitful. These can be rubbed off with the hand, which operation should be done as soon as possible after they appear.

"Disbudding consists in the removal of shoots on the one-year-old wood not showing fruit, or thinning out.

"Topping, which consists in the removal of the end of the shoot, is recommended by some authorities, but is not absolutely necessary under Queensland conditions.

"*Tying.*—This should be done when buds are swelling; the canes are then more pliant, consequently are not so liable to crack. Material for tying; strands from potato bags, old binder twine, rushes, New Zealand flax, &c., are all suitable. Binder twine or similar material, which is inclined to cut into the vines as they grow, will in all probability have to be cut during the summer.

"*Cultivation.*—Summer: Consists in keeping the surface stirred and the vineyard free of weeds. Winter: Ploughing 4 in. to 6 in. deep should be carried out as soon as the pruning is finished, throwing away from the vines. This destroys any surface roots, which are not advantageous, more especially in dry climates, and sweetens the soil.

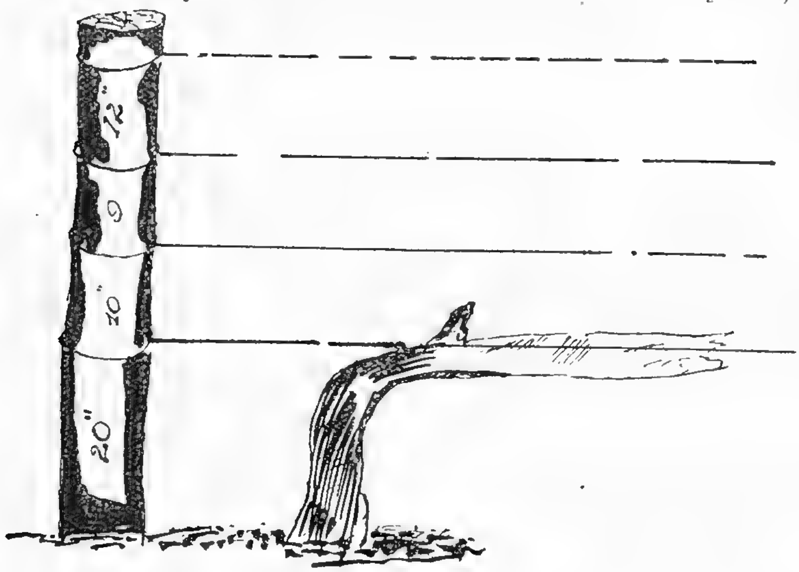


DIAGRAM NO. 6.

"Any detail information will be gladly furnished if required.

RECLAIMED RUBBER.

In "Grenier's Rubber News," light is thrown upon the amount of reclaimed rubber annually used by manufacturers, the estimates varying, as a rule, between 100,000 and 250,000 tons per annum, although much larger figures have occasionally been mentioned.

"After corresponding with the leading British and foreign reclaiming firms, Mr. Maclaren judges that the total of the actual scrapped rubber annually collected has amounted in recent years to approximately 280,000 tons, from which about 140,000 tons of reclaimed rubber compounds are annually produced. Of these compounds, however, the actual rubber content does not exceed 40 per cent., so that the amount of new rubber displaced by the reclaimed article cannot well exceed 56,000 tons per annum.

"There is one important point about the position which deserves more notice than it has received. The reclaiming industry is not a new one, but the strides it made in 1910 and 1911 were enormous. It was in these years that the consumption of reclaimed rubber rose from a comparatively small figure to over 50,000 tons per annum. If to the generally accepted figures of rubber consumption in recent years we add the vast increase in the use of reclaimed compounds, we shall find that the world's demand for rubber has progressed at a very much bigger rate than is commonly imagined. Instead of an annual increase of 10 per cent., it is probable that the total quantity used by manufacturers has risen by a figure nearer 20 per cent. As the reclaiming industry is declining almost as rapidly as it formerly rose, it would seem to follow that the field thus left open to plantation rubber is almost as large as that created by the disappearance of supplies of the wild article."

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING APRIL, 1913 AND 1914, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	April.	No. of Years' Records.	April, 1914.	April, 1913.
North Coast.	In.		In.	In.
Atherton	4·94	11	3·01	1·79
Cairns	13·85	25	11·53	6·82
Cardwell	9·58	25	7·04	5·47
Cooktown	9·39	25	13·29	6·94
Herberton	4·78	25	3·54	3·59
Ingham	8·87	20	8·38	8·33
Innisfail	22·63	25	22·29	11·11
Mossman	16·78	5	13·01	5·46
Townsville	3·22	23	4·89	7·75
Central Coast.				
Ayr	2·78	25	4·86	6·63
Bowen	2·74	25	3·18	6·98
Charters Towers ...	2·53	25	2·64	3·44
Mackay	6·46	25	4·98	5·94
Proserpine	6·78	10	4·65	8·70
St. Lawrence ...	3·04	25	1·48	1·41
South Coast.				
Crohamhurst ...	4·92	20	0·53	14·87
Biggenden	1·73	14	2·00	1·73
Bundaberg	3·10	25	2·55	5·01
Brisbane	3·64	63	0·42	6·35
Childers	2·65	17	0·87	3·24
Esk	2·77	25	1·85	2·03
Gayndah	1·57	25	1·48	0·14
Gympie	3·17	25	2·20	6·42
Glasshouse M'tains	...	...	0·79	..
Kilkivan	2·06	25	0·85	1·67
Maryborough ...	3·41	25	2·00	5·98
South Coast—continued:	In.		In.	In.
Nanango	2·07	25	0·94	1·39
Rockhampton ...	2·54	25	0·88	1·35
Woodford	3·93	25	0·51	11·26
Yandina	4·16	19	3·31	15·69
Darling Downs.				
Dalby	1·68	22	0·86	0·32
Emu Vale	1·21	17	1·08	0·74
Jimbour	1·48	24	0·33	0·20
Miles	1·55	25	2·65	0·80
Stanthorpe ...	1·62	22	2·88	0·84
Toowoomba ...	2·73	22	2·44	1·78
Warwick	1·47	22	1·94	0·29
Maranoa.				
Roma	1·23	21	1·88	1·61
State Farms, &c.				
Gatton College ...	1·84	14	1·53	0·63
Gindie	1·42	13	1·21	1·19
Kamerunga Nurs'y	13·03	23	9·06	...
Kairi	...	...	3·65	...
Sugar Experiment Station, Mackay	5·07	16	5·67	...
Bungeworgorai ...	...	...	1·74	1·66
Warren	...	...	2·38	...
Hermitage ...	1·32	7	2·03	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for April this year and for the same period of 1913, having been compiled from telegraphic reports, are subject to revision.

Tropical Industries.

NOTES ON DATE-GROWING.

HAND POLLINATION, ITS ADVANTAGES, POLLEN STORING FOR VERY EARLY FLOWERS OF FEMALE TREES IN THE ENSUING YEAR, ETC.

[CONCLUDED.]

Date when the Trees come into Flower.—In some other parts of the world it has been found that date palms usually come into flower while the mean temperatures are between 60° F. and 77° F. . . . . The time of flowering of a date tree varies with the variety as well as with the climate, however, and it is probably also influenced more or less by the water supply, &c. [Instances are here given of date trees flowering at widely separated intervals during the year.—Ed. "Q.A.J."]

One date tree of either sex will produce from five to thirty clusters in one season, and a month may elapse between the times that its first and its last flower cluster is ready for fertilisation.

Method of Artificial Pollination.—Pollination is the conveying of pollen grains from the pollen sac of the stamen to the stigma or receptive point on the carpel. In good date-growing countries this operation is performed by the cultivator. It is usually done in the following way:—The male flower cluster with its enclosing spathe is cut from the tree, generally immediately before the spathe splits open. The stage at which the spathe is ready to split open may be known by comparing the spathes that are just splitting with those that have not yet reached that stage. It will be seen that when ready to split, the spathe will have assumed a brown colour, a soft texture and other characters by which the splitting stage is fairly easily known. By removing the spathe then it will be seen that the waxy scales are closed over and protecting the stamens of the flowers, and if these scales are lifted, it will be seen that the pollen sacs have not yet burst. If on removing the spathe, the flower cluster is exposed to the sun, it will be found that within a few hours the waxy scales of the flowers have opened out and that the pollen sacs have burst and are shedding their pollen. Sometimes the male flower cluster is cut from the tree just after the spathe opens, but in this case there is a chance that many of the pollen sacs may have opened and that much of the pollen dust may be shaken out and lost while removing the flower cluster from the tree and carrying it to the female trees. If the flower cluster is removed just before the spathe opens, the pollen will not be lost in carrying it about. The spathe must be very near the bursting stage before the male flower cluster is cut from the tree however, as otherwise the pollen grains will not be mature enough to fertilise the ovules of the female. Having obtained a male flower cluster in the proper stage of development, a female flower cluster is next found which is just appearing between the parts of its bursting spathe (*see* photo. No. 3 and photo. Nos. 5 and 6), and one or two small branches are broken from the male flower cluster and are inserted among the small branches of the female cluster. In due time the male flowers open, the pollen sacs burst and the pollen is carried by wind or insects to the stigmas of the carpels of the flowers in the female cluster. In most cases the Arabs place only one branch of the male flower cluster among the branches of

PLATE 58 (Photo. 6).
Arabian Date Palm, planted at Multan Central Gaol, September, 1910, being hand-pollinated in March, 1912.

the female cluster and then loosely bind the branches of the female cluster around the inserted male branch; the binding being done by a strip of palm leaf or string and in such a way that it will become undone by the time the fruit begins to develop. In Sind two small branches of the male flower cluster are said to be usually inserted in the female flower cluster and no tie is used.

Number of males required per 100 *females.*—As the number of flower clusters on both male and female trees are about equal and there are 100 or more branches in a male inflorescence, one male tree will suffice to fertilise 100 female trees approximately where one male branch is used to a female flower cluster, and will suffice for fifty trees approximately where two male branches are used. It is evident, therefore, that if the male trees produce a fair number of flower clusters, two male date trees ought to suffice to pollinate 100 female trees. It is safer, however, to have three male trees to every 100 females.

Hand Pollination demands Regular Attention at the Flowering Season.—It is essential that pollination is done as soon as the female spathe bursts, as within a very short time the stigmas of the carpels become withered and unreceptive. For this reason the plantations of good date cultivators are carefully and frequently inspected during the flowering season and every flower cluster is fertilised as it becomes ready. As hand pollination is being introduced into the Punjab, I may here emphasise that unless careful and regular attention can be given to the pollination of the female flower clusters in the flowering season, good results will not be got where only 3 per cent. of the trees are males and no wild males are growing near. Pollination is a very simple process, however, consisting merely of thrusting a branch of a male flower cluster into a female cluster, and probably two visits per week during the flowering season would be sufficient to ensure getting the flowers in the proper stage of development for pollination.

Preservation of Pollen.—Pollen may be kept for at least one year with safety if it is stored in a dry place. For storage purposes the flower cluster is frequently not removed from its spathe, and if it is removed from its spathe, it is usually stored in a paper bag. Where male trees are late in coming to flower and females are early, it is advisable to store a few male flower clusters, which contain ripe pollen, so that pollen may be at hand when the early females come into flower in the following season.

Selection of Male Trees.—Some male trees produce more pollen and some come earlier into flower than others. In propagating male trees, to be used to pollinate female trees whose fruits are to be sold for consumption, off-shoots should be taken from trees which produce much pollen and which come into flower at or a little before the time that the females are in flower. If new varieties of dates are to be bred, male trees should be used which have been reared from seeds got from good varieties of trees and which have had good male and female ancestors.

Characters of Male Trees do not Influence the Fruit formed as the Immediate Result of Pollination.—It is most convenient if males can be propagated, which come into flower in succession throughout the female flowering season. If the trees produce a plentiful supply of pollen in the proper season, other qualities of the male tree selected are mostly unimportant if rearing of date trees from seedlings is not undertaken, as the characters of the male are not transmitted to the fruit formed as the immediate result of a pollination. If the seeds of those fruits are sown, however, the plants produced will probably show some of the characters of the male used.

Percentage of Males required for Natural Pollination.—Where pollination is done by natural agencies—*i.e.*, where the pollen is carried from the pollen sacs on the male tree to the carpels on the female by wind, insects, and other agencies not controlled by the farmer—about 50 per cent. of the date plantation should be male trees, and these should be well mixed with the female trees to obtain the best results. Cases are on record in which pollen is believed to have been carried many miles by natural agencies, and female date trees fertilised by it, but where the distances between the male and female trees are great, good results could only be expected when the winds are in a favourable direction, the air not too humid, &c., &c., at flowering time.

Advantages of Artificial Pollination.—(1) Fertilisation will be more certain. (2) Forty-seven per cent. of the trees on a plantation which are males and bear no fruit, can be replaced by good fruit-bearing females, and, therefore, practically double the crop of fruits can be got from a given area of land with the same water supply, and the only difference in labour being the pollination of the trees, and the collection and disposal of the extra fruits.

FRUIT DEVELOPING AND RIPENING PERIODS AND FRUIT PRESERVATION.

Falling of two of the three Fruits from a Female Flower.—When date flowers are pollinated, all three carpels in the female flower are usually fertilised and begin to develop (*see* sketch C). When the fruits get to about the size of peas, two of the three fruits fall off, and one date fruit only is left to ripen in each flower (*see* sketch D, and photo. 7). . .

Seedless Dates, and their relation to Pollination.—If these dates begin to develop without being fertilised, all three dates may remain on the flower, but they will be seedless and generally of poor quality. When a large number of seedless dates are found, it may usually be concluded that fertilisation has been defective, as the absence of the seed in a date is, in most cases, due to the ovule not being fertilised. In such cases, if hand pollination has been employed, the method of performing it, the stages of development of both the male and female flowers, the rainfall, &c., at the time of pollination, should all be carefully looked into. If the trees were pollinated by natural agencies, the number of male trees around, their distances from the female plant examined, the direction of the winds, the rainfall at the flowering period, &c., should all be carefully considered. . . . .

Reducing the number of Bunches of Fruit to ten or twelve per Tree.—After the fruits have become sufficiently developed to show what sort of bunches may be expected, about ten or twelve of the best bunches should be selected to remain on the tree, and the remainder should all be cut down. If the bunches are poor, a greater number are left on the tree.

Too many Fruits on a Date Tree.—If more fruits are left than the tree can develop properly, a large number shrivel without coming to proper maturity. . . . . With those people who do not understand date culture properly, there is always a tendency to avoid reducing the number of date bunches where necessary, but there is no more advantage in leaving too many bunches of fruits on a date tree than there is in leaving too many maize plants in a maize field.

Moist Atmosphere at ripening Time.—As has been stated already, fruits are very apt to fall off the trees before they are ripe if the atmosphere at the ripening period is too moist. In localities in which the

PLATE 59 (Photo 7).

A Bunch of Date Fruits in which only one carpel has been fertilised. The fruit produced by the fertilised carpel is large, well developed, and contains a seed. The remaining carpels have developed into seedless fruits. The fruit from the fertilised carpel can be distinguished near the centre of the bunch by its much greater size. Normally after fertilisation two of the three carpels in each female flower fall to the ground when the fruits are about the size of a pea, but in most flowers in this bunch all three carpels have developed into seedless fruits.

climate is usually dry enough for the date fruits to ripen properly, rains at the ripening period may do very great damage to the crop by fermenting the fruits.

Ripening of Fruits.—Ripe dates are usually had in Multan and Muzaffargarh by the 20th July, and the harvest is usually over by the 15th September. All the dates on a cluster do not ripen simultaneously. If a variety is a fairly good one, the people in these districts usually pick the dates off the cluster as soon as their ends show a small ripened spot. The ripening is then completed by spreading the fruits on mats in the sun. Dates are rarely completely ripened on the trees in the Punjab. Dates which have their skins broken, or which are in a bad condition, should be carefully removed from the cluster when ripening. If these are not removed, the whole cluster becomes tainted. If the variety is not very good, the cluster is cut from the tree when about 50 per cent. of the fruits on it are ready, and the fruits are then spread in the sun. Any fruits which do not ripen while spread are fed to goats, &c.

Protection of Fruits from Enemies.—The chief enemies complained of are human thieves, parrots, and other birds, wasps, and monkeys in some parts of the Province. A chaukidar (watchman) usually looks after the trees from the time the fruits have developed sufficiently to attract enemies until they are harvested. The following is recorded in the "Multan Gazetteer," 1901-02, regarding the watchman:—"He receives about Rs. 4 per month and a small number of dates, and he attends, taking one month and one locality with another, some 300 trees." He sees that no human thieves steal the fruits, and he keeps off birds by shouting, slinging stones, &c., &c. To help to scare away birds he frequently hangs bells and other contrivances for making a noise on the trees, and shakes these occasionally by means of strings. In date-growing countries the bunches of fruits are often encased in rough baskets made of palm leaves to prevent birds getting at the fruits. The basket should be made as open as is consistent with its purpose, as it prevents a good deal of sunlight getting at the cluster of fruits, and probably retards ripening. Another method is to hang a number of small branches of some very thorny plant round each cluster of fruits. This is very effective in preventing birds getting at them, and is more open than the basket usually is. A good thick layer of thorns round a fruit cluster would probably also give monkeys some trouble in getting at them. Rings of thorns round the stems of the trees where the trees are not too close together might also hinder monkeys from getting at the fruits. Fortunately, however, there are no complaints of depredations from monkeys in the areas of the Punjab which seem best suited for date-growing. To prevent depredation by wasps, &c., the fruit clusters might be enclosed in coarse muslin bags (*see* photo. No. 8).

Preservation of Dates.—The methods of preserving dates, together with some other points connected with date culture, will be dealt with more fully in a future paper. Only a few remarks will therefore be made here. Most varieties of dates only keep fresh for a few days after being plucked from the trees when ripe, unless they are partly dried or otherwise preserved.

The varieties of dates differ very much in the length of time they keep fresh without being preserved, however. Preservation of dates by drying depends upon the fact that bacteria concerned in the fermentation cannot live and perform their work in a sugary solution above a certain concentration. Therefore, the juice of those dates that keep longest fresh is usually less watery than those that go rancid sooner. The preservation by drying is usually done by spreading the fruits thinly on

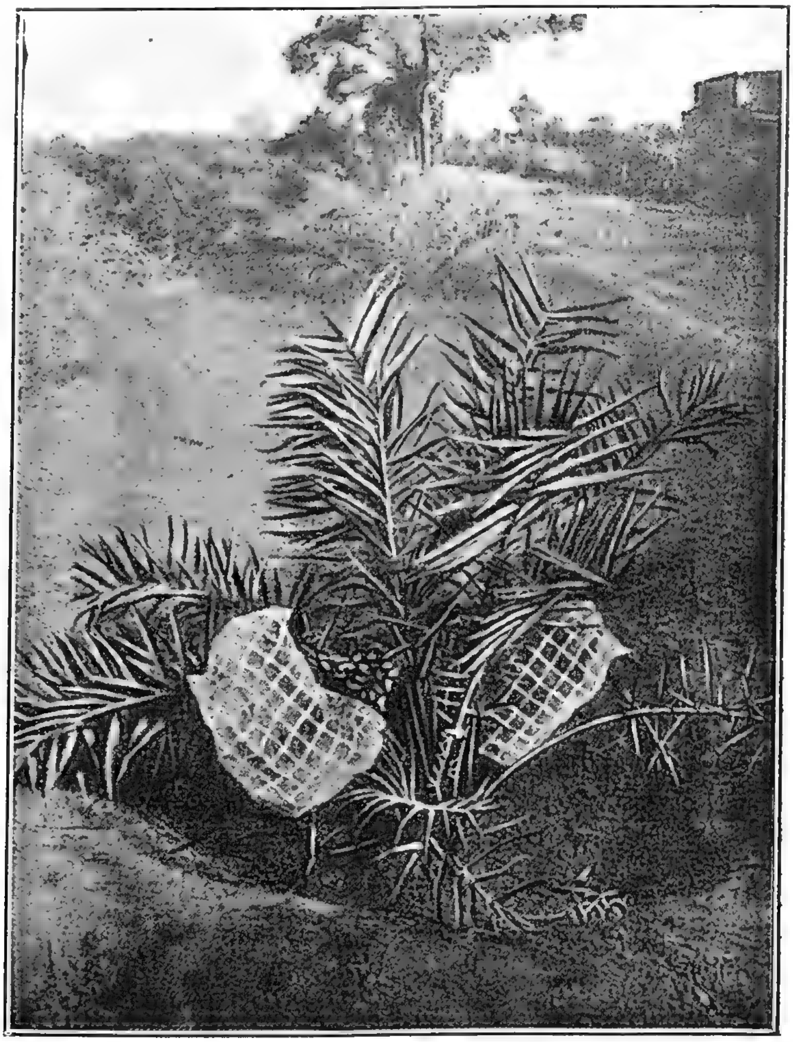


PLATE 60 (Photo. 8).

Arabian Date Palm, planted at Lyallpur, September, 1910, bearing first crop of fruits, July 1912. Two of the three bunches of fruits on the tree are protected by special net bags from the attacks of birds, wasps, &c.

a mat in the sun. The object to aim at is to dry off just as much of the water from the fruit as will leave thejuice as concentrated as will preserve the fruit for the length of time required. More water than this is not dried off as weight is lost, the fruits have a less plump and attractive appearance, and the flavour is impaired. Different varieties of fruit will require to be exposed to the sun for different lengths of time to bring them to the necessary stage of dryness; and if the sky is cloudy or the atmosphere is more or less humid, the length of time of exposure required to dry a particular variety sufficiently will also vary. In Muzaffargarh in good weather some varieties require to be spread in the sun about one week in order to reduce them to the proper stage of dryness; others require only three or four days. Date cultivators very soon get to know approximately how long a particular variety of date fruit will require to be exposed to dry it to the proper stage, and they become very accurate in their estimations of how dry the fruits must be in order to preserve them sufficiently for their purposes. All decaying fruits must be carefully removed from the others during drying, as they taint the whole lot if not removed. The fruits require the closest attention while being preserved if the best results are to be got. Mr. J. C. Gaskin, Assistant for Commerce and Trade, Bagdad, in a note kindly forwarded to me on 22nd October, 1912, states "a considerable quantity of boiled dates are annually shipped from the Batineh Coast, Katif, and Busrah to India where they are considered a luxury, and are used by the Hindus at their festivals. The Indian date-growers could perhaps with much advantage treat their surplus in the same manner, and cut out the imports from Arabia. The dates are boiled when they are yellow before they become ripe, and fetch a higher price than the ripe dates. One advantage is that the grower can get rid of his inferior dates and recoup himself early in the season." At present the date-growers in the Punjab could not hope to carry on a large and successful trade in dates nicely packed up for the higher prices in the market, as even if samples of the fruits were accepted in the market as suitable, date-growers could not collect any considerable quantity of exactly the same quality of fruits, owing to the pernicious habit that the people have of rearing most of their trees from seeds.

How to Discover Early Whether a Variety of Date Palm is Suited to a Particular Locality.—If any cultivator wishes early satisfaction regarding the quality of the fruits that a particular variety of date palm will produce in his particular conditions of soil and climate, in what months it will ripen its fruits, &c., I would advise him to plant on his land a few young date trees of that variety and which have just become old enough to bear fruits. If he will treat them well as regards water, &c., they will probably yield fruits in their second year after planting. As stated above, we have got fruits at Lyallpur from strong Arabian suckers in the second year after planting, but this result is much more likely to be got if young trees which have just begun to bear fruits are used instead. In either case it is very important that the plants shall be planted in good soil and be well treated.

CROPS OF DATES PER TREE AS ESTIMATED IN THE PUNJAB. PROFITS TO BE EXPECTED FROM DATE-GROWING IN SUITABLE DISTRICTS.

Crop of Dates per Tree.—The crop of fruits got per tree has been variously estimated at from 10 seers (20 lb.) to 250 seers (500 lb.), and average yields in various places have been calculated at anything from

20 seers (40 lb.) to 60 seers (120 lb.) or more. As the crop of fruits got per tree varies greatly not only with the variety of tree, but with the age of the tree, the quality of the land, the amount of water supply, the climate of the locality, &c., &c., a fair estimate of the average yield is difficult to get. Regarding the crops of dates yielded per tree in the Punjab, the "Multan Gazetteer" informs us as follows:—

"It is difficult to say what the average produce of a full-grown tree may be. At the recent settlement the produce recovered by the owner or baikhar after deducting payment in kind and miscellaneous losses was assumed to be 30 seers (60 lb.) of green dates in Kabirwala, and 20 seers (40 lb.) in the other tahsils."

Gross Income for Date Fruits per Acre.—If 139 good palms are planted per acre (trees 19 feet apart in the rows and the rows 16·4 feet apart), they are hand pollinated, 20 (1 seer = 2 lb.) seers of fruits (the lowest estimate to hand) are got per tree, and the value of the fruits is 8 seers per rupee; then allowing four male trees per acre, the gross income would be Rs. 337-8-0 (1 rupee = 1s. 4d.); and if 30 seers were got per tree, the gross income would be Rs. 506-4-0. We have already seen that Muskat dates simply packed in 1-lb. cardboard boxes are selling in Lahore at annas 8 per lb. (1 anna = 1d.), and that Algerian dates packed in ½-lb. packets in a way that will preserve them for more than a year are selling at Rs. 1-2-0 per lb. in Simla. I have also an American newspaper before me which states that last year some dates grown in Indio-California were sold at Rs. 2-10-6 per lb., and that they are selling at Rs. 3-2-0 per lb. there this year. These prices are for dates packed to have a more or less nice appearance on the dinner table, or to preserve them for a lengthened period, &c., but, although these prices give some indication of the possibilities of date culture, an extensive market could not be got for such commodities at once. I therefore do not wish to take too much notice of these prices. Dates do not require to be resown every year like most farm crops; they do not usually require much attention as regards water after the trees are established; they require no or little attention during the greater part of the year, and the fruits require little preparation for the market. With Basra date fruits of fourth or fifth quality actually selling in the unpacked condition in the market here at 3 to 4 seers (6 to 8 lb.) per rupee, our estimate of a gross income of Rs. 337 per acre for fruits alone seems most moderate, and if this is so, dates properly farmed ought to be a most remunerative crop when grown in suitable districts.

Date Palm, Bye-products, Their Value, &c.—Date-growers in Arabia estimate that they receive about 5 annas per tree for the sale of date palm leaves, fibre from the bases of the leaves, stalks of date inflorescences, &c. (Gaskin's note, dated 22nd October, 1912.) This works out to Rs. 43-7-0 per acre of 139 palms. These materials can be made into many useful articles, such as crates for fruits, poultry, and pottery; cages for poultry and small birds; fencing for fowl runs, chairs, stools, sleeping couches, &c. Those interested in the manufacture of ropes, mats, baskets, &c., from date leaflets and the fibre from the bases of leaves should purchase small samples of these from Dera Ghazi Khan. The cost will be practically nothing, and the articles will give a better idea of their suitability for the purposes for which they are made than any description could convey. There is also the possibility of making sugar, wines, &c., from dates.

Imported Arabian Trees.—Some doubts have been expressed as to whether imported Arabian palms would bear the same quality of fruit in

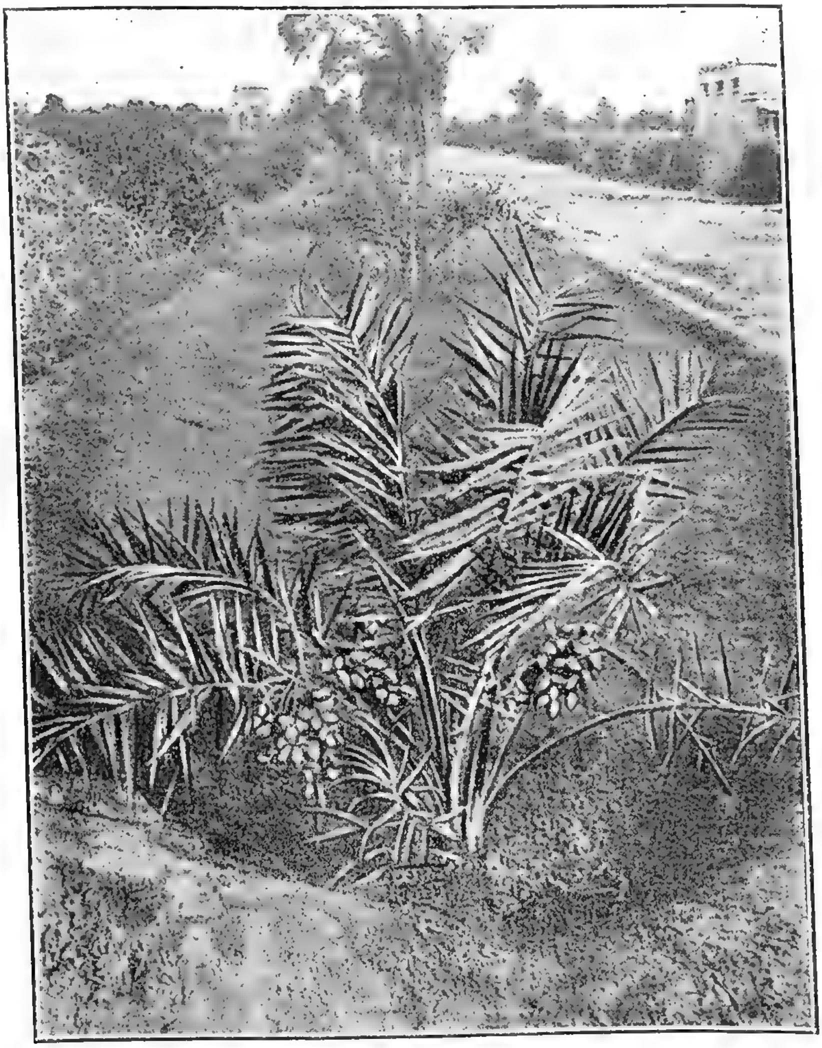


PLATE 61 (Photo. 9).

Young Arabian Date Tree bearing its first crop of Fruits at Lyallpur in July, 1912. The plant was planted as an offshoot in September, 1910.

India as they would at Basra, but there has been no evidence either from Punjab or from other parts of the world to indicate that the quality of the fruits from the imported trees will be inferior to those produced in their original home. (*See* photo. 9.)

THE TAMARIND.

As it appears that there is to-day a good market for tamarinds in the Southern States of the Commonwealth, a few lines on the subject of the cultivation of the tree, the yield of fruit, and method of marketing may be acceptable. In the past there has been no demand for this fruit on a large scale, although it has been grown successfully in various parts of Queensland, from Brisbane northwards, since 1872, and probably much earlier. In March, 1913, however, an enquiry was received by the Department of Agriculture and Stock for two or three tons of tamarinds, not for a condiment, but for the manufacture of boot polish, for which purpose we understand the fruit is largely used. Two species of the tamarind are known—the East Indian (*Tamarindus indica*), the pod of which is elongated, being six times longer than it is broad, and containing from six to twelve seeds; and *Tamarindus occidentalis*—the West Indian Tamarind, the pod of which is short, being only three times longer than it is broad, and containing from one to four seeds.

Under favourable conditions, the tamarind is a large, beautiful, spreading tree, attaining a height of from 40 to 80 ft. in India and Java. The foliage is feathery, and acacia-like, and the clusters of yellow and red flowers come out from the sides of the branches. The pods, when ripe, are brown in colour and brittle, and the interior soft flesh is also brown, covered and permeated by woody fibres. The fleshy part is agreeably sour.

CULTIVATION.

Notwithstanding the fact that the cultivation of the tamarind has extended to all suitable tropical countries, the tree, unlike the orange, lemon, mango, coconut, mangosteen, durien, &c., has nowhere been grown in separate plantations. Here and there may be found a small group of trees, but more generally it is utilised as a shade tree near houses or is planted as in Java and India for avenue and clump purposes, and without doubt there is scarcely any other tree which is so suitable for these avenues. It is a very long-lived tree. The trunk and branches are so strong that they bid defiance to the heaviest wind-storms, while the delicate, feathery, dense foliage form an overhead, wide-spreading shade. For this reason the tamarind was prized first as a shade tree, and taking second place as a fruit tree. The planting and after care of the trees are the least costly and troublesome than is the case with rubber, coconuts, citrus fruits, &c., as the former require no protection from wind, do not make great demands on the soil, demand no particular care or nursing, are not troubled much by disease or insect pests, and bear heavily for a very lengthened period. As regards soil, two conditions only need be observed: First, that it should not be swampy, nor retain stagnant water, and, secondly, that there should be no rocky subsoil or even rock boulders in the neighbourhood of the trees, although they thrive best in a dry soil, but only slightly damp. The tamarind will not thrive in loose sand. Under these conditions the character of the soil with regard to fertility is negligeable. It would be difficult to find any soil embracing the above qualities in which the tamarind will not thrive.

The tree is propagated from seed in a nursery with plenty of humus, the soil being thoroughly pulverised. The seeds are then planted at distances 1 ft. apart each way, and covered with ½ in. of soil. It is usual before sowing to soak the seed for twenty-four hours in lukewarm water to hasten germination. The seeds, not always being of equal size, the largest should be selected. If the seed is to be kept for some time, or exported, it should be packed in dry sand in clay, or China pots, hermetically closed with oiled paper. For keeping purposes, it is best to take the seed from hardly ripe fruit, instead of from dried pods, as the latter cannot be relied on. The seed bed must be kept slightly damp, and, of course, be free from weeds. Should any insects attack the young sprouts, they should be dusted with plenty of ashes and lime. As soon as the young shoots appear above ground, each plant must be shaded until it attains a height of about 10 in., the simplest plan being to erect a rough framework over the seed bed and cover it with matting or light linen stuff. There must, however, only be a sort of half-shade, just breaking up the sun's rays. The best way to raise plants for putting out is to sow the seed in pots, which enables the planting out to be done without exposure of the roots. Transplanting may be done when the plants are 2 ft. high and the seed bed must be thoroughly drenched with water so that the soil will cling to the roots and a large ball of earth pressed on to them. On no account must the roots be exposed. As the tree will eventually attain an immense size, like the oak or horse chestnut, plenty of space must be given between the plants, say, of at least 40 ft. each way.

If a plantation be formed, then the land must be ploughed, subsoiled, and harrowed, as in the case of an orange grove, but where the trees are planted singly as in the neighbourhood of houses, or in avenues, holes must be dug 3 cubic feet in extent, the soil removed must be freed from stones, roots, and clods, and mixed with compost or soil rich in humus, before being returned. The holes must be prepared at least a month before planting, so that the soil may set, otherwise the soil will sink so much with the plant that the bark will rot or the tree will grow crooked. For the first four years the young tree must be fastened to a stake, and shade must be provided for the first three or four weeks. In a dry season plentiful watering is necessary. Then the tamarind may be treated like any other fruit tree, with the exception that pruning is unnecessary, especially if planted for shade purposes, but if fruit is desired, it is well to cut out too-closely growing branches. The wounds should be at once dressed with wax.

THE HARVEST.

In eight years the tree will bear its first fruit crop and the harvest last about two months. The fruit must be perfectly ripe, as before this condition is reached the flesh will be too sour and the fibre too woody to give a good result. When fully ripe, the pod is of a dark-brown colour, and, furthermore, should easily be cracked between the finger and thumb. Once ripe the fruit should be promptly gathered, as in some tropical countries they have then many enemies such as monkeys, a troop of which animals will quickly make a clean sweep of the crop. Parrots, cockatoos, and other birds, squirrels and flying foxes and many insects are also troublesome at harvest time.

The fruit should never be knocked off with poles as is frequently done, as this damages the fruit-bearing branches, with the result of a poor crop in the next season. For high trees ladders should be used, and the fruit cut off by an ordinary fruit cutter.

PREPARATION OF THE FRUIT.

The simplest way of preparing the fruit for keeping is to dry the pods in the sun, covering them with light linen or glass to keep off insects which would lay their eggs in them, and thus cause much damage. When dried they are ready for home consumption or for export. From Brazil regular small shipments of dried tamarinds are made to North America. They are also exported from Asia and Egypt undried, but packed in salt. The well-known tamarind pulp which mostly comes from the West Indies, is easily prepared as follows:—The pods are opened and the contents are laid out on a table in rows. The pulp is first cleansed of all particles of broken pods, and then placed in layers in a cask. When the cask is nearly full, sugar-cane juice just on the point of granulation after boiling is obtained from the nearest sugar-mill, and this is poured over the pulp. The syrup penetrates all the layers from top to bottom, and forms the pulp into a compact mass. As soon as it is cool (the syrup being added when hot from the cooler at the mill), the cask is headed up, and is ready for shipment. Sometimes a more clarified syrup is used which produces a better commercial article. The pulp loses none of its natural taste by the process, in fact, it has a still more agreeable flavour. At the same time this process might be improved upon. For instance, the pulp may be passed through a hair sieve, this being the only way to get rid of the seeds, fibre, and broken pods. Then the clean pulp should be boiled with white sugar syrup as in the case of the manufacture of marmalade, adding perhaps a little spice such as vanilla, ginger, or cinnamon. Other improvements might be suggested, but it is important to take care that the natural flavour of the pulp is not destroyed by either sugar or condiments. Packing could also be improved. Casks should not be used. Either glass jam jars or small wooden kegs, the latter coated on the inside with shellac, are far preferable.

Finally, the timber of the tamarind tree is excellent for building and upholstery work. We have taken the above notes from Professor H. Semler's work on Tropical Agriculture.

TAMARIND TREES IN QUEENSLAND.

In Central and North Queensland there are several bearing tamarind trees. On Ross Island, Townsville, we are informed by Mr. C. Ross, Instructor in Fruit Culture, there is a fine, fruit-bearing tree over 40 ft. in height, on Mr. Willington's property. At Mareeba, in North Queensland, Mr. E. Miller, Abbotsford, has several trees in bearing. There are some half-dozen trees at the Kamerunga State Nursery, Cairns, and at Bundaberg, Mr. N. E. Goodchild has trees producing a few hundredweights annually. Probably there are many others in the North. The price of West Indian tamarinds in Australia is about 6d. per lb., and Queensland growers, after paying freight and charges and dealers' commission, would net 4d. per lb. f.o.b. at all Queensland ports.

THE LUCE CANE HARVESTER.

In our March issue we gave an account of the work performed by the Luce cane harvester at a trial of the machine at Audubon Park, Louisiana. We now have further confirmation of the value of the machine, as shown by a letter published in the "Louisiana Planter" (and reproduced in the "Queensland Sugar Journal" of 9th April) written to Mr. Geo. D. Luce, by Mr. Frank Barker, of the Clothilda Plantation, Raceland, Louisiana, to the following effect:—

"Dear Sir,—Reporting on actual field work of the Luce cane harvester on my Clothilda plantation, would say that it was tried in D74 cane, running 40 tons to the acre, sufficiently to show that even in this heavy cane it would do excellent work. As all of the D74 and D95 was in very soft land, and there being no mud legs on the wheels, it was given a more thorough try-out in native or purple cane, averaging about 30 tons per acre.

"This cane was, for this variety, quite straight, but considerably blown down, leaning, and admittedly in bad shape for machine handling. The result may be fairly stated as follows:—

"The bottom cutting was in all cases perfect, a square clean cut being made, and about 4 in. lower than hand cutting, which, besides adding much to the sugar yield, would seem to make stubble shaving unnecessary. Leaning or blown down cane was brought up and handled as well as that standing straight. Stripping was as good as the average hand work. Topping was as exact as hand topping, except on short cane, crooked cane, or suckers not long enough to reach the topping knife. No attempt had been made to house the machine; the working parts being left exposed, so that their movements in operation could be noted. In this connection it is but justice to the machine to state that those parts that cannot be housed—that is to say, the bottom cutters, the topping knife and the stripping brushes—cleared themselves perfectly, being as free from cane trash when stopped as when they were started. The other parts, such as shafts, sprockets, and gears can, in a commercial machine, be fully housed and protected.

"The expressed opinion of those who saw the machine, nearly all of them practical men, is that machines built in commercial style along these lines, some parts strengthened, and the whole made lighter, as it can be done, will solve the problem of the cane harvester, and give us a practical machine that will harvest all of the D74 and D95, and, in fact, all cane, light or heavy, that is grown in rows, and is reasonably straight.

"Wishing you the success that both yourself and the machine deserve, I beg to remain."

DETAILS OF THE SUGAR CROP OF 1913.

The Government Statistician (Mr. Thornhill Weedon, F.S.S.) has issued a statement showing the actual results of the sugar campaign for 1913. The total yield was 242,837 tons, which showed an increase of 129,777 tons on the season of 1912. The figures are as follows:—

Division and District.	Area Crushed for Sugar.	Total Area for Sugar.	Weight of Cane.	Sugar.
	Acres.	Acres.	Tons.	Tons.
Rockingham and York Peninsula—				
Cairns and Douglas	10,928	17,072	190,795	25,159
Ingham and Mourilyan	15,831	25,331	269,814	37,255
Total	26,759	42,403	460,609	62,414
Edgecumbe—				
Ayr and Townsville	7,711	13,777	205,546	25,903
Proserpine and Bowen	2,985	3,788	55,968	6,535
Mackay	25,320	37,021	498,888	55,211
Total	36,016	54,586	760,402	87,649
Wide Bay—				
Bundaberg and Gin Gin	21,688	26,384	438,030	51,476
Biggenden, Childers, Gayndah, Maryborough, and Tiaro	15,236	19,516	363,377	34,849
*Gympie	170	294	3,353	...
Total	37,094	46,194	804,760	86,325
Port Curtis—				
†Gladstone	309	458	5,704	400
Moreton—				
Logan	968	1,465	18,759	1,635
Marburg and Rosewood	405	520	5,819	552
Maroochy	1,062	1,641	25,182	3,287
Nerang and Southport	190	476	4,353	575
Total	2,625	4,102	54,113	6,049
Total, 1913	102,803	117,743	2,085,588	242,837
Total, 1912	78,142	141,652	994,212	113,060
Increase or decrease	24,661	6,091	1,091,376	129,777

* Mostly crushed in Maroochy. † Part crushed in Bundaberg.

In addition to these figures the statement shows that the area for plants was 2,541 acres in 1913 and 3,515 acres in 1912.

The area of stand-over or unproductive cane in the several divisions was as follows:—Rockingham and York Peninsula, 14,397 acres; Edgecumbe, 17,541 acres; Wide Bay, 8,850 acres; Port Curtis, 149 acres; Moreton, 1,462 acres. This gave a total of 42,399 acres, as compared with 59,995 acres in 1912.

The principal yields in other years were:—

1907	188,307
1910	210,756
1911	173,296

Animal Pathology.

TUBERCULOSIS IN COWS.

Writing to the "Live Stock Journal" of 20th March, Mr. H. Leeney takes up the cudgels in defence of cow's milk. He says:—

"That it has never yet been definitely proved that any human being has been infected by the consumption of cow's milk; that it is difficult to infect bovines with human bacilli; that the experiments by subcutaneous, intra-venous, and intra-peritoneal injection of vast quantities of virulent sputum often failed; that some subjects were poisoned but not infected with tuberculosis; that some lesions proved retrogressive although this virulent material was employed, and that none were infected by natural means.

"Neither Koch nor anyone else who has studied the subject would say that a dentition abrasion in an infant's mouth might not afford an entrance for a stray bacillus, but what are the chances? Surely the available statistics give the answer! I do not think it will be denied that three times as much cows' milk is consumed by infants to-day as was taken by a previous generation whose mothers recognised their duty, and it cannot be denied that the returns of deaths from tuberculosis have fallen by 50 per cent. If the cow, as often asserted without any evidence whatever, is the chief cause of tuberculosis in human beings, then we ought to have three times as many cases, instead of 50 per cent. less."

STOMACH OR WIRE WORMS IN SHEEP.

Consequent upon the publication of Mr. W. G. Brown's lecture, in which he advocated the rearing of sheep on coast lands, very great interest has been aroused on the subject, and many inquiries have reached the Department as to the best grasses on which to pasture the sheep (the natural grasses being wholly unsuitable), and as to the possibility of the sheep becoming affected by stomach worms. For the information of those interested in the matter, we republish a paper by Mr. Sydney Dodd, F.R.C.V.S., formerly Principal Veterinary Surgeon and Bacteriologist in the Department of Agriculture and Stock, on worms in sheep and the treatment to be adopted for destroying them:—

"Stomach worms in sheep and calves are known to exist pretty generally throughout the world, and are often a source of great loss to stock-raisers. In some parts of Queensland this condition is one of the most serious drawbacks to sheep-raising, the mortality amongst lambs being very high. In calves, also in some districts, parasitic gastritis or stomach worm is very prevalent, more especially on the coastal districts or where the climate is moist. In the latter animal it gives rise to a condition known amongst stockowners as 'bottle.'

"Stomach worms are to be found in ruminating animals of all ages, but in adult sheep and cattle their presence, unless in very large numbers, does not usually give rise to any outward symptoms, although they are a source of infection to young stock. It is in lambs and young calves that their effects are most serious.

SYMPTOMS.

"The most constant symptom is scouring, and this is seldom or never absent. Accompanying the diarrhœa is rapid loss of flesh and loss of appetite. An unusual thirst is often seen, and lambs at times show a tendency to lick sand or earth; but the evidence of this latter is often only seen when the fourth stomach is opened after death. The temperature may be above normal. There is no cough as a rule.

"In the more chronic cases, the disease is accompanied by dropsical swellings of the dependent parts, chiefly seen under the lower jaw. The swelling in the latter place in calves is said by stock-owners to have some resemblance to a bottle, hence its popular name in Queensland—'bottle.' There is also great anæmia, seen in the marked paleness of the visible mucous membranes, such as of the eye and mouth.

"In some cases the course of illness is very acute in very young animals—these sometimes dying in a very few days, but, as a rule, the course is a chronic one, the animals being more or less ill with the above symptoms.

"A positive diagnosis of this disease may be made by killing one of the badly affected animals and opening the fourth stomach, then emptying its contents into a shallow glass dish or basin. If the worms are present in great numbers, as they usually are, by carefully searching the liquid one can see them wriggling about very vigorously, like eels. They are from ½ to 1½ inch long, and about as thick as a pin. Or, in order to observe them better, one should empty out the stomach contents, and scrape the lining of the stomach with a knife, then mixing the scraping with a little clean water in a small flat-bottomed glass dish.

Strongylus contortus (Stomach Worm, natural size).

"The worm which is most prevalent in these conditions is known as *Strongylus contortus* (or *Hæmonchus contortus*), receiving its name 'contortus' owing to its having a red-and-white twisted appearance like a barber's pole, due to the arrangement of the ovarian tubes around the intestines. The body of the worm is usually brown or reddish.

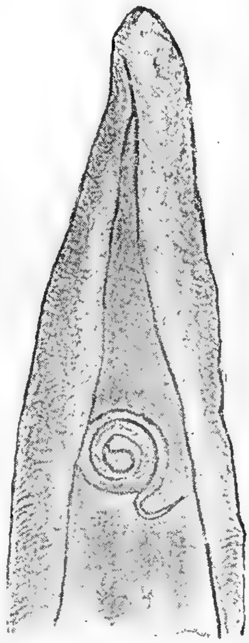
LIFE HISTORY OF THE TWISTED STOMACH WORM.

"The *Strongylus contortus* is ovo-viviparous—that is, the eggs contain living embryoes before the former are discharged from the adult worm.

"The life history of this worm has recently been worked out by Mr. Ransom, Zoologist to the United States Department of Agriculture, and is as follows:—

"In the stomach of affected animals, the worms, after being fertilised by the male, produce large numbers of eggs, which are very minute. These are passed out with the droppings, and are scattered widely over the paddocks.

"If the temperature is above 40 degrees to 50 degrees Fahr., the eggs hatch out in from two hours to a few weeks, depending upon whether the temperature is high or low. If the temperature is below 40 degrees Fahr., the eggs remain dormant, and can remain in this condition for two or three months, and afterwards hatch out if the weather becomes warmer. Freezing or drying soon kills unhatched eggs. The minute worm which hatches from the eggs feeds upon the organic material in the manure, and grows until it is nearly one-thirtieth of an inch in length. Further development then ceases until it is swallowed by a sheep or other ruminant, after which it again begins to grow, and reaches maturity in the fourth stomach of its host in two or three weeks. The chances of the worms being swallowed are greatly increased by the fact that they crawl up blades of grass whenever sufficient moisture, such as a rain, fog, or dew, is present.



Embryo of *Strongylus contortus* coiled on the tip of a blade of grass.—*After Ransom.* Enlarged 100 times.

"The young worms which have reached the stage when they are ready to be taken into the body of the host are greatly resistant to cold and dryness. They will survive repeated freezing, and have been kept in a dried condition for thirty-five days, afterwards reviving when moisture was added. At a temperature of about 70 degrees Fahr. young worms have been kept alive for six months, but experiments have shown that land over which no cattle, sheep, or goats have been allowed to graze for a year will be free from infection at the end of that period.

"The time required for a clean pasture to become infectious after sheep, cattle, or goats are placed upon it depends upon the temperature—that is, the eggs of the worms contained in the droppings must hatch out, and the young worms develop into their final larval stage, at which stage they are able to continue their development in the body of their host, and the rapidity of this depends upon the temperature. The final larval stage is reached in three or four days to three to four weeks after the eggs have been dropped from their host, according to the temperature conditions. It has been proved that eggs or newly-hatched larvæ are unable to develop if swallowed by an animal—a certain degree of development must first take place outside the body of its host—and although a certain amount of infection may take place through drinking from pools soiled by droppings, yet the most frequent source is the pasture; and it explains why this disease is much more prevalent on the coastal district or where the rainfall is heavy, thus keeping the grass continually moist.

TREATMENT.

"In America very elaborate methods have been devised for freeing the pastures from infection, but generally speaking the conditions obtaining in this country do not admit of their practical application here.

"Various remedies have been used for destroying stomach worms. The one used most commonly in South Africa is a solution of bluestone (sulphate of copper), and I have frequently used it with satisfactory results. The bluestone should be in clear blue crystals, with no white patches or crusts. It should not be dissolved in an iron or galvanised vessel—an enamelled bucket answers very well. Rain water is best for making the solution.

"The doses recommended are as follow:—

For Lambs: Take 1 lb. (avoirdupois) of pure bluestone and 1 lb. of Colman's mustard (fresh). Mix well with 12 gallons of rain water.

Dose for Lambs: 3 to 6 months old, give 2 oz.; 6 to 9 months old, 3 oz. 9 to 12 months old, 3½ to 4 oz.

For Sheep: Take 1 lb. (Avoirdupois) pure bluestone, 1 lb. Colman's mustard (fresh). Mix with 10 gallons of rain water.

Dose for sheep over 12 months old, give 4 oz.

Dose for calves, 15 to 30 grs. of bluestone dissolved in 1 quart of rain water.

"The animals should be fasted from twenty to twenty-four hours before dosing, and they should be kept away from water on the day they are dosed. It is important that the bluestone and water be accurately weighed and measured, and a graduated medicine glass should be used to measure out the various doses individually. In dosing sheep it is better to leave them standing on all four legs, as it has been found by experience that if the dose is taken quietly when the animal is in the standing position most of the liquid will pass directly into the fourth stomach, while if the animal is placed on its haunches, only part of the liquid goes immediately into the stomach where it is needed. An assistant places the sheep between his legs, and raises its nose up to a level with its forehead. The person giving the dose then places his hand lightly over the animal's nose and inserts one or two fingers into the left side of the animal's mouth in order to open it. At the same time he inserts the neck of the bottle containing the measured dose, and pours gently as fast as the animal will drink. No attempt should be made to force the animal's mouth wide open or to hold the nose high in the air.

"Many sheep are killed by careless or hurried dosing. Great care should be exercised in order to prevent the liquid going down 'the wrong way'—that is, into the lungs. Therefore, if an animal coughs or bleats, stop pouring and lower the head at once. Do not be in a hurry to get the job finished or try to break records. If a very large number of animals are to be drenched, it is better to drench a certain proportion daily, and turn those dosed into a separate paddock until the whole are finished.

"It is also advisable before dosing the whole of the flock to test the drench by dosing a few of the animals first, and then waiting a day or so to see whether any bad result follows.

"In America good results have been obtained from a single dose of a 1 per cent. solution of coal tar creosote. The solution is made by shaking together 1-oz. of coal tar creosote and 99 oz. of water (making 5 pints altogether). The dose of this mixture is as follows:—

Lambs, 4 to 12 months old, 2 to 4 oz.
Sheep, 12 months and over, 3 to 5 oz.
Calves, 3 to 8 months old, 5 to 10 oz.
Yearlings, 1 pint.

"Coal tar creosote has been found to vary greatly in composition, and in the United States complaints have been made that the drug dispensed by some chemists as coal tar creosote has failed to give satisfactory results.

"Gasoline is one of the popular remedies in America for stomach worms. If gasoline treatment be adopted, it is important to repeat the dose, and it is usual to give it on three successive days. The evening before the first dose is to be given the animals are shut up without feed or water, and are dosed at 10 o'clock the next morning. Three hours later they are fed and watered. At night they are again shut up without feed or water. The next morning the second dose is given, and the third morning the third dose, the treatment before and after dosing being the same in each case.

"The doses are:—

Lambs, ¼-oz.	Calves, ½-oz.
Sheep, ½-oz.	Yearlings, 1 oz.

"The dose for each animal is mixed and given separately in linseed oil or milk. Gasoline should not be given in water.

"In addition to whatever treatment is adopted, it is very necessary that the strength of the animals should be maintained by generous feeding.

PREVENTION.

"From what has been said in the preceding pages, it will be seen that worms have no power of reproduction outside the body of their host, and therefore the chances of worms infecting an animal are in direct relation to the number of sheep and cattle grazing over the pasture, and also the size of the latter. It will be easily understood that if the area of the grazing land is large and the relative number of sheep and cattle on it small, there is less probability of an animal eating grass that is contaminated with worm embryoes than there would be if the conditions were reversed—that is, a small grazing area and a large number of animals on it. In other words, overstocking of land plays a great part in the cause of this disease. Paddocks on which a large number of lambs are grazed are certain to be greatly contaminated, and lambs put to graze on this the following season run great risk of infection. A few worms may probably be found in most sheep, but their eggs cannot develop into mature worms inside the body. They must be passed out with the excrement, and after a certain stage of development find their way into the body of another lamb or calf. From this it is evident that worms may be present for years without any serious loss. It is only when the number of worms swallowed by an animal becomes excessive that the train of symptoms and results ensue.

"Therefore, in order to reduce the prospects of infection to a minimum, lambs or calves should not be grazed over ground that has become grossly infested with worms. The larger run they have the better. Also, it should be remembered that moist spots are very favourable places for harbouring the immature worms. If a paddock has become heavily infested, the better way would be to remove sheep and cattle from it for a year, and only use it for grazing horses; or, in some districts that are more closely settled, the land could be cultivated for a year.

"Stomach worms are not so prevalent on those runs where the grass has been frequently burned off. This is what one would naturally expect, knowing the life history of the worm; but, unfortunately, this means of keeping down worms is not practicable in many instances, because it is the small selector who often suffers the most heavily, and he cannot, as a rule, afford to burn off his grass; and also worms are most prevalent in moist places, and here the grass is usually too green to burn."

REMEDY AGAINST MOSQUITOES.

Some time ago we received a communication from Mr. J. D. Howlett, of Bingham, Urangan, enclosing a cutting from the Maryborough "Colonist,' stating that New Jersey, in the United States, ranks among the most mosquito-infested countries in the world. There immense tracts of land are deserted on this account. Some years ago a scientific commission was formed to devise a remedy. After patient research this body decided to employ a shrub from South America called *Ocimum viride,* on account of a peculiar odour which it possesses, which the mosquitoes dislike, and which puts the insects to flight and frees the locality of them. A single branch in a room and a plant growing near a house are, it is stated, sufficient to establish immunity."

This plant is known locally as "Mosquito Balm." Mr. F. M. Bailey, Colonial Botanist, says that it does not grow in Queensland, but that there is an allied species, *Ocimum sanctum,* the Sacred Balm found in the Cloncurry district. Mr. Howlett states that when travelling some years ago in the bush he camped in a farmer's paddock at Myrtle Creek, near Maryborough; it was a wet time and mosquitoes were very troublesome. Yet not a mosquito came near the camp, although only 3 miles away, where he camped on the previous night, the pests were in swarms. At Myrtle Creek the timber was all thick scrub and undergrowth. He believes that there must be some shrub which grew there naturally. And this was not the only place on the coast where he had the same experience. He stayed three days and nights at Myrtle Creek, and, as the farmer said, the mosquitoes had never been known to come within the boundary of the scrub, although beyond at the creek crossing they were plentiful. There is no such useful plant growing at Bingham or Urangan, where mosquitoes and sand-flies never cease from troubling. It would be interesting to know whether any other bush-dweller has had the same experience as Mr. Howlett.

Entomology.

THE NUT GRASS COCCID.

Mr. Froggatt, Government Entomologist, New South Wales, in reply to correspondents who have recently applied to the New South Wales Government for information with regard to the coccid which destroys nut grass, writes in the "Agricultural Gazette of New South Wales" (2nd May) :—

"The Nut Grass Coccid (*Antonina Australis*) feeds upon the nut-like roots of the nut-grass in the grass and lucerne paddocks of the Hunter River district. It will kill out the nut-grass if the land is not disturbed, thus allowing the coccids to thrive, whereas, if the ground is ploughed, they die out. A number of experiments have been carried out by transplanting scale infected nut-grass into other districts, but without much success, as it appears to be difficult to establish it under new conditions, although it has been known to be successful in some districts.

"The parasite is peculiar to the nut-grass, which is really a sedge and not a true grass. It has never been found on any useful crop or grass.*

"The parasite does not travel through the soil unless it can follow the roots of the nut-grass, but it may be spread by very carefully turning over the ground, causing the minute larvæ to be distributed over the paddocks."

A CABBAGE MOTH ATTACKING TURNIPS.

BY E. JARVIS, Assistant Government Entomologist.

One of our least known cabbage moths, *Godara comalis*, has recently manifested a decided liking for turnips, the caterpillars feeding openly on the leaves, which they soon skeletonize in a manner illustrated on Plate 62.

This species is sometimes found in association with *Hellula undalis*, a notorious pest known as the "Cabbage Webworm," which not only tunnels the centre and stem of this vegetable, but is destructive at times to turnips, radishes, stocks, &c.

The caterpillar of *Godara comalis* is greenish, dotted with black (*see* Figs. C, G, H on plate), and the upper surface of the body marked with three longitudinal pale-yellow stripes.

* About three years ago the insect was found at South Brisbane, feeding on buffalo grass on the crown of the leaves, by Mr. Tryon, Government Entomologist, Brisbane.

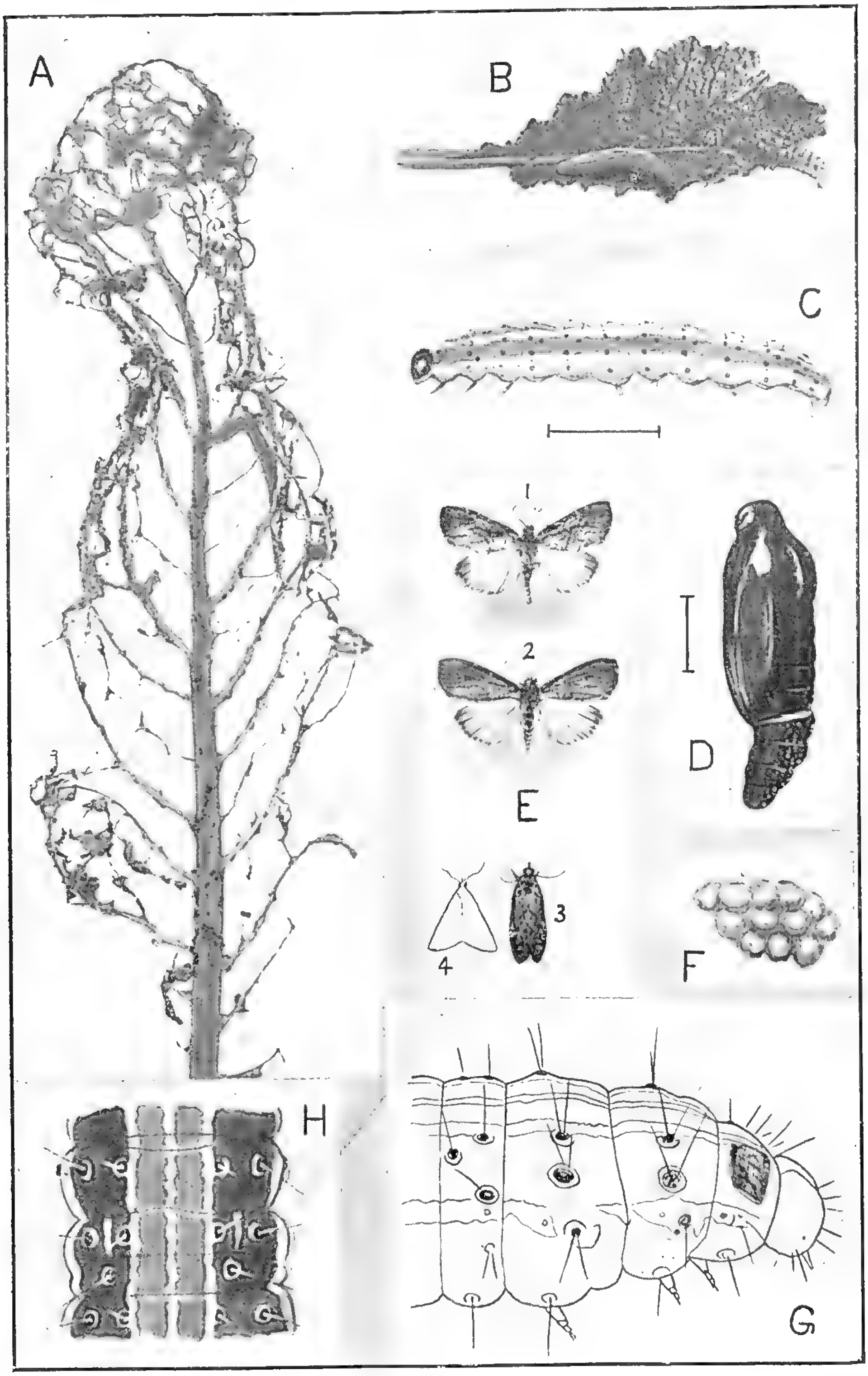


PLATE 62.

A—Turnip leaf, skeletonized. B—Young turnip leaf eaten on one side, and larva *in situ*. C—Caterpillar (magnified about four times). D—Pupa (four times natural size). E—Moth (*Godara comalis*), natural size. 1, male; 2, female; 3, resting position; 4, outline of resting position of *Hellula undalis* (natural size). F—Eggs (highly magnified). G—Thoracic and first abdominal segments (magnified ten times), showing position of spots, streaks, hairs, &c. H—Top view of third thoracic and first abdominal segments (magnified ten times).

It is pinkish-brown on the sides, yellow along spiracles, and light-green on ventral surface. The head is brownish-yellow, and the body tapers slightly towards each extremity.

The perfect insect, which is a little larger than that of the cabbage webworm, and of a different shape (*see* Fig. E), has yellowish forewings mottled with brown, whereas those of the latter moth are dark-grey, flatter when in repose, and carried in a position that causes the insect to assume the form of a somewhat acute triangle (*see* E—4).

It is not surprising that *Godara comalis* should attack a closely related plant like the turnip, but its occurrence on this vegetable appears worth recording, pointing as it does to the possibility of the pest becoming increasingly troublesome in the future.

REMEDIES.

With reference to control measures it must be remembered that prompt treatment at the commencement of the season is of the utmost importance, since destruction of the first brood of moths will materially decrease the injurious action of succeeding generations.

Arsenical sprays are of little use against larvæ well established among the heart leaves of big cabbages, but should be effective when applied to young plants, or to the foliage of turnips.

This pest has not, I believe, like *Hellula undalis*, been hitherto recorded as attacking cabbage seed-beds, but in the event of its acquiring the habit, Bordeaux mixture sprayed upon seedlings whilst in the bed, and when planted out, should act as a deterrent.

Adopt a system of clean culture which shall entail the destruction of all weeds, especially of cruciferous plants; and be careful to at once destroy any very badly injured cabbages, and never allow stumps with worthless leaves to remain in the ground after marketing the vegetables. Such refuse should be put in a heap and burnt without delay.

Cultivating between cabbages with "Planet Junior" teeth at a time when the most injurious brood of larvæ are in the pupal state would doubtless destroy many of them, and also improve the general condition of both the crop and soil.

TOMATOES FROM CUTTINGS.

It is not generally known that tomatoes will grow freely from cuttings. Make the cuttings rather long. Lay them horizontally in the ground at a depth of 2 or 3 in., leaving the head above ground. Water judiciously, and roots will spring from every joint. This plan gives the plant a good hold in the ground, and a quick start.

General Notes.

THE FIRST ARTESIAN BORE IN AUSTRALIA.

The March and April issues of "The Pastoral Review" contain two very interesting articles on the early days of boring for artesian water. "The True Story of the Beginning" is graphically described by the Hon. Simon Fraser in the March number of the above journal. He mentions that in 1882 four boring machines were obtained by the Queensland Government, and at Winton, in Central Queensland, water was obtained by boring at a depth of 336 feet, but it had to be raised by pumping, and was by no means adequate for the purpose of supplying the needs of the township, and in 1884 Winton was only saved from a water-famine by trains of tanks mounted on wagons hauled by traction engines. Yet all this time there lay beneath the drought-stricken district a vast body of clear fresh water under a sufficient pressure to make it gush forth from the subterranean depths as soon as an outlet should be provided. The discovery of the supply was left to private enterprise. Mr. Fraser then goes on to describe the circumstances which led to his engaging a Canadian wellborer (Longhead), who introduced the "Canadian Pole Tool" plant, and who commenced boring in December, 1886, in the Colton Bush Paddock, 30 miles from Cunnamulla. In six weeks he had reached a depth of 1,000 feet, and had not gone much further when the water rose in the bore and overflowed from the tubing at the surface. This event, Mr. Fraser says, happened in February, 1887, and was the beginning of the artesian water supply of Australia.

Following on this is a letter from Mr. John Bignell in the April issue of the "Review," who claims to be the first to search for artesian water in Queensland, "or at least in the Warrego district." After consulting with Mr. Russell, of the Meteorological Department of New South Wales, his firm (E. and J. Bignell) decided to try their luck, and imported a diamond drill from America, with all the necessary tools and rods for borings up to 1,000 feet. The Queensland Government carried part of the plant free of cost to Roma. There the plant was hauled 300 miles by teams to Widgeegoara. This was in 1883. As soon as boring operations were started all went well for five weeks, when a good supply of sub-artesian water was struck at 380 feet from the surface. Then, however, heavy drift-sand put an end to the boring. A second bore was then put down, and at 365 feet a good supply of stock water was obtained, but, after boring some few feet further, the heavy drift-sand held the bit and rods, with the result that the bit studded with diamonds and the core barrel were left in the hole, and were never recovered. These two bores watered 40,000 sheep through the drought of 1885, and were the salvation of the sheep on the holding.

According to Mr. H. S. Officer, when referring to Mr. Fraser's article in the "Review," the first artesian flow was obtained, and the first flowing well bored, on Kallara station, near Bourke, New South Wales, in 1879, the work being carried out by the Messrs. Officer's then manager, Mr. David Brown, to whom the credit must be given. This is confirmed on reference to the "Official Year Book of New South Wales."

POTATO PENETRATED BY NUT-GRASS.

The accompanying illustration serves to show how clean land where nut-grass has never appeared may yet be affected in the remarkable manner here depicted. The root of a nut-grass plant has perforated the potato, and a nut has developed in the centre. This potato was part of a consignment from Beenleigh, purchased in the Brisbane market by Mr.

PLATE 63.—NUT GRASS NUT GROWING IN A POTATO.

T. Dunn, of Moorooka, to whom we are indebted for the photograph. If this were a seed potato, and the bulk of the consignment had been purchased for planting, not only one but possibly dozens might prove so affected, and thus the pest would be quickly propagated. In a season when potatoes are not cut, but planted whole, the evil would not be discovered until the mischief was done.

Answers to Correspondents.

EARTH REMOVED FROM AN EXCAVATION.

"SELECTOR," Kingaroy—

According to your diagram and measurements, the amount of earth excavated is 955 cubic yards. This is approximately, but possibly not absolutely, correct, as another cross section should have been given.

HARNESS OIL.

"SUBSCRIBER," Wondai—

The best buggy harness oil is said to be "Black Satin" oil, which is used by the livery stables and can be procured from Messrs. Butler Bros. and other wholesale houses in Brisbane. Kindly see notice to correspondents on page viii.

SEASONABLE SOWINGS FOR WINTER CROPS.

"NEW CHUM," Noosa—

It is far too late to sow cucumbers, melons, pumpkins, marrows, &c. You may sow seed of the Globe Artichokes. Eschalots may be grown throughout the year. There is still time for lettuce and endive, also for Kohl-rabi; carrots and radishes may be sown at intervals throughout the year. Broad beans will do if sown between March and September. Where frosts prevail, French beans can be sown only from the end of August to about April. Peas may be sown from January to September. April and May are too late for sowing cauliflower, but cabbage in some districts will do well if sown from February up to August or September. You should obtain a good "Gardener's Calender," meanwhile we send the Department's pamphlet on "Market Gardening in Queensland."

THE VALUE OF THE RUPEE.

"TRAVELLER," Townsville—

The Indian rupee is worth 1s. 4d. According to the Report of a Royal Commission on Indian Finance and Currency, which has just been published, the sterling value of the rupee is prevented from rising above 1s. 4d. by more than the cost of remitting sovereigns to India. That is to say, no one will pay for a sovereign in India more than 15 rupees (its equivalent at 1s. 4d. to the rupee), because he can get rupees at that rate from the Government for any amount of sovereigns. The exchange value of the rupee has been steady at about 1s. 4d., because if anyone demands more than this rate the Secretary of State (including the Government of India) puts him out of the market by offering at that rate of exchange either way. This is fully explained in the March issue of the "Wealth of India." Your sovereign will be exchanged for 15 rupees in India, and no more. A rupee is not pure silver. It weighs 180 grains, of which 165 grains are pure silver and the rest alloy.

SPICED BEEF.

E. E. WARD, Inglewood—

Spiced beef is one of the fine arts. The beef should first be kept in pickle for about two days, and should then be wiped quite dry before adding the spice. Then, mix together some allspice, coarse brown sugar, and a very little cinnamon, and rub this well into the beef on all sides. Place on a big dish, and keep it in a cool place, turning it every day and rubbing in more spice. Should the surface become at all dry, a little more pickle must be added, and the dish on which it then stands should be cleaned every three days. Continue this process for a fortnight, then wash in clean cold water, and place in a jar or tin only just large enough to contain it, with a very little cold water. Then place in a boiler, and boil fast for ten hours, if for a joint of 10 lb.—less time for smaller joints. Allow it to cool in the jar, and on taking it out, scrape off the outside, which will probably be black. The joint is then ready for consumption.

BANANA CULTIVATION.

W. G. STUART RUSSELL, Eumundi—

In reply to your questions on banana cultivation, &c.:—

1. *The standard fertiliser* approved by Mr. Brünnich in his Sixth Progress Report on Manuring Experiments at Buderim Mountain (June, 1913), KPN, is for rich soils—3 cwt. of potassium sulphate, 2½ cwt. of dried blood or nitrate of lime, and 4 cwt. of superphosphate per acre. To be applied twice a year. The fertilisers cost about £12 10s. annually, the cost per stool being 10d. With this manure, the average yield of bananas at Buderim has been 345 bunches (3,035 doz. bananas), value, at 3d. per doz., £38 per acre. Double the amount of the fertiliser on poorer soils resulted in 457 bunches (4,330 doz. bananas), value £54 per acre, and future yields were expected to be much higher. The quantity of fertiliser for each stool would be about 3½ lb. at each manuring. Apply in Spring and Autumn.

The ground is scuffled between the rows and the manure applied, and the soil is then well mulched.

2. *Cutting Surface Roots.*—Opinions on this point differ very largely, some planters in the W. Indies, Fiji, &c., maintaining that it is injurious, others that the cut roots send out numbers of rootlets which enable the plants to obtain more plant food, as is stated in my pamphlet on the banana.

3. *Concerning Stripping Dead Leaves.*—The latest authority (Fawcett on the Banana) does not recommend pruning off the dead leaves. If these are cut away, the sheathing leaf stalks which form the outside of the trunk dry up, and do not perform their office. But if plants are closely clustered together there is too much shade, hence the stems get weak, lengthen out, and become brittle. In such a case the dead leaves are better removed.

4. *The Fruit-fly.*—A useful spray for the fruit-fly is composed of sugar, 3 lb.; arsenate of lead, 4 lb.; water, 5 gallons. Apply with an ordinary spray pump. As you say that the arsenate discolours the fruit, the next best way is to enclose the bunch of fruit in cottonette, as used to be done in North Queensland.

For Root Disease.—There is no remedy except to avoid planting on land where the disease has occurred, and on no account to plant suckers from such land.

Fruit Rust (Discolour).—Dust with flowers of sulphur.

Nematodes.—There is no cure but rooting out the plants.

Banana aphis does not do much damage. A dusting of tobacco dust will settle this trouble.

You are quite right about the application of potash, which is essential to the well-being of the plant.

MANURE FOR A SMALL MARKET GARDEN CROP.

Market gardeners on a large scale apply stable manure in various quantities, ranging from 25 tons to 100 tons per acre, but more than 50 tons is regarded by some as wasteful or at least not economical; 25 tons is a medium application in market gardening. In the most intensive garden operations manure is often spread to a depth of 3 in. For a small garden with beds covering only about 25 square yards, an application of stable manure at the rate of 5 lb. per square yard is sufficient, especially if supplemented by artificial. Coarse manures should be ploughed or dug under, while those of fine texture will be most beneficial when used as a top dressing, especially on heavy soils. This surface application has a marked effect in improving physical conditions, in making soils warmer, more friable, and less liable to baking and wasting.

In soils of rather poor fertility it is a good plan to use stable manure in drills, but this is not customary when the soil is of high fertility. But it is without doubt an advantage in the thinner soils, because it secures greater concentration of plant-food in the immediate region of the roots, and results in a more economical use of the manure applied.

FRESH MANURE *VERSUS* ROTTEN MANURE.

On this subject there is much to be said, and usually farmers and market gardeners in all countries pin their faith, except under peculiar circumstances, on well-rotted manure. Now, this is what Mr. Ralph L. Watts, Professor of Horticulture in the Pennsylvania State College, writes in his valuable work on "Vegetable Gardening":—

"In general farming, the best practice is to apply manure to the land as soon as possible after it is produced. This may also be the best policy in certain lines of vegetable farming; as, for example, grass land to be planted in early cabbage and early sweet corn might well receive dressings of fresh manure after hay harvest of the previous season. In field trucking—*i.e.*, market gardening on a large scale—a very general and commendable practice is to apply fresh manure at any time, provided all conditions are favourable to such applications. The probabilities are that yields will be better than if an attempt is made to store the manures and apply them when well decomposed. It is a well-known fact, however, among market gardeners that fresh stable manures are not suitable for intensive operations in market gardening, because they are not quick enough in their action, and their coarse textures prevent thorough incorporation with the soil particles. Again, fresh manures are likely to cause a rank growth of certain crops, such as tomato, egg-plant, peppers, melon, and cucumber at the sacrifice of the fruit. With root crops such as radish, turnip, beet, carrot, parsnip, and salsify, fresh manures not only cause excessive top growth, but also prevent the proper root development. It is, therefore, generally conceded that rotten manure is indispensable in all intensive lines of vegetable gardening."

Now, about composting. The same authority says: "On almost every place devoted to market gardening there is a compost pile. Although it is called the compost pile, it seldom contains much material in addition to horse manure. . . . . . Composting destroys troublesome weed seeds. Valuable data upon this subject have been published by the Maryland (U.S.A.) Station. The results obtained show that (1) When manure is allowed to ferment in piles for six months, no danger of distributing weeds is incurred; (2) when manure is allowed to remain in piles, undergoing partial fermentation, little danger of distribution is incurred.

THE COMPOST PILE.

Although composting is essential, it should be avoided as much as possible, for decomposition cannot be controlled without some loss of plant food. It also requires a large additional expenditure of labour in the extra handling.

In the management of compost heaps, the gardener should see that leaching and fire-fanging are controlled, and that the finest texture is secured. To accomplish these ends, it is customary to stack in rather compact, flat piles not less than 4 ft. deep, and covering as much area as may be necessary. The piles are so deep that there can be no leaching if they are built with perpendicular sides. They must be watered with a hose often, and freely enough to prevent fire-fanging. To improve the texture, the piles are turned from one to three times at convenient intervals. About six months are required to secure the proper decomposition.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR MAY, 1914.

Article.		MAY. Prices.
Bacon	lb.	$6\frac{1}{2}$d. to $9\frac{1}{2}$d.
Bran	ton	£5 5s.
Butter	cwt.	102s.
Chaff, Mixed	ton	£5 10s. to £6
Chaff, Oaten (Victorian)	"	£5 10s. to £5 15s.
Chaff, Lucerne	"	£5 5s to £5 12s. 6d.
Chaff, Wheaten	"	£4 10s.
Cheese	lb.	$7\frac{1}{2}$d. to $7\frac{3}{4}$d.
Flour	ton	£9
Hams	lb.	1s. 2d
Hay, Oaten (Victorian)	ton	£6 to £6 10s.
Hay, Lucerne (Prime)	"	£3 10s. to £4 15s.
Honey	lb.	$2\frac{1}{2}$d.
Maize	bush.	3s. 11d.
Oats	"	3s. 6d. to 3s. 8d.
Onions	ton	£8 to £8 10s.
Pollard	"	£5 15s.
Potatoes	"	£8 to £9
Potatoes (Sweet)	cwt.	1s. to 1s. 6d.
Pumpkins	ton	£1 10s. to £2 5s.
Wheat, Milling	bush.	3s. 9d
Eggs	doz.	1s. 2d. to 1s. 9d.
Fowls	pair	2s. 9d. to 4s. 6d.
Geese	"	5s. 6d.
Ducks, English	"	2s 6d. to 3s.
Ducks, Muscovy	"	3s. 6d. to 4s. 3d.
Turkeys (Hens)	"	7s.
Turkeys (Gobblers)	"	11s. to 14s.

SOUTHERN FRUIT MARKETS.

Article.	MAY. Prices.
Bananas (Fiji), G.M., per case	17s. to 17s. 6d.
Bananas (Fiji). G.M. per bunch	3s. to 9s
Bananas (Queensland), per case	8s. to 12s.
Lemons, per gin ase	15s. to 17s.
Mandarins, per case	9s. to 10s.
Oranges (Queensland)	5s. to 9s.
Papaw Apples, per double case	10s.
Passion Fruit, per quarter-case	9s.
Pineapples (Queensland), (common), per case	10s. to 12s.
Pineapples (Queensland). (Ripleys), per case	12s. to 13s.
Pineapples (Queensland), (Queens), per case	12s. to 14s.
Pineapples (Rough), (Queensland), per case	10s. to 1 s.
Tomatoes, per quarter-case	2s. 6d. to 5s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	MAY Prices.
Apples, Eating (American), per case	9s. to 13s. 6d.
Apples, Eating (Local), per case	5s. to 7s. 6d.
Apples (Cooking), per case	3s. to 7s. 6d.
Bananas (Cavendish), per dozen	2½d. to 4d.
Bananas (Sugar), per dozen	2½d. to 3d.
Cape Gooseberries, per quarter-case	8s.
Cocoanuts, per sack	12s. to 14s.
Custard Apples, per quarter-case	4s. to 5s. 6d.
Lemons (Local), per quarter-case	5s. to 7s.
Mandarins, per quarter-case	4s. 6d. to 5s 6d.
Oranges, per case	3s. 3d. to 6s.
Papaw Apples, per quarter-case	2s. to 4s.
Passion Fruit, per quarter-case	5s. to 7s.
Peanuts, per pound	3d. to 3¼d.
Pears, per half-bushel case	5s. 6d. to 6s.
Pineapples (Ripley), per dozen	6s. to 8s.
Pineapples (Rough), per dozen	6s. to 7s. 6d.
Pineapples (Smooth), per dozen	4s 6d. to 9s.
Rosellas, per sugar bag	1s. 6d. to 2s. 6d.
Strawberries, per tray	1s. 6d. to 1s. 9d.
Tomatoes, per quarter-case	1s. to 3s.

TOP PRICES, ENOGGERA YARDS, APRIL, 1914.

Animal.	APRIL. Prices.
Bullocks	£9 15s. to £12 2s. 6d.
Cows	£7 17s. 6d to £9 12s. 6d.
Merino Wethers	27s. 6d.
Crossbred Wethers	25s. 9d.
Merino Ewes	20s. 6d.
Crossbred Ewes	21s 9d.
Lambs	20s. 6d.
Pigs (Baconers)	61s.
Pigs (Porkers)	59s

PRICES FOR COTTON AT LIVERPOOL.

Current prices for cotton up to 14th April, 1914, are given as follows in the "Weekly Circular" of the Liverpool Cotton Association:—Sea Island, 12½d.—12¾d. per lb.; Egyptian Brown, 8·40d.—10·70d. per lb.; Egyptian Abassi, 9·85d.—11·55d. per lb.; Indian, $4\frac{7}{16}$d.—6½d. per lb.

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.

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. Sow Guada Beans (Snake Gourd) at the end of September.

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 the 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.