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PHILIPPINE BUREAU OF AGRICULTURE.

FARMERS' BULLETIN No. 7.

REPORT ON THE INTRODUCTION AND DISTRIBUTION OF SEEDS AND
PLANTS BY THE BUREAU OF AGRICULTURE

BY

WILLIAM S. LYON,

IN CHARGE OF DIVISION OF SEED AND PLANT INTRODUCTION.

PREPARED UNDER DIRECTION OF THE CHIEF OF THE BUREAU

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THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

PHYSICS 309

LECTURE 10

PROBLEMS

1. A particle of mass m moves in a circular path of radius r with constant speed v . Find the magnitude of the centripetal force.

2. A particle of mass m moves in a circular path of radius r with constant speed v . Find the magnitude of the centripetal force.

3. A particle of mass m moves in a circular path of radius r with constant speed v . Find the magnitude of the centripetal force.

4. A particle of mass m moves in a circular path of radius r with constant speed v . Find the magnitude of the centripetal force.

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LETTER OF TRANSMITTAL.

MANILA, *May 1, 1903.*

SIR: I have the honor to submit herewith a report upon some of the operations of the Division of Plant Industry since the organization of the Bureau and recommend that the same be published as Farmers' Bulletin No. 7.

Respectfully,

WM. S. LYON,

In Charge of Division of Seed and Plant Introduction.

HON. F. LAMSON-SCRIBNER,

Chief of Bureau.

REPORT ON THE INTRODUCTION AND DISTRIBUTION OF SEEDS AND PLANTS BY THE BUREAU OF AGRICULTURE.

INTRODUCTION.

In the preliminary efforts of this Division to introduce improved varieties of economic plants into the Philippines, serious obstacles have been encountered owing to the difficulty of obtaining reliable data as to what has been accomplished by the Spaniards. Many excellent papers are extant showing that through private channels and official sources the economic flora of the Islands has been enriched by exotic species from the tropical regions of two hemispheres, but there seems never to have been any concert of action between the authorities nor any effort to record these introductions or tabulate the results. As a consequence we have had to grope and feel our way and have doubtless duplicated much elementary investigation that could have been avoided had the Bureau of Agriculture fallen heir to any systematic records of its predecessor's labors. Still another obstacle to success has been found in the widely varying physical conditions prevailing in different parts of the Archipelago, and the difficulty in securing in any one region, where these conditions are approximately alike, a sufficient number of experienced collaborators from whose reports we feel justified at this time in drawing conclusions.

Distribution of field, forage, and vegetable seeds has been made to all of the provinces in the Archipelago, and a very manifest interest in the acquisition of improved varieties developed over a large extent of territory.

The economic products of temperate regions previously introduced into these Islands were chiefly from seeds grown in subtropical countries, and until importations were made by this Bureau little or nothing was known of the behavior of plants developed from seeds grown in northern latitudes.

The experiments so far conducted have already demonstrated that many garden vegetables of northern origin may be grown to great perfection in these Islands, but the *sine qua non* of success lies in accelerating their earliest possible development by the unstinted use of water, manure, and constant tillage. With these resources necessary to promote early maturity at hand, there is no serious obstacle to the successful commercial cultivation of very many garden crops of colder climates.

Some attention has been devoted to exploiting the excellence of our native fruits and vegetables. The facility with which they may be grown,

relative assurance of a crop, and their marked acceptability to the Occidental palate are sufficient to encourage their general use.

In the following pages are given brief reports on those species or varieties of plants whose introduction has been followed by more or less systematic and direct observation, supplemented by the results obtained through our collaborators in various parts of the Archipelago.

To this is added a complete list of seeds and plants brought into the Philippines by the Chief of the Bureau.

CEREALS.

American Field Corns.—Six varieties have been widely distributed throughout the provinces, and the results in both growth and development have been generally disappointing. The tendency to early maturity (an inestimable feature in countries of short seasons, but with nothing to commend it to the tropical planter) is very marked, and results in a few ears forming close to the ground. By acclimatization and careful seed selection, made over two years, and determining the proper season for planting it is hoped that this objectionable feature may be overcome or greatly modified.

Native corn is of the small Mexican type, although in parts of Negros and Luzon a variety occurs that in habit and appearance closely approaches the old standard King Phillip variety. It is far less prolific than its American prototype, but this is doubtless to be explained by the absence of those conventional operations of modern farming in America that are deemed essential to the production of a good corn crop.

Millet (Panicum miliaceum).—One of the more dwarf Japanese varieties was tried, as a dry-season crop, and exhibited the same early fruiting tendency as field corn. It was also found less resistant to drought.

FORAGE PLANTS.

Alfalfa (Medicago sativa).—Records derived from outside sources are of conflicting character, attributable doubtless to general inexperience among native planters with proper culture methods, a condition that widely distributed instructions failed to entirely overcome. The direct investigations made by the Bureau, however, are full of promise for the future of this invaluable clover. Our trials conducted on sandy soils and heavy clays indicate that there are no radical climatic conditions antagonistic to success.

Here, as elsewhere, good results are assured only by a deep, thorough preliminary soil breaking, followed by such subsequent surface tillage as will insure the reduction of the soil to a good seed bed. In addition, and particularly upon the west coast, provision must also be made for irrigation and drainage.

There, season of planting has an equally important bearing; for notwithstanding a voracious appetite for water, alfalfa is easily "drowned

out," and forty-eight hours of submersion is generally sufficient to destroy young seedlings.

To effect a successful result plantings should be made toward the latter end of the rainy monsoon, when long-continued storms have abated and there are only enough occasional showers to keep the young plants in good growth. This period has the further advantage of coming toward the cooler season of the year (October and November), when conditions are more favorable to seed germination than in the hotter months.

It is of record that excessive, even inundating, rains have fallen in December, but such instances are abnormal.¹ If they occur, however, unless the plants are well advanced they may necessitate reseeded. On the western coasts alfalfa may be grown for both cutting and pasture, as the weather in the five months (January to May, inclusive) is well adapted for curing the hay. On the eastern coasts the more equable distribution of rains, the absence of a long, well-defined dry season, and the greater relative humidity would impair the process of hay curing and make the value of alfalfa problematical except as a pasture crop.

Teosinte (Euchlaena luxurians).—Teosinte, so far grown only as a dry-season crop and without irrigation, in two months from planting has run rapidly to seed and maturity. Portions cut prior to this time furnished a sweet, nutritious, and easily cured fodder, and subsequent irrigation has developed a strong aftermath now ready for a second cutting. While there has been no opportunity to observe its behavior during the wet season, it is probable that upon well-drained lands it will prove a most productive forage crop of great economic value.

Sulla (Hedysarum coronarium).—Our preliminary tests indicate that sulla has less drought-resistance force than alfalfa. So far its trial has been restricted to light sandy soils not susceptible of irrigation and subject to a drought whose prolongation has been exceeded only once during the thirty-seven years of official meteorological records of the Archipelago.

SOIL-RENOVATION PLANTS.

A number of field or forage pulses are briefly reviewed under this heading, as most of the trials were made upon lands long cropped to general uses and without return of fertilizers of any kind, and the preliminary purpose of the plantings was to determine their relative adaptability to the country and their soil-renovating values.

No soil inoculations were made.

The kinds tried have been *Glycine hispida* (soy bean), *Dolichos chinensis* (cowpea), *Dolichos multiflorus* (velvet bean), and *Lupinus varius* (blue lupine).

All were grown as dry-season crops, drill sown, well cultivated, but given no irrigation.

¹ The average December rainfall at Manila is only 58.1 m.m.

From none except the velvet beans were satisfactory results obtained, no crops of sufficient yield being produced to pay for soiling or for the labor of turning down as green manure. To this the velvet bean was a notable exception, amply sustaining its reputation as a dry-region product, yielding abundant and vigorous vine and seed. Samples fed to carabao by the writer were eagerly consumed, and a ration of this well-known nutritious fodder to supplement the precarious subsistence of chance weeds and innutritious grasses that chiefly go to make up the diet of this most useful animal would doubtless result beneficially to beast and owner alike. That it will grow here and yield abundantly, if not as a spontaneous crop, at least with a minimum outlay of labor, is a feature that should commend it strongly to many native farmers.

GARDEN VEGETABLES.

A fairly wide range of experiments have been carried on with horticultural products directly under the Bureau's observation and through a large circle of collaborators.

The facts as coming to this Bureau, which of course must be impartially recorded, show a larger percentage of failure or poor success than one would desire to report of any planting enterprise. Yet it must not be forgotten that there were three contributing causes that would make a preponderance of ill success during our initial year almost unavoidable. One, due to the difficulties of maintaining our seed supply in the best possible germinative condition, while in our own hands and after it had gone into the hands of our consignees. This was a pregnant cause of failure and one that happily, as the results of improved methods of packing, preserving, and shipping, will be largely obviated in future. A second cause of failure was the unprecedented and long-continued drought and the failure of springs, streams, and wells in localities heretofore under irrigation, while a third and serious factor was found in the necessity of selecting or utilizing the service of willing but perfectly untrained observers. Not only were they inexperienced in cultivation of many of the products sent to them, but their unfamiliarity with methods of recording material and useful data has impaired the value of the whole. In detail the Bureau, outside of its own definite trials, has received reports on—

Bush or Snap Beans.—Reports from forty-one collaborators show gratifying results from sixteen sources and more or less pronounced failure from twenty-five. From central Luzon came the best records, and the poorest are accredited to the Visayan group. Our own observations show no deterioration in yield or quality, and that good crops may be assured by the maintenance of proper conditions.

Lima and Pole Beans.—These proved equally satisfactory, and where protected from inundation by listing or hilling-up the land will doubtless flourish as well as the indigenous *Phaseolus lunatus* that is so largely

grown as a perennial throughout the Archipelago under the name "patani." Our cultivated limas are in all respects as to quality and productiveness very much superior to, and will, in time, I think, supersede the "patani."

Garden Pease.—Outside reports have in general been even less satisfactory than those made with beans, and our own trials, while satisfactory, have been merely confirmatory of the hypothesis that their development would only be good when planted during the coolest season of the year (December to March) and irrigated.

Exotic Cucurbitaceæ.—Of these a great variety of squashes, vegetable marrows, pumpkins, cucumbers, and musk and water melons have been tried, and the long record of disaster is practically all confined to the ravages of insects or fungus diseases. Our own plantings quickly succumbed to a blight that the early and frequent application of boulli bordelaise was powerless to subdue, but we experienced no difficulty in holding insect foes in check by the application of conventional sprays. The omnipresent *Diabrotica* appears in clouds, and without unremitting warfare the planter of exotic cucurbits engages in a hopeless undertaking.

The blights appear to be the same as those that have at times devastated the melon and cucumber fields of the middle western United States and may in all likelihood be held in suspense by the application of timely prophylactic sprayings.

Still more valuable I esteem the information derived from many native Filipino gardeners as to the influence that time of planting bears upon the control of these diseases.

The hypothesis, and a very plausible one, being that the spores of the disease are inactive or dormant during the dry season, and consequently plants reared at that time will escape all attacks.

While it is imprudent to generalize from isolated cases, I will cite the fact that I observed in Cavite Province, upon lands analogous to those of our own station and located like the latter at sea level, both melons and cucumbers of surpassing excellence grown from American seeds distributed by the Bureau but not planted until late into the dry season. These had received irrigation but no treatment for disease of any kind, and their general condition was such as to excite the admiration of the most critical horticulturist. The native cucurbits, which contribute by far the most important green element to the Filipino menage, are by no means immune from this disease, and their almost universal practice of late or mid-dry-season planting furnishes an invaluable and probably unerring guide to the successful cultivation of this class of plants at sea level. Our own previous recommendations, based upon insufficient knowledge of local conditions, advising planting of cucurbitaceæ *toward the close of the rainy season*, will be accordingly modified to meet the obvious benefits that will probably follow the use of the Filipino method.

All exotic cucurbits are extremely sensitive to decay of leaf, vine, and

fruit if subjected to the slightest overflow or inundation, and a further acceptance of the Filipino trellis system seems unavoidable where late or lenten-season planting of late-maturing varieties promises to defer the fruiting epoch until the advent of the heavy June rains.

The Solanaceæ.—As was to be anticipated, many representatives of this largely tropical order have given encouraging results. From our few tests made with potatoes it is yet too early to forecast results, although it is altogether safe to aver that south of 15° north latitude no commercial planting under an elevation of 600 meters can successfully be made. Seed of very great promise was received by the Bureau through the kindness of Maj. W. W. Robinson, jr., United States Army, and has been sent to our station at Benguet for purposes of propagation.

Eggplants, tomatoes, and peppers, all of unrivaled size and excellence, are generally reported by our collaborators and from our own agronomic stations.

The experiences of the Spaniard and of the Filipino indicate a rapid degeneration in size and quality, even in the second generation of these products when reared from home-grown seeds.

Whether a high standard can be maintained by careful seed selection—an operation generally unknown to the Filipino horticulturist—or, if annual importation of northern-grown seeds of plants originally of tropical origin, such as the foregoing, must continuously be made, is one of the problems for investigation now before this Bureau.

The Liliaceæ.—A native onion, small in size and rank in quality, is common throughout the Islands. In Batangas Province it is, in fact, grown upon a considerable commercial scale for distribution in the Manila markets. Our American varieties have not in general responded well to our own efforts nor those of outside planters. Our investigations have gone far enough to indicate that this product is also emphatically a cool-season crop that may be sown with hope of success only toward the end of the rainy monsoon. Leeks have been planted with more general success, and the widely disassociated genus asparagus is giving excellent promise of future success.

Miscellaneous Genera.—Okra (*Hibiscus esculentus*), of topical Asiatic origin, as was to be expected, has given universally good results. Beets, turnips, lettuce, endive, spinach, and radishes are among that class early referred to in this paper whose successful and profitable production, we have abundantly demonstrated, is assured by an intense high-forcing system inaugurated from the day the seed is sown until the crop is secured. Early varieties of cabbage proved disappointing, so far as our own immediate trials went, although a very considerable number of our collaborators report "headed out well." Cauliflower was a failure, notwithstanding tests made with seeds from the extra tropics of Algeria. Sweet or table corn, like the field varieties, developed the same tendency

to dwarf and tassel out when but a few inches high, while on the other hand it must be admitted that from Panay Province we have reports of good growth, good crop, and good quality. Rhubarb and celery have both made a creditable and satisfactory start, but at the time of this writing it is premature to forecast their final outcome.

OIL-YIELDING SEEDS.

Of these sesamum, rape, peanuts, and sunflower have all had preliminary trials during a dry season and without irrigation.

The first and last of these have given unqualified and excellent returns. Rape early in the season succumbed to heat, and was especially subject to the devastation of aphid. Of peanuts we have but scanty and contradictory reports. The seeds imported by the Bureau of the most select sort grown in Virginia in size, appearance, and productiveness seem to offer no improvement on the kind in general cultivation.

In Batangas Province peanuts are primarily grown for the pony forage that the ripened vines afford. The ground nuts themselves, of excellent quality, are secured for food, but seem to be a secondary consideration. Peanut culture in most tropical countries, as we well know, is for the purpose of oil making. In the Philippines this industry is as yet unknown.

Sunflower under truly adverse circumstances has developed a fine growth and a large seed yield. Its further exploitation is to be recommended.

The success that has followed our trials with *Sesamum indicum* calls for a somewhat extended notice. So far as I recall, the small order *Pedaliaceæ*, to which this plant belongs, is of exclusive tropical Asiatic or Malaysian origin, and its excellent behavior here was in a measure to have been anticipated. In fact the black-seeded variety is reported by Blume¹ as indigenous to Java, and the same kind has been more or less grown as a minor product for many years in these Islands. But the white-seeded and by far the most useful variety I have not encountered, and the presumption is strong that the present instance is its initial introduction into this Archipelago. Through circumstances altogether unavoidable our plantings in January were made a full month or more too late in the season and with soil conditions far from being of the best. Notwithstanding this, growth and final crop returns were of the best. Our observations also go to show comparative freedom from the many insect pests, unending warfare with which makes the cultivators life no sinecure.

From several creditable sources I am also assured of the absolute immunity of this plant from the ravages of the locust that in frequent years devastates the fields of every living green thing. Whenever positive verification of this is forthcoming it should place the culture of this plant on a plane of the highest commercial rating.

¹ Bijdragen, p. 778.

There is a practically unlimited demand for sesamum oil in both the Orient and in the West, and of that the product of the white-seeded, on account of its lighter and better color, is most in demand at the best price. It responds (in this climate) to such primitive cultural methods, and its harvests, suitable to the labor of women and children, is attended with so much facility and at so insignificant an outlay of cultivating and harvesting implements, that it recommends itself strongly to the attention of the small proprietor. Its cultivation here upon a considerable scale would be soon followed by the necessary factories to reduce it to a finished product, and in the incidental production of a high-standard cattle food and fertilizer help to solve one of the most vexing and vital questions of Philippine agriculture.

FRUIT-BEARING PLANTS.

Some importations of tropical and subtropical plants and a very few species of strictly temperate-region fruit trees have been made by the Bureau and planted at different elevations. Some of these last named were planted near Abúcaý, Bataan Province, in latitude 14° 45' north, at an altitude of 300 meters, and others in Benguet, 16° 30' north, at an approximate elevation of 1,300 meters.

At sea level the various forms of improved orange that the Bureau has introduced have made excellent growth and give much promise. It is to be expected, however, that the fine and attractive color that contributes so much to the appearance of the cultivated oranges desired from extra-tropical sources may be lost with their transition to the Tropics.

Citrus fruit of a few species and many varieties is common in and indigenous to many parts of the Archipelago. In particular, a variety of *Citrus decumana* which grows at sea level in various parts of Paragua Province is worthy of more than passing mention. Its uncommon size (in some instances quite 15 meters), great vigor, excellent form, and positive freedom from any traces of insect or fungus disease strongly commend it as of value for the reproduction of the best Occidental types of the orange and lemon. The fruit is altogether worthless. Excellent sweet oranges are grown in Cuyo and other islands, especially in Batangas Province.

On the Bureau's trial grounds at Manila a very limited number of Japanese plums, loquats, persimmons, chestnuts, and grapes have been tried together with Japanese types of *Citrus aurantium* var. *nobilis* and a few pomegranates. The grapes and persimmons have made a good initial start, and the progress of the citrus fruits and of the pomegranates has been of the best.

TEXTILE PLANTS.

Cotton.—Experiments with textile plants have been confined to cotton and jute. Both have heretofore been grown in the Archipelago as minor products—the jute as a spontaneous and the cotton mainly as a perennial crop, but uncultivated. Our distributions of cotton seeds have

mainly been of varieties grown in the Southern United States, and although we have generally good results reported there is the remaining doubt if the native grower has an adequate comprehension of the standard crop requirements of cotton-growing countries.

Varieties of Egyptian and Brazilian origin are all that seem heretofore to have found any particular favor with native growers. The facility with which the lint is stripped from the former varieties, the absence of any gins, and the very primitive hand-linting substitutes probably have much to do with the neglect, not to say discredit, of American varieties.

Our own observations indicate that, in general, the tendency to early and continuous flowering may be overcome by planting after the mid-rainy season and by good tith a vigorous growth may be promoted. Then, with the check that the cooler and the dryer season brings and the lay-by of cultivation promotes, the plant will develop the *crop* rather than the individual inflorescence so essential to its economical harvesting. We have had no reports indicating wilt or other diseases incident to the cotton plant.

Jute (Corchorus capsularis).—The climatic conditions are evidently unexcelled for the fullest development of this plant.

Under the most discouraging environment it nevertheless developed a sufficient growth to promise excellent returns if given reasonable cultural assistance.

The extended cultivation of jute should be strongly encouraged in these Islands. The world's market for cheap baggings and gunnies is practically unlimited, and as yet there has been no textile fiber grown that so well subserves their manufacture as jute. The relative facility, as compared with abacá, with which the fiber is prepared offers a larger inducement to the general planter than does abacá. The export trade of British India in this fiber, amounting to some \$15,000,000 annually, could be largely diverted to this Archipelago.

MISCELLANEOUS PRODUCTS.

Coffees.—Liberian and the Maragotype hybrids have both been imported from Java and distributed to planters interested in the attempt to rehabilitate the coffee industry. The Bureau has also raised successfully many thousands of young plants destined for planting out under its own direction.

The most recent investigations into coffee enemies and diseases indicate that these species enjoy no specific immunity from disease or insects, but their greater vitality and vigor make them resistant in so far that they are better able to sustain these attacks than the feebler growing Arabian types. There has, so far as the writer can ascertain from inquiry and personal investigation of the coffee-growing districts, never been the faintest attempt made to grow the coffee plant other than as a spontaneous product, and there are reasonable grounds to believe that under the

influence of clean, open culture, and the use of these vigorous-growing stocks the encroachments of both fungus diseases and insect pests may be successfully held in check.

Tobacco.—Through the kindness of Prof. D. G. Fairchild, of the United States Department of Agriculture, the Bureau secured seeds of selected strains of the best Sumatra wrapper seed. Some of this was distributed in the famous Isabela and Cagayan tobacco districts. Plantings have also been made upon the trial grounds in Malate under the Bureau's control, and until now, the approach of the harvest, its planting has been highly satisfactory. Trials have been made in the open and under cover, and the findings of the result when curing is completed will probably be made the subject of a future bulletin.

"Seguidillas" (*Psophocarpus tetragonolobus* D. C.).—This is a leguminous vine widely spread over the Asiatic tropics and is spontaneous in most parts of the Archipelago. Its merit and excellence have so attracted the attention of outsiders that enterprising Australian seed growers now catalogue the seed under the name of "asparagus pea." The plant is very prolific of tender angular pods, which when boiled have a distinct asparagus-like flavor. It is a strong-growing and long-cropping legume, producing from October-sown seeds abundant yields from November to March. It is very highly prized by the natives, and there are few garden vegetables of northern origin that would be better appreciated by Americans.

Bobug (*Sterculia foetida*).—An excellent nut-yielding tree of extraordinarily rapid development. It fruits at an early age, probably the third or fourth year, and produces an abundance of wholesome and nutritious seeds not unlike in size and taste the piñon or western pine nut.

The tree grows to great size and adapts itself to any and every soil or locality.

Casuy (*Anacardium occidentale*).—A New World introduction of long standing in these Islands that has become sparingly spontaneous in many localities. The general planting of casuy can not be too strongly commended as an article both of food and export. The tree begins to fruit in its earliest life (sometimes the second year), and bears largely increasing and *regular* crops every succeeding year. Its domestic value lies in its being the only native nut-bearing tree of a quality and excellence that compares favorably with the best nuts of Western markets. These nuts are delicious eaten raw and still further improved by roasting. Under pressure they yield about 40 per cent of a bland light oil of much greater value than pure olive oil, which rates on the same plane with the best grades of almond oil. The plant serves a number of local domestic purposes and the curiously engorged torus is in some demand as a fresh fruit. In Cuyo I observed trees 7 to 8 meters in height and crown diameter whose single crop of nuts, I think, could have been conservatively estimated at not less than 10 kilos.

Citrus limonum.—A variety from Lepanto-Bontoc, different from anything figured or described by Bonavia, and more probably of Philippine than Indian origin. The tree is only lightly spinescent and of remarkably vigorous growth, plants only three months from the seed measuring 25 to 30 cm. The fruit is large size, long-oblong, and of good keeping quality. The skin is thin, smooth, and very highly colored, and the flesh juicy acid and abundant. A rather large seed production is its single defect. In other respects it will compare to advantage with some of the best seedlings of European or Californian origin. Its cultivation on a large scale should result in supplanting the now considerable foreign importation of lemons to these Islands.

LIST OF SEEDS AND PLANTS INTRODUCED.

CEREALS.

Name.	Variety.	Whence derived.
Buckwheat -----	Japanese -----	United States.
Corn (field) -----	Burpee's Golden Beauty -----	Do.
	Cocke's Prolific -----	Do.
	Improved Southern White Snowflake -----	Do.
	Virginia White Dent -----	Do.
	White Cap Dent -----	Do.
	White Majestic -----	Do.
Millet -----	Pearl -----	Do.
Oats -----	Georgia Turf -----	Do.

FORAGE.

Alfalfa -----		United States.
Bermuda grass -----		Do.
Clover -----	Italian Crimson -----	Italy.
Corn -----	Kafir -----	United States.
Paspalum dilatatum -----		Do.
Cane -----	Early Amber -----	Do.
	Early Orange -----	Do.
Hedysarum coronarium -----	Sulla -----	Italy.
Euchlaena luxurians -----	Teosinte -----	United States.

GARDEN VEGETABLES.

Artichoke -----	Large Green Globe -----	United States.
Asparagus -----	Barr's Mammoth -----	Do.
	Columbian Mammoth White -----	Do.
Beans (bush) -----	Best of All -----	Do.
	Curries's Rustproof Golden Wax -----	Do.
	Dwarf Horticultural -----	Do.
	Early Prolific Dwarf German -----	Do.
	Early Round Yellow -----	Do.
	Extra Early Red Valentine -----	Do.
	Extra Early Refugee -----	Do.
	Goddard or Boston Favorite -----	Do.
	Golden Wax -----	Do.
	Improved Early Round-Pod Red Valentine -----	Do.
	New Pencil Pod Black Wax -----	Do.
	Refugee Wax -----	Do.
	Rustproof Golden Wax -----	Do.
	Saddleback Wax -----	Do.
	Stringless Green Pod -----	Do.
Beans (lima) -----	Burpee's Bush -----	Do.
	Dreer's Bush -----	Do.
	Willow Leaf -----	Do.
	Woods's Prolific Bush -----	Do.

GARDEN VEGETABLES—Continued.

Name.	Variety.	Whence derived.	
Beans (pole)	Kentucky Wonder	United States.	
	King of the Garden	Do.	
	Lazy Wife	Do.	
Beets	White Creaseback	Do.	
	Crosby's Egyptian	Do.	
	Detroit Dark Red	Do.	
	Eclipse	Do.	
	Edmand's Early Turnip	Do.	
Borecole	Stinson	Do.	
	Dwarf German	Do.	
Brussel's sprouts	Paris Market	Do.	
Cabbage	All Seasons	Do.	
	Burpee's Allhead Early	Do.	
	Burpee's Surehead	Do.	
	D'Hiver Parapluie	France.	
	Early Etampes	United States.	
	Early Jersey Wakefield	Do.	
	Early Winnigstad	Do.	
	Extra Early Express	Do.	
	Fottler's Drumhead	Do.	
	Henderson's Early Summer	Do.	
	Large Late Drumhead	Do.	
	Montgibello	Italy.	
	Premium Flat Dutch	United States.	
	Carrot	Chantenay	Do.
		Early Scarlet Horn	Do.
		Scarlet Golden Ball	Do.
	Cauliflower	Early Snowflake (Henderson's)	Do.
Extra Early Dwarf Erfurt		Do.	
Extra Early Paris		Do.	
Celery	Primus	Italy.	
	Evans's Triumph	United States.	
	Golden Self-Blanching	Do.	
Collards	White Plume	Do.	
	Georgia	Do.	
Corn (sweet)	Country Gentleman	Do.	
	Crosby's Early	Do.	
	Earliest Sheffield	Do.	
	Early Cosmopolitan	Do.	
	Early Fordhook	Do.	
	Early Minnesota	Do.	
	Kendel's Early Giant	Do.	
	Shoe Peg	Do.	
	Stowell's Evergreen	Do.	
	Cucumber	Burpee's Giant Pera	Do.
		Corosan	Italy.
		Coy's Early Cyclone	United States.
Fordhook White Spine		Do.	
Formosa		Italy.	
London Long Green		United States.	
New Extra Early White Spine		Do.	
Paris Pickling		Do.	
Thorburn's Everbearing		Do.	
Early Dwarf Red Purple		Do.	
Fordhook Improved Spineless	Do.		
Endive	New York Improved Large Purple	Do.	
	Giant Fringed	Do.	
	Green Curled	Do.	
Garlic	White Curled	Do.	
		Do.	
Leek	London Flag	Do.	
Lettuce	Scotch Champion	Do.	
	Big Boston	Do.	
	Boston Market	Do.	
	Black-Seeded Tennis Ball	Do.	
	California Butter	Do.	
	Deacon	Do.	
	Grand Rapids	Do.	
	Hanson	Do.	
	Nansen	Do.	
	Philadelphia Early Dutch Butterhead	Do.	
	Martynia	Proboscidea	Do.
		Burpee's Matchless	Do.
	Melon (musk)	Early Nutmeg	Do.
		Early Jenny Lind	Do.
Extra Early Hackensack		Do.	
Golden Eagle		Do.	
Jersey Belle		Do.	
Netted Gem		Do.	
Paul Rose		Do.	
Rocky Ford		Do.	
Sorts		Italy.	

GARDEN VEGETABLES—Continued.

Name.	Variety.	Whence derived.	
Melon (water)	Cuban Queen	United States.	
	Duke Jones	Do.	
	Frame's Santiago	Do.	
	Ice Cream	Do.	
	Kolb's Gem	Do.	
	Kleekley's Sweet	Do.	
	Long White Icing	Do.	
	Mountain Sweet	Do.	
	McIver Sugar	Do.	
	Dwarf Prolife	Do.	
Okra	Lady Finger	Do.	
	Perkin's Mammoth	Do.	
	American Prize Taker	Do.	
Onion	Australian Brown	Do.	
	Extra Early Barletta	Do.	
	Extra Early Red	Do.	
	Extra Early White Pearl	Do.	
	Large Red Globe	Do.	
	Large Yellow Globe	Do.	
	Large Yellow Strasburg	Do.	
	Large White Globe	Do.	
	Philadelphia Silverskin	Do.	
	Red Wethersfield	Do.	
	Silver King	Do.	
	White Portugal	Do.	
	Yellow Danvers	Do.	
Parsnip	Improved Guernsey	Do.	
Pease	Alaska	Do.	
	American Wonder	Do.	
	Bliss's Everbearing	Do.	
	Bliss's Abundance	Do.	
	Burpee's Best Extra Early	Do.	
	Dwarf White Marrowfat	Do.	
	Extra Early Premium Gem	Do.	
	First and Best	Do.	
	Heroine	Do.	
	Improved Stratagem	Do.	
	Pride of the Market	Do.	
	Prosperity	Do.	
	Yorkshire Hero	Do.	
	Pepper	Bird's Eye	Do.
Black Nubian		Do.	
Bull Nose		Do.	
Coral Gem		Do.	
Chinese Giant		Do.	
Red Chili		Do.	
Red Cluster		Do.	
Ruby King		Do.	
Chartier		Do.	
Extra Early Searlet Turnip		Do.	
Radish	Long Cardinal	Do.	
	Scarlet Button	Do.	
	White Strasburg	Do.	
	Princee Albert	Italy.	
	Sandwich Island Mammoth	United States.	
Rhubarb	New Victoria	Do.	
Salsify	Boston Marrow	Do.	
Spinach	Coeozelle Bush	Do.	
	Coeozella of Tripoli	Italy.	
	Early White Bush	United States.	
	Early Yellow Bush	Do.	
	Faxon	Do.	
	Golden Summer	Do.	
	Hubbard	Do.	
	Mammoth White Bush	Do.	
	Tomato	A Tige Raide de Laye	France.
		Burpee's Matchless	United States.
Fordhook First		Do.	
Helios		Italy.	
Ignotum		United States.	
Livingston's Perfection		Do.	
Paragon		Do.	
Ponderoso		Do.	
Sparks's Earliana		Do.	
Stone		Do.	
Turnip	Suecess	Do.	
	Early Purple Strap Leaf	Do.	
	Early Red	Do.	
	Early White Flat Dutch	Do.	

FRUITS.

Name.	Variety.	Whence derived.
Castanea japonica	Chestnut	Japan.
Citrus aurantium	Nobilis	Do.
Citrus decumana	Pomelo	Do.
Citrus japonica	Kumquat	Do.
Citrus trifoliata	Pomelo	Do.
Diospyros kaki	Persimmon	Do.
Eriobotrya japonica	Loquat	Do.
Prunus japonica	Plum	Do.
Punica granatum	Pomegranate	Do.

GUM OR RESIN YIELDING PLANT.

Manihot glaziovii	Ceara rubber	India.
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LAND-RENOVATION SEEDS.

Cowpea	The Clay	United States.
	Whippoorwill	Do.
Lupinus varius	Lupine	France.
Soja bean		Japan.
Velvet bean		Do.

MISCELLANEOUS.

Bambusa species	Bamboo	Japan.
Cinnamomum camphora	Camphor	Do.
Dioscorea japonica	Yam	Do.
Coffee	Liberian	Java.
	Maragotype hybrid	Do.
Glycyrrhiza	Glabra	France.
Pumpkin	Big Tom	United States.
	Genuine Mammoth	Do.
	Golden Oblong	Do.
	Large Cheese	Do.
Tobacco	Connecticut	Do.
	Havana	France.
	do	United States.
	Sumatra	France.
	do	Sumatra.
	do	United States.

OIL-YIELDING SEEDS.

Peanut	Improved Virginia	United States.
Poppy	Opium	France.
Sesamum	Indicum	Do.
Sunflower	Mammoth Russia	United States.

POT HERB SEEDS.

Caraway		Italy.
Lavandula vera		Do.
Origanum vulgare		Do.

TEXTILE PLANTS.

Cochorus textilis		France.
Cotton	Egyptian	Do.
	Neapolitan	Italy.

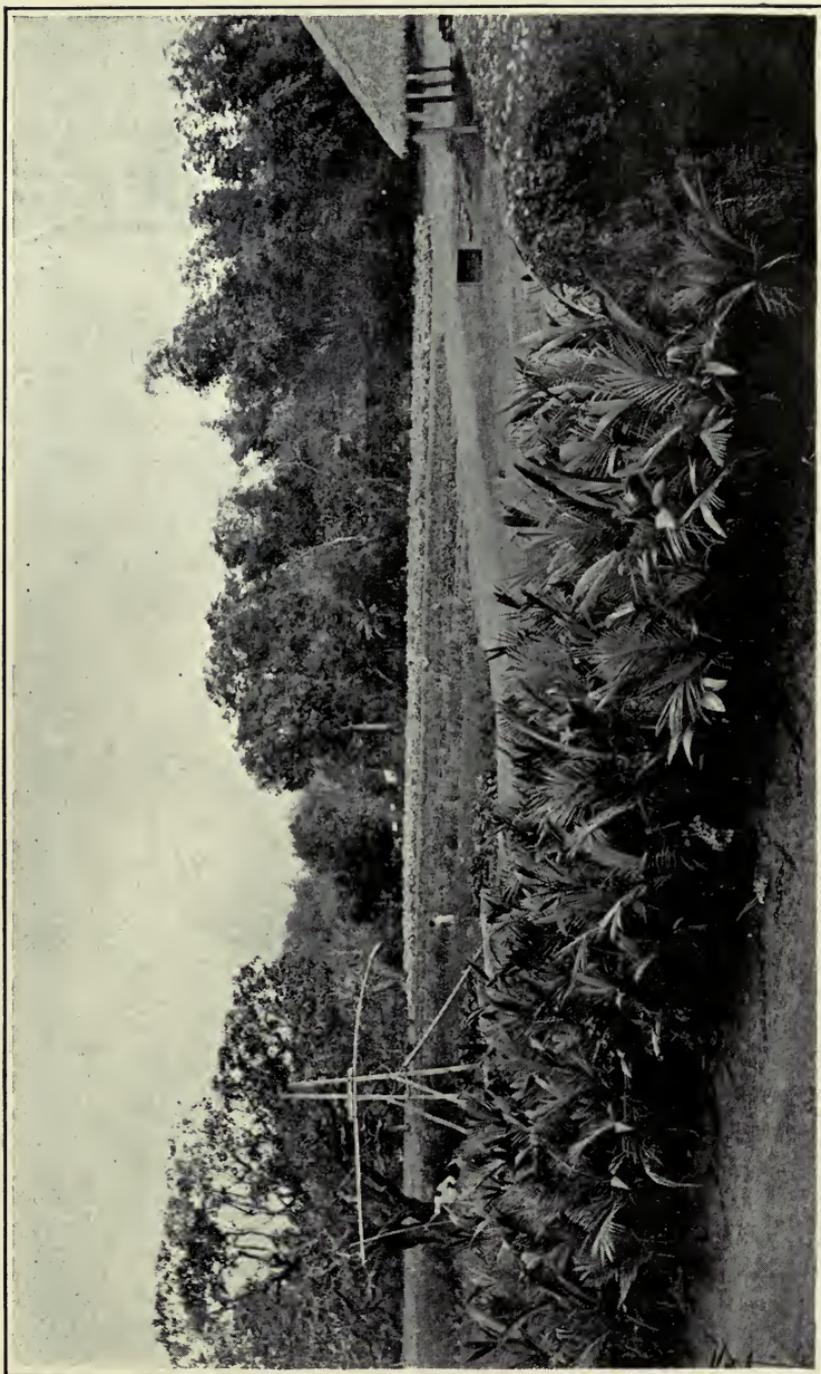
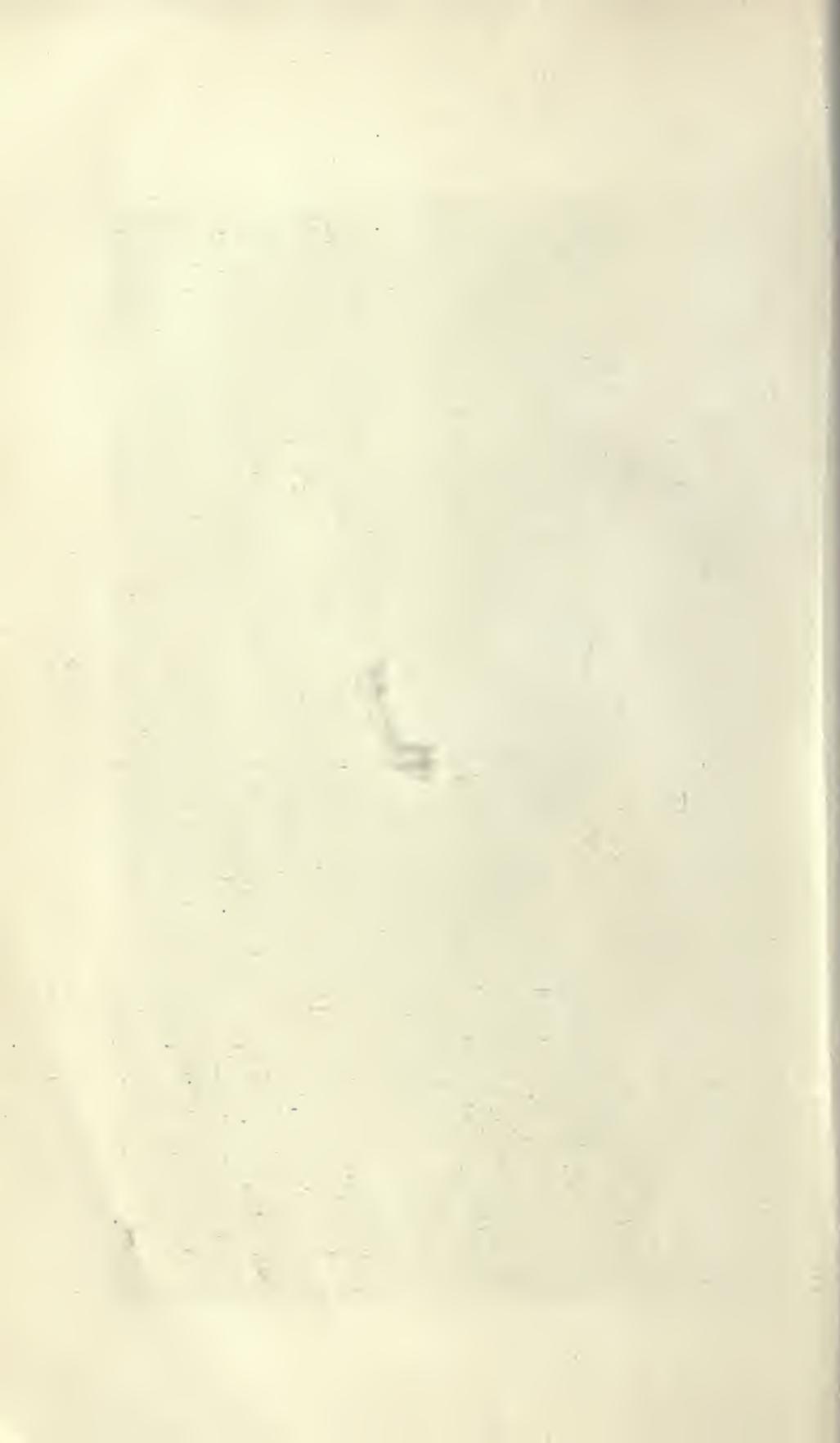


PLATE I.—GENERAL VIEW OF TRIAL GROUNDS OF BUREAU OF AGRICULTURE IN MALATE.
FROM PHOTOGRAPH BY F. LAMSON-SCRIBNER, FEBRUARY 15, 1908.



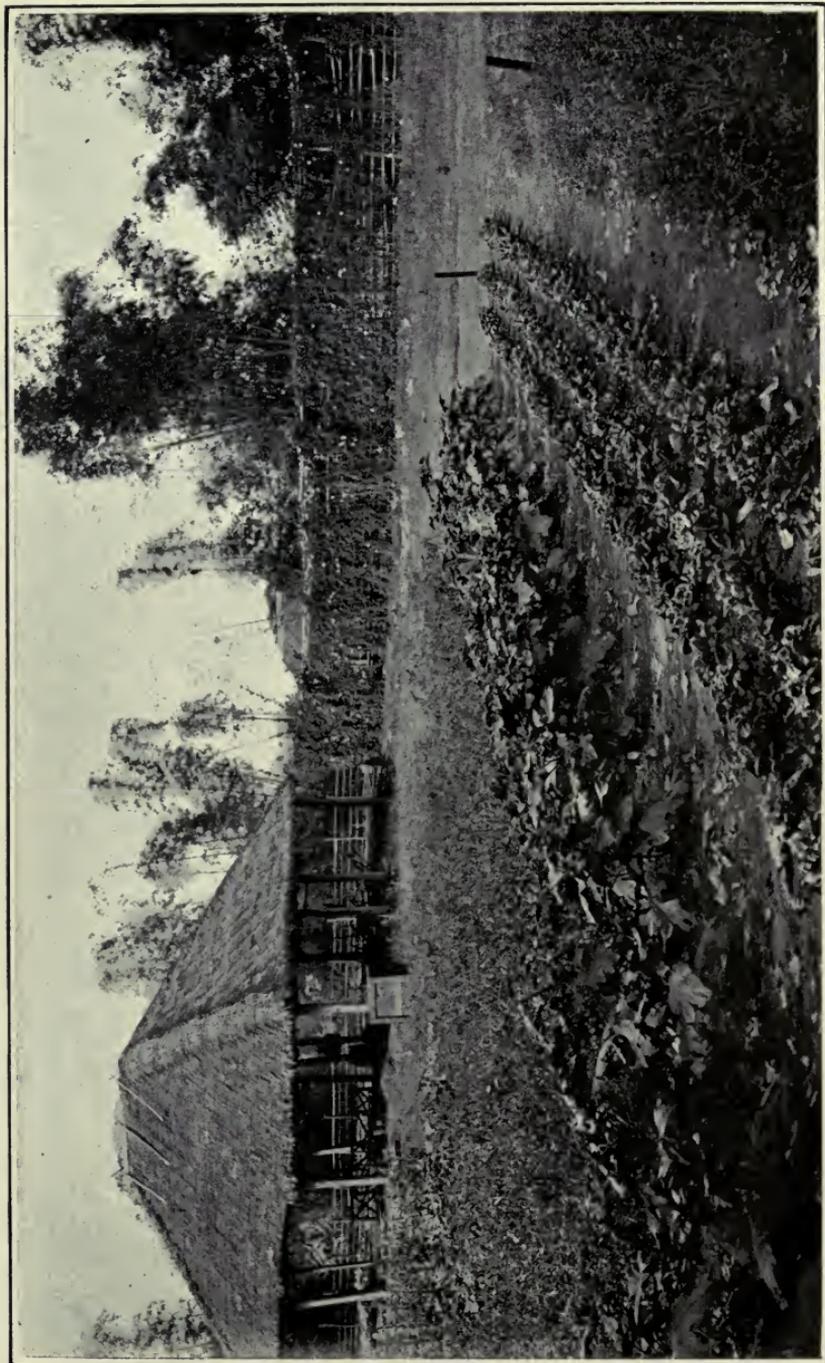


PLATE II.—TRIAL PLOTS AT EXPERIMENT STATION OF BUREAU OF AGRICULTURE IN MALATE—EGGPLANTS AND LETTUCE IN THE FOREGROUND. FROM PHOTOGRAPH BY F. LAMSON-SCRIBNER, FEBRUARY 15, 1903.



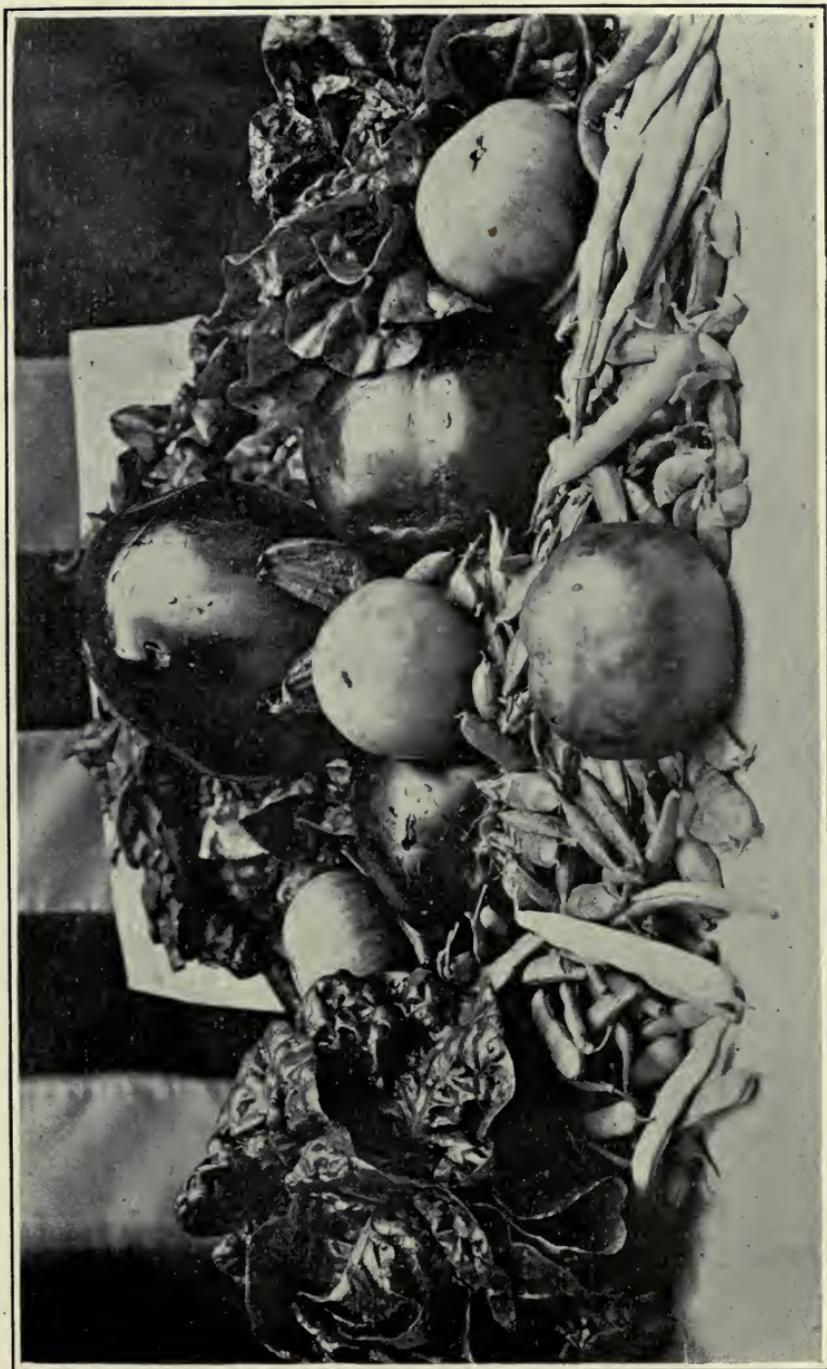


PLATE III.—VEGETABLES—LETTUCE, EGGPLANTS, TOMATOES, OKRA, PEASE, BEANS—GROWN ON THE EXPERIMENT STATION OF THE BUREAU OF AGRICULTURE AT BATANGAS, FEBRUARY, 1903. FROM PHOTOGRAPH BY F. LAMSON-SCRIBNER.

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