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QUEENSLAND AGRICULTURAL JOURNAL

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Agriculture.

THE MOUNT LARCOM MINING HOMESTEAD AREA.

Reporting to the Under Secretary for Agriculture and Stock on his recent visit to the mining homestead area, Mount Larcom district, for the purpose of giving advice to settlers in regard to agricultural matters generally, Mr. G. B. Brooks, Instructor in Agriculture, says:—

"This portion of country lies to the south-west of the township, commencing at a point 3 miles distant and extending some 12 miles to the south.

"An outstanding feature in connection with this settlement is that it is undoubtedly the most thickly populated centre in Queensland, over 200 farmers being located on 80-acre blocks.

"*Physical Characteristics.*—The land in this locality is made up of gently undulating ridges, with the exception of the south-west corner, which is of a more hilly and broken nature. There is one disadvantage in connection with mining homestead areas, and that is the roads run in a straight line irrespective of the grade. The result is that in many places transport facilities are by no means of the best.

"*Soil.*—The formation is to a large extent of volcanic origin, mostly overlying limestone rock and covered with a more or less dense scrub. The soil is rich and friable, and generally of good depth.

"There are small areas of forest, timbered with box and gum, the soil being of a close textured grey clay nature. Samples of soil representing both scrub and forest were secured and handed over to the Agricultural Chemist for analysis.

"*Rainfall.*—Records covering a lengthy period were not procurable. The average annual rainfall is stated to be in the region of 43 in. Although this high average for the twelve months is of some importance, yet the average for the individual months would be far more so, for upon a well distributed rainfall depends the successful raising of many important crops.

"*Temperatures.*—In regard to the lines of development followed up, temperature is likely to prove an important factor. Many of the settlers are planting crops of a tropical habit, and others are about to make a move in the same direction.

"It will be found that fairly severe frost will be experienced in the low-lying portions, more especially when the scrub disappears, as it undoubtedly will in the near future. Some little care will, therefore, have to be exercised in regard to the keeping of such crops well above the frost line.

"*Lines of Development.*—This district being practically in its infancy, no definite system of cropping has yet been developed. The only marketable product so far produced, to any extent, is maize. To depend upon this crop alone entails a considerable amount of risk, as is seen during the present season, when in many instances the yield is reduced to less than half through lack of moisture.

"The raising of additional crops such as broom millet, onions, &c., was strongly advocated, with the result that several farmers have decided to plant experimental areas during the coming season.

"The growing of market garden crops was also discussed. Not only is the soil and climate favourable, but an outlet for the products would be found in Rockhampton and along the Central Railway Line; while a shipping port for the Southern markets is quite handy at Gladstone.

"During my visit tomatoes were to be found growing in wild luxuriance in the cleared areas, and, although tons were actually going to waste, apparently no effort is made to put them on the market.

"*Fruit Culture.*—Many of the settlers are putting down several acres in bananas, while smaller patches of pineapples are also being planted.

"*Sugar-growing.*—Experimental patches of cane are to be found all over the district; and, in the event of a mill being erected, a large number of farmers would undoubtedly engage in this industry.

"*Dairying.*—Although the climate and pasture is eminently suitable for dairying, still on a selection of 80 acres it will only be possible to maintain a small herd; and, to make this successful, it will be absolutely essential that only animals of a highly productive nature be kept.

"Pig-raising would be a necessary adjunct.

"*Water Supply.*—Unfortunately, very few of the settlers have a permanent supply of water. The cutting up of the land into 80-acre blocks has been the means of making the water problem a more difficult one than would have been the case had the areas been larger. Many of the selections are on broken limestone formation and without even a trace of any natural watercourse.

"In my report upon the adjoining German settlement area a suggestion was made that some assistance should be given in regard to the location of underground supplies in dry districts. This was given effect to, an automatic water-finder belonging to the Lands Department being secured on loan. This instrument formed part of my equipment during my visit to the mining homestead area.

"The weather was, unfortunately, showery during the first half of my tour in the district; therefore I did not consider it advisable to test for sites while these conditions obtained. The number selected during my stay was, therefore, not so numerous as would otherwise have been the case.

"It may be mentioned that several sites were pegged out during my previous visit by means of the divining rod. One was on the farm of Mr. W. J. Hamilton, who had recently put down two wells with negative results. He was pleased to inform me on my return that, in sinking where I had indicated, he had struck a flow at the shallow depth of 14 ft. On testing this site with the automatic finder, the result coincided exactly with that previously located. Another divined site was tested on the farm of Mr. J. N. McCulloch. In this case there was a difference of 1 yard between the finder and the rod.

"The relationship between the divining rod and the instrument is —according to the results so far obtained—remarkable. Out of some 14 tests made, the results were practically identical; and in most instances I could foretell how the instrument would act, and its peculiar behaviour according to the supposed underground stream, by previously prospecting with the 'rod.'

"The results obtained from sinking on the places indicated will be of extreme interest and importance, for, should supplies be obtained at a comparatively shallow depth, the benefits accruing to both settler and State would be inestimable.

"I would suggest that, as opportunity offers, data be collected as to the success or otherwise of obtaining water, depth of sinking, strata, &c. This information would be very valuable as a guide to future operations.

"The thanks of the Department are due to Mr. F. Finke, who spent some days in taking me over the south-west portion of the district, and also to Mr. T. D. Ferguson for information supplied."

GOOD ROADS.

The road question is one of vital importance to farmers living at any distance from a railway station, and there are many splendid areas of arable land in all parts of the State which would become important centres of agricultural activities were it not for their inaccessibility owing to the want of roads of communication to a railway. Some ten years ago the Hon. A. J. Thynne, then Minister for Agriculture in this State, took up this question of road-making, and a series of articles on the subject, penned by him, appeared in the "Queensland Agricultural

Journal" (vols. XIV. and XV., 1904). A good article on road-making in farming districts was also published in vol. XXI., 1908.

It will be interesting to farmers in the districts alluded to by Mr. Thynne to note how the pioneers of the agricultural industry fared then, owing to the want of roads, ten years ago:—

"In the days when the Romans, under various emperors, extended their conquests to other lands, they invariably gave great attention to the construction of good military roads, especially in countries which they permanently occupied. There roads were so well constructed that they have lasted for over eighteen centuries, and are as good to-day as when the Roman generals, the soldiers, and the conquered people laboured at them. To construct such roads at the present day would be out of the question, for the cost of them would be prohibitive, no forced labour being available, as it was in Cæsar's day. Neither are such splendidly built roads necessary for ordinary country traffic. But, whilst we have been expending our energies and large sums of money in establishing an excellent railway system, we have most shamefully neglected our high roads. Time was when high roads and bridges were made, built, and maintained by the Government, and the main roads, at least, were kept in a good state of repair, because money could generally be found to carry out such public works, and to maintain them afterwards. The building of railways to the interior caused neglect of the main high roads. Coaches and wagons, bullock and horse teams being discarded for railway carriage, it was deemed no longer necessary to keep the road in repair. When the old road boards were done away with, there was no one to attend to the matter, and travelling by road became fraught with discomfort, damage, and danger. Nearly 100 years ago the United States Goevrnment was engaged in projecting and building extensive systems of public highways to develop the resources of the country, and probably that policy would have been continued but for the rapid growth of railway systems that seemed better adapted to the needs of the expanding business and the increasing traffic of the country. Within recent years there has been no adequate system for maintaining the highways in that country, and, as an American journal puts it, 'their condition in this age of general development is a disgrace to a civilised nation.'

"Now, an Office of Public Road Inquiries has been established through the Department of Agriculture, and this office is maintained by yearly appropriations from the public Treasury, resulting in great good in promoting road improvement, and there has been an increasing demand upon this office, not only for achieving aid, but for material assistance. In responding to the people's call for Government aid, there has been made a safe and healthy beginning, and the time is opportune for enlarging and extending the work in that country.

"In our State of Queensland the making and maintaining of the roads devolves upon the Shire Councils, who are empowered to levy rates for these purposes. In many parts of the country, such as in mountainous districts, as, for instance, in the Blackall Range and Main Range, and

PLATE 1.—A SCRUB ROAD IN THE MAROOCHY DISTRICT.

on vast stretches of deep alluvial or volcanic plains, such as the Darling Downs, the formation of good solid roads is beyond the means of the Shire Councils, whose funds have many other calls upon them. A great many necessary public works in the various shires have to be carried out by the aid of loans from the Government, but these loans have to be repaid, together with interest. If loan after loan is granted, and repayment deferred to the Greek Kalends, then it practically amounts to the work being done, as in olden times, by the Government. It was precisely to avoid this, that, together with other reasons, local government was established. The old system gave rise to many abuses, and easily obtained grants for local purposes were often diverted from the objects for which they were intended, and expended in some other direction. In some districts, the roads are a credit to any country, but when the highways are in such excellent order it will be found that the local conditions are all favourable to inexpensive, yet effective, road construction. The greatest trouble about roads exists in the farming districts, and in many of them roadmaking is limited to throwing up a heap of black soil and building culverts over the worst gullies. Metalling the black soil road is useless under such conditions, and the Shire Councils are not in a sufficiently flourishing condition financially to incur the great expense of properly 'building' roads over the rich alluvial plains. During a continuance of dry weather there is no trouble with the plains roads, unless it be in districts where they are badly cut up by timber wagons; but in wet weather travelling by wheeled vehicles is next door to impossible. A glance at the illustration on another page, of a road in the Maroochy district, will show the sea of mud and water the unhappy settler must struggle through to reach the railway. The worst roads in this State are, as stated, in the hill country and on the blacksoil plains. It is possible to ride or drive over the latter during heavy rains; but when the soil begins to be less saturated, travelling, if not impossible, is exceedingly hard on horses and bullocks employed in wheeled traffic. In the mountainous country the farmer has to contend with very steep gradients, as well as with deep, adhesive mud. In the Blackall Range the pioneers of settlement were the timber-getters. Their bullock teams drew the logs from the scrub by the nearest route, irrespective of steepness, as the road to the railway is all down-hill, and the teams returning with empty wagons were able to negotiate the steep bush tracks. When the farmer came along, however, to settle on these lands, the question of roads became a very serious one. But those responsible for opening roads for the farmers contented themselves with improving the old bullock tracks, by taking out a few stumps, cutting down a very bad sidling, leaving a road so narrow as hardly to allow two carts to pass each other. And even where the worst steeps were reduced by heavy cuttings, the gradient in several places is 1 in 2. We have only lately seen a bullock dray, empty, drawn by sixteen bullocks, stopped twice on one of these long, steep hills, to rest the animals. Those who are learned in the traction power of draught animals have proved, by incontestible figures, what actual force has to be expended by a horse in drawing a certain load on level and on steep

roads. It appears, by tables published by the Department of Agriculture of the United States, that a horse can exert a tractive force of 83·33 lb. for 10 consecutive hours at the rate of 3 miles per hour. This means that he can move a ton for 30 miles in 10 hours over a smooth, well-made gravel road. But taking a grade of 1 in 30 he can only move it 11 miles. If the gradient is increased to 1 in 10, he could only move it 5 miles. How far could he move a ton on such a road as we have described—*i.e.*, the road from Nambour to Dulong—where the gradients are so very steep? He could not move it at all. A settler at Mapleton has been bringing cedar in flitches down this range. His load, with four horses, does not exceed 600 feet. The distance is about 9 miles, and it takes the best part of two days to go and return. We do not enter here into the question of wear and tear on harness and wagon, which must be considerable. Then there is the loss of time to the driver. That is of as great importance as any other factor in the business. There are three ways of improving this state of affairs. The existing roads where these excessive gradients occur could be divided into sections of steep and level. If short level stretches were to succeed short pinches before the strength of a team is exhausted by a long pull, the cattle would be on level ground, and there recover breath and move easily on to the next short steep to be negotiated. Thus the top of the range would be reached in shorter time, and with greater ease to the cattle. The second plan is to abandon the road where these steeps occur and contour the ridges. There is a piece of country running below the pinches we mention, where a road could be carried in 2 or 3 miles, which would not have a gradient of more than 1 in 30, and which would, in even a shorter distance, reach the objective point beyond the ridges. This is only a single instance of many mountainous roads in the State which we could point out. The third and best way of overcoming the gradient difficulty is the narrow-gauge tramline. Such a tramline has now been built in this particular part of the range, and an 8-h.p. motor-car has taken a load of 5 tons up the range at the rate of 3 miles per hour. We believe that not even one ton has ever been taken before from Nambour to Mapleton by horse power and wagon.

"As for the black soil plains, the building of roads, as we have pointed out, is a matter of *naturæ locis*. Stone and gravel are plentiful in many parts of the Darling Downs, or of the Downs country of the Central and South-Western Districts, and where such is the case excellent roads have been constructed, as witness the road running from Warwick to Freestone and Swan Creeks. Many persons know that for a long time it was deemed impossible to make a road of any kind across Chat-moss, in England. Millions of tons of stone were emptied into it to form a road for the railway, only to be swallowed up in its bottomless abysses. Yet, to-day, the trains run regularly across this shaking bog. The roadway was made of fascines, on which the sleepers, rails, and ballast were laid, and the road is as solid and firm as if it ran over rock. Our blacksoil plains are not bottomless. But, if the top crust is broken, many more tons of broken metal would be required to form a firm road

than if it ran over a sandy plain. Here fascines would come in. The road could be formed, drains made on each side, the surface laid with fascines, as has been done in the case of the training walls at the Hamilton Reach of the Brisbane River, and on these fascines a firm roadway could be built. We propose to continue this subject of good roads for farmers, as it is one of vital importance to them, and we shall endeavour to throw all possible light on it, in the hope that eventually the proverb about dropping water wearing away a stone will be realised in the determined effort of all Shire Councils to provide easy means for farmers to bring their produce to the various railways."

RICE-GROWING AT BULIMBA.

That Uplands or Mountain Rice will thrive and yield heavy crops on the coast lands of Queensland from the Southern border to the Far North at Cairns has long ago been proved. At one time the industry was carried on profitably in the South, in the Pimpama, Logan, and Albert districts, where a rice mill was erected by Mr. W. Heck, which treated all rice grown in the neighbourhood. The crops then grown with only fair cultivation yielded from 30 to 40 and up to 60 bushels of paddy per acre, which sold at from 4s. to 5s. per bushel delivered at the mill. Besides the grain, the straw, which is less hard than and compares favourably with oaten straw, yielded from 3 tons to 4 tons per acre, according to the variety grown, of a value of from £2 to £3 per acre. Thus a six months' crop of rice gave the grower an average of £15 10s. per acre. In favoured districts free from frost, as in North Queensland, two crops can be obtained in the year. The price of rice at the time was from £19 to £24 per ton, which gave the local miller a fair margin of profit if he sold at £18 per ton. To produce a ton of marketable rice, 1 ton 10 cwt. of paddy is required to be milled of a value of over £12, and the miller's profit was £3 10s. per ton. The question of labour does not enter largely into rice cultivation. The land is prepared in the same way as for wheat, and the seed may be sown either broadcast at the rate of 60 lb. of paddy per acre, or, what is preferable, in drills 2 ft. 6 in. apart, with 10 in. between the plants by means of an automatic seed sower. Rice has usually been harvested with the ordinary sickle in the districts named. It is then left for a day or two to ripen, when it is carted to the barn for stripping and thence to the mill.

Owing to the spread of the sugar and dairying industries, the cultivation of this profitable crop was neglected, but the facts remain as above stated.

In proof of what can be done in rice-growing, we have received from Mr. C. F. Dennis, Hawthorn road, Bulimba, near Brisbane, a sheaf of rice here depicted:—

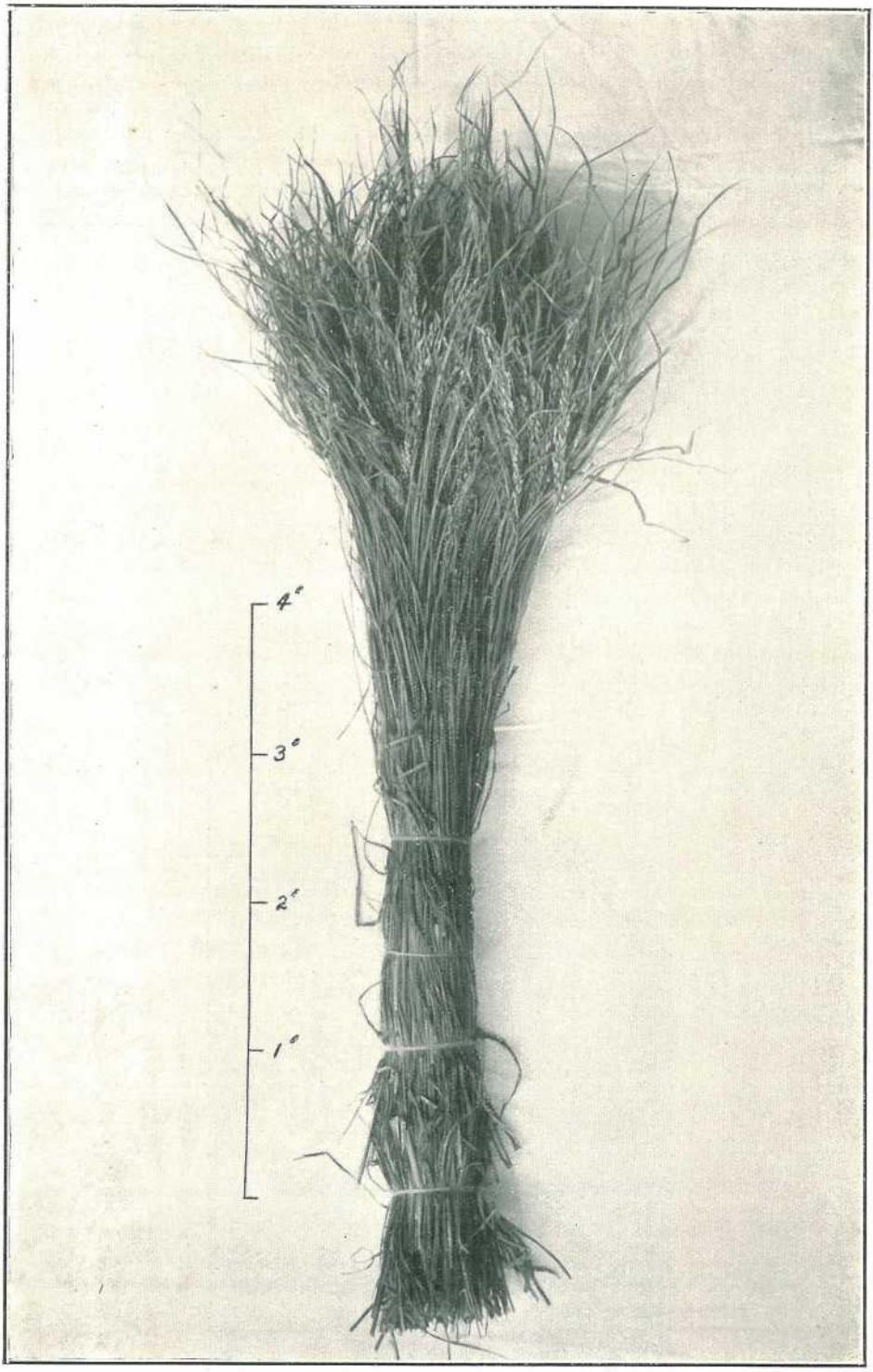


PLATE 2.—RICE GROWN AT BULIMBA.

It was grown on alluvial soil at the foot of a hill; depth of surface soil, about 2 ft., with a subsoil of pipeclay. The area planted yielded at the rate of 60 bushels per acre; the heads were well developed and the straw from 4 ft. to 5 ft. high. The seed was obtained from a local seedsman (Mr. T. H. Wood), and germinated freely. The straw is much finer than that of oats, with which it compares favourably for chaff. The crop was sown on 10th January, 1914, and harvested on 8th May of the same year, the sample here shown having been cut about 6 in. above the surface of the ground.

TANIAS; OR, DASHEENS.

We have received from Mr. B. Harrison, F.R.H.S., &c., of Cudgen Park, Burringbar, N.S.W., the following paper on the "Dasheen," described as a new vegetable. Those of our readers who are in possession of the "Queensland Agricultural Journal" for September and November, 1906, will find therein a full description of the Dasheen, which is grown in the West Indies, also in Mexico and tropical parts of South and Central America. The vegetable is said to be principally grown in localities where the English potato will not thrive. We have not found any disposition on the part of our farmers to take up the cultivation of this vegetable, which is not to be wondered at seeing that in almost all parts of the State the English and sweet potato, as well as yams, thrive well. Those who take an interest in the cultivation of new food plants will read with interest Mr. Harrison's remarks on the "Dasheen," or Tania:—

PLATE 3.—DASHEENS (TANIAS).

"This belongs to the family Calocasia, and the leaves are shield-shaped, resembling taro, and when fully grown attain the height of 4½ ft. to 6 ft. The tubers in the raw state contain the same acrid principle that characterises most other plants of this family, and should never be tasted raw. In cases of the accidental tasting of acrid tubers or leaves, lemon juice in a little water is found to alleviate the ill effects. The dasheen corms (central plants) and tubers are similar to the potato in composition, but they contain less water, and in consequence the content of starch, as well as of protein, is roughly one-half higher than in the potato.

" In addition, they possess a very agreeable nutty flavour. It is said that remarkable digestibility has long been attributed to the acrid tubers, and in Hawaii, as well as in other countries where they are grown, their use for invalids is often prescribed. The starch grains of the taro and

PLATE 4.—DASHEEN (TWO-THIRDS NATURAL SIZE).

dasheen are among the smallest in all food plants, and this is thought by some to account partly for the ease of digestion. An average of eleven analyses by the United States Agricultural Department of the dasheen gives 27⅔ per cent. of carbohydrates (starches and sugars) and 3 per cent. of protein. For the white potato the generally accepted figures are 18 per cent. of carbohydrates and 2·2 per cent. of protein. The sweet potato approximates the dasheen in carbohydrates, but is even lower than the white potato in protein. The dasheen requires rich sandy soil, very moist, but well drained; and a brief flooding or immersion will not injure the crop. Any low-lying sandy land that is fairly well-drained, but which is too wet for general field crops, can be used to advantage, but it would be advisable to plant on ridges. Tubers of 3 oz. to 5 oz. in weight are used for planting, from 2 in. to 3 in. deep, in hills 3 ft. apart, the distance between the rows being 4 ft. The crop matures in about seven months. Where the conditions are favourable, dasheens will produce from 6 lb. to

10 lb. or more per plant. The tubers are formed in a compact cluster, with smaller ones attached to and around a central corm, which sometimes weighs up to 5 lb. These are also excellent when baked, and they can also be converted into flour for soups and gruels, and when mixed with ordinary flour it makes delicious pancakes, biscuits, and bread, which do not become heavy by standing. The nutty flavour of the tubers gives them an advantage as food that would seem to make the plant, when compared with the potato, an even more valuable food producer. The young blanched shoots of the dasheen make a very delicious and tender vegetable, and are used much like asparagus. The flavour is delicate, and is suggestive of mushrooms. The first crop of shoots, when forced, is usually ready for cutting within 35 or 40 days after planting. From 6 to 10 cuttings can be made at intervals of 10 to 14 days, depending upon temperature and the size of the corms, or plants, used. The shoots will keep well for several days if in a cool, dry place."

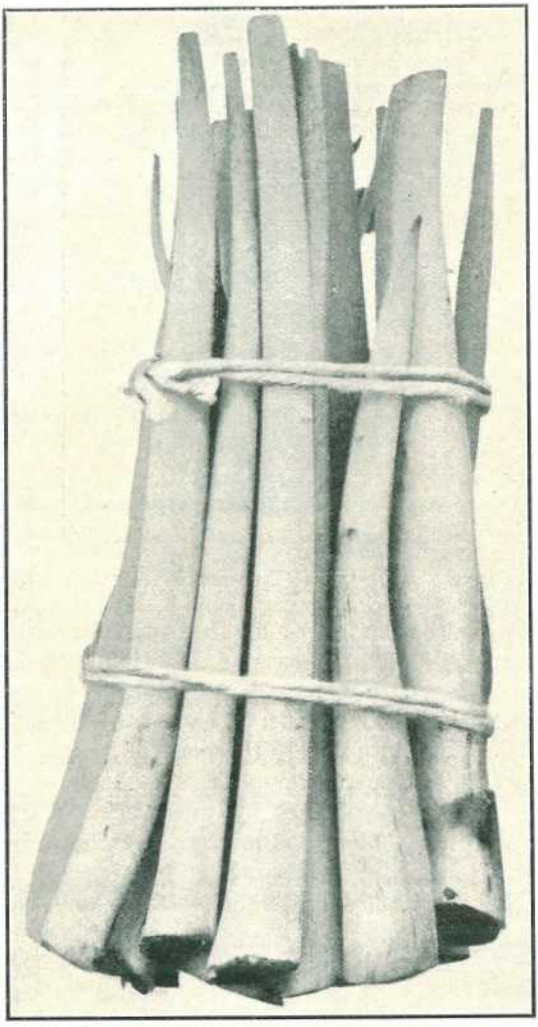


PLATE 5.—FORCED DASHEEN SHOOTS.

THE USE OF EXPLOSIVES IN FARMING.

Gradually, but surely, the substitution of dynamite for clearing land of trees and stumps, and for subsoiling lands which are becoming exhausted with constant cropping for horse and hand labour, is becoming understood and adopted by many farmers, orchardists, and sugar planters. Thorough preparation of the soil by deep cultivation is an essential point in Agriculture, the object being to bring the lower strata in contact with the air and warmth and to regulate the conditions of moisture. Soils which have been cropped year after year, in time, fail to produce satisfactory crops, except at heavy expense for manures—artificial or natural. Such soils are erroneously said to be exhausted, but the real fact remains that, although the ingredients which have built up the plants have eventually been removed by successive crops, they are still present, but out of reach of the roots of the plants, and, in order to make them available, they must be brought up in some way or another. This has for generations been done by the expensive method of subsoiling by horse labour, and, later, by traction-engine power. Let it be borne in mind that the difference in yields between fertile and so-called "exhausted" soils is not due to a difference in the supply of available plant nutrients, but, as was proved by experiments made by the Bureau of Soils of the United States Department of Agriculture, to the presence of something deleterious to the plant's growth; and this was corroborated by exhaustive experiments, in which it was conclusively proved that unproductivity of the soil was due to a poison, and the Bureau found out these poisons, determined their qualities, and identified them. One was "tyrosin," a substance found in green manure; the other was "cumarin." It was found that pure water when impregnated with tyrosin, even to the small degree of 50 parts to a million parts of water, killed wheat seedlings outright, and that they thrived in proportion as the quantity of tyrosin was diminished. To get rid of these poisons, it was considered by the American scientists that a systematic rotation of crops was the true remedy.

Every farmer knows that by constant ploughing of the land a hard pan forms below the depth to which the soil has been turned up, and, in the case of land which has been cropped year after year without breaking up the subsoil below the surface, this lower stratum becomes harder, more solidified, and more impervious to moisture; but it is this very subsoil which contains as many elements of mineral plant food as were originally in the fertile surface soil, and all that is needed is to make them available by some means or other. Obviously, a great saving in artificial manure is made if the subsoil, which, as said, contains plenty of valuable plant nourishment, is treated in the same way as the surface layer. This is most successfully accomplished by blasting the soil without bringing the substratum to the surface. The blast breaks up the ground, opens and thoroughly shatters the subsoil so as to admit air and warmth, and the shattered soil, being now porous, will conserve moisture and properly drain the surface, thus causing fresh fertility.

REGULATING THE MOISTURE IN THE SOIL

is of the greatest importance, for scientific agriculturists have discovered that water is the most important element in plant growth. It is not at all necessary, as some suppose, that the root of a plant shall come in actual contact with the plant-food elements, for plant roots have the power of drawing from the surrounding soil the necessary food—provided that soil permits of the passage of such food. Water or moisture is the carrier of the plant food through the soil and into the plant roots. Therefore, a porous, loose soil is of vital importance for a sufficient food supply to the plants, and this is obtained in a prominent degree by the action of an explosive on the subsoil. The yields of the crops from blasted soil being exceptionally large prove the value of soil-blasting. As all agriculturists and pastoralists know, impervious strata make land practically valueless. In wet weather they hold the water in such quantities that the roots are drowned or rot away, and in dry weather such land does not retain the moisture and the vegetation dies off quickly. Such land can be rendered fertile by blasting. The hard pan is completely broken up, the water-storing capacity is increased, and the dry, dead topsoil is converted into rich land.

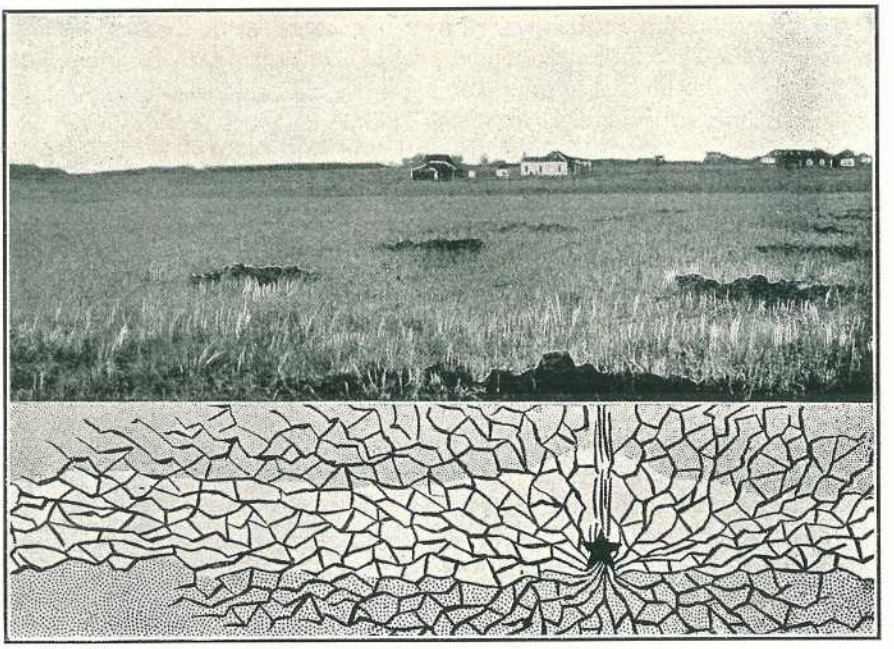


PLATE 6.—BLASTED HARD-PAN, WITH SECTIONAL VIEW OF SOIL.
1. Surface Soil. 2. Hard-pan. 3. Subsoil.

Deep ploughing is of great advantage where a layer of sand is on top of a layer of loam. Now, to make this valuable loam accessible for the plant roots, it is necessary to turn the soil over with the spade or fork if it cannot be reached with the plough. This is a labour which is expensive and which takes much time; hence useless to any but owners of small

vegetable gardens. On a field scale, blasting will perform the work effectively and economically, securing a perfect shattering and mixing of the soil.

HOW THE WORK IS DONE.

The operation of subsoiling with dynamite was well demonstrated on 26th May last, by Mr. T. J. Doolan (M. Aus. I.M.E.), representative of Nobel's Hamburg Explosives Company, and his colleague, Mr. Hand, at the Penal Establishment at St. Helena. The cultivated land on the island was, and much still is, of surpassing richness, as evidenced by the heavy field crops which have been produced there for over thirty years. On the invitation of the Comptroller of Prisons (Captain Pennefather), Messrs. Doolan and Hand, together with a few others interested in the matter, went to St. Helena, where all arrangements had been made by

PLATE 7.—MR. DOOLAN AND SOME OF THE VISITORS.

the Superintendent (Mr. J. Ryan) to enable the work of blasting to be commenced immediately on arrival of the Comptroller and the visitors. A piece of land had been chosen for the demonstration which had, after many years, begun to produce such poor crops as to necessitate its being thrown out of cultivation or treated in some manner, other than merely manuring, by which its fertility might be restored. This is what Mr. Doolan proposed to show the feasibility of.

The subsoil had become solidified, the only loose soil consisting of about 6 in. or 8 in. of the surface.

The first proceeding was to examine the soil depth, and thus fix the depth for the blast holes; and for this purpose two holes about 3 ft. apart were made with a sharp-pointed 1¼-in. steel bar to a depth of 2 ft. 6 in. In each hole was placed one stick of dynamite with detonator and fuse attached, and slightly tamped with a wooden tamping rod. When these

charges exploded there was only a slight disturbance of the surface; but when the loosened soil was dug out it was found that the subsoil had been shattered to a depth of over 3 ft.

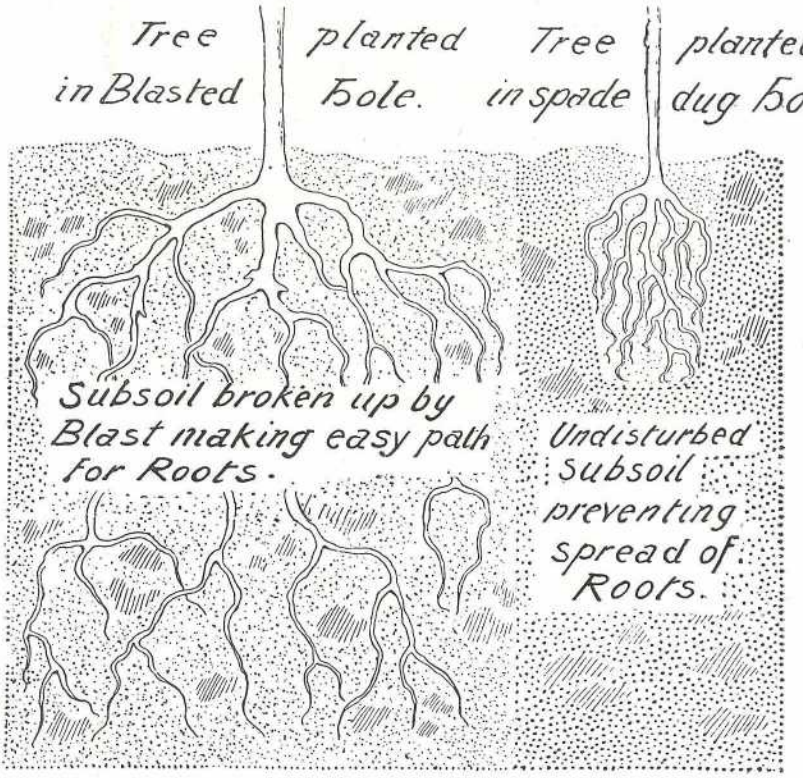
PLATE 8.—VISITORS STANDING OVER A CHARGED HOLE, AWAITING THE EXPLOSION.

The proper depth for the placing of the charges having thus been ascertained, pegs were put in at a distance of 4 ft. to 5 ft. apart in a slanting position. Then the holes were made with the bar, and, as each

PLATE 9.—DEEP BLAST, WITH SIX PLUGS OF DYNAMITE.

charge was placed and tamped, the peg was placed upright to show that the hole was charged. Some thirty of these were charged with a stick of dynamite, with a half-stick of gelignite in which the detonator with fuse

attached was placed above it as a primer and very slightly tamped. Then thirty more holes were charged with gelignite. As soon as all was ready, Mr. Doolan and Mr. Hand went along lighting the fuses; and before all were lighted the explosions began, but so little was the surface soil disturbed that the operators went on with their work unconcernedly. When the last of the blasts had gone off, the area operated on (about 1/8-acre) showed little disturbance of the surface soil. To show, however, how holes could be opened for planting trees, six sticks of dynamite were placed at a depth of 3 ft., and six of gelignite at the same depth.



Compare Growing of Roots.

On this occasion the visitors were requested to move off to some distance. After the explosion, which blew masses of soil into the air, there appeared two gaping holes in the soil, which was completely shattered to a depth of 4 ft. Examination of the other parts of the blasted area showed that all the subsoil between the holes was completely loosened to about the same depth. At the conclusion of the demonstration, the visitors were invited to stand over a charged hole, and several accepted with some trepidation as they were told to stand right over the lighted fuse. When the charges exploded, the only result was that a slight underground shock produced a pleasurable tingling sensation in those standing over the charges.

This demonstration was completely successful as regards the subsoiling. It was then arranged that two areas of the same dimensions should be marked off before planting maize next September, a space of several feet being left unplanted between the blasted area and that portion not dealt with. Accurate notes will be taken as the crop grows, and results compared when harvested.

Samples of the soil were taken from a depth of 4 ft., also of the medium and top soils, which were sent to the Agricultural Chemist for analysis. Another analysis will be made after the crop is harvested.

The agency in Brisbane and other towns of Queensland for Nobel's Hamburg Explosives is in the hands of Messrs. Burns, Philp, and Co., from whom all information on the subject of the use of explosives in clearing land, farming, tree-planting, &c., may be obtained.

THE COST OF SUBSOILING WITH EXPLOSIVES.

Since the demonstration given by Mr. Thomas J. Doolan, at St. Helena, of the value of explosives in subsoiling, that gentleman has forwarded to us (through the agents, Messrs. Burns, Philp, and Co.) the following estimate of the cost of the work on land in a similar condition to that at St. Helena. He says:—

"Taking an area of 10 acres, and putting down 600 holes 18 in. deep to the acre, and using a full cartridge, one detonator, and 18 in. of fuse for each hole, it will work out something like this:—

Cartridges per case, ¾-in.—60 per packet, or 600 per case.

Ten cases, 6,000.	£	s.	d.
Cost, Brisbane, 46s. per case	23	0	0
Detonators at 36s. per 1,000, for 6,000 holes	10	16	0
Fuse, at 6d. per 24 ft., using 9,000 ft.	9	7	6
Total	£43	3	6

This is about £4 6s. 3d. per acre, only estimating the cost of explosives. Labour must be taken into consideration. I think three men could easily drill, charge, and fire 2,000 holes per day; allowing 8s. per day each man amounts to £3 12s. for three days' work doing 10 acres and firing 6,000 holes. . . . I am estimating for cleared land similar to St. Helena; and were I to undertake subsoiling 10 acres there, I do not think I would put down more than 450 holes per acre, equal to about 10 ft. by 10 ft., as I could put the holes down to better advantage than one not used to the work. However, I think I have given you some distinct data to work on, and at the same time remember that circumstances and conditions of country to be operated on change from time to time. I have based the above estimate on St. Helena country only. . . . It may be that for orchards already planted, say, 15 in. by 15 in., and subsoiling as per diagram in our pamphlet, the cost would be considerably less, one hole to every four trees being all that is necessary; the acreage being easily worked out, an estimate can be given for the work. . . . Furthermore, a smaller quantity of dynamite may be used in some places—perhaps half a plug, which would reduce the cost a lot."

DEPARTMENT OF AGRICULTURE AND STOCK.—SEED MAIZE FOR DISPOSAL FOR SEASON 1914-15.*

It is a well-known fact that good typical seed corn of a recognised variety is hard to procure, and that rapid deterioration in type and yield of grain soon follows when care is not exercised in seed selection. This feature is only too applicable to maize on account of the manner in which fertilisation is effected naturally, and to the susceptibility of the plant to hot winds and to any lack of moisture when "tasselling" or during subsequent development.

Our coastal belt and the districts lying adjacent to the Main Range are so favoured in the matter of rich soils and by the climate that, in anything like an average season, the output of grain bids fair to assume large proportions.

The standardisation of the Queensland-grown article is rendered somewhat difficult on account of the diversity of soils and conditions under which the crop is produced, but it is safe to assume that insufficient cognisance is still taken of the means of improving existing varieties either in type or productivity.

For some seasons past this Department has made a practice of importing seed from the corn-growing belt in the United States of America, and elsewhere. Considerable trouble has been taken to secure varieties which have excelled in competitive trials extending over a series of seasons. Latterly the practice of establishing seed-propagation plots in well-known maize-growing districts throughout this State has been adopted; and at these a system of selection and of topping and tailing the ears, conforming to a recognised standard of type and quality for each respective variety, has enabled the Department to offer seed of the varieties noted hereunder, at 8s. per bushel, delivered to the railway station nearest to where the applicant resides. Persons served by steamer trading to recognised ports, and thence by rail, will be entitled to the same privileges.

Delivery will be made about the latter end of August. Orders should be addressed direct to the Under Secretary for Agriculture, Brisbane, and be accompanied by remittance (exchange added).

The quantity of seed grain which will be supplied to each individual applicant will not exceed 3 bushels, and orders will be filled according to priority of application. In the event of orders exceeding the available supply of any one variety, the right of substituting another is reserved; if the arrangement is not acceptable, notification to this effect should be made when ordering.

Varieties available—

Golden Beauty, Hildreth, Hiawatha Yellow Dent, Yellow Dent, Reid's Yellow Dent, Early Leaming, Red Butcher.

Summary.—Maize yields are so influenced by seasonable differences that no single variety can be said to enjoy a monopoly in this respect. The "strain" or "breed" of grain is all important; and where a

* Compiled by H. C. Quodling, Agricultural Inspector.

variety adapts itself to local conditions, and proves that it possesses the attributes associated with a high-yielding, marketable grain, this standard can only be maintained by an exclusive system of selection.

It is generally recognised that quick-maturing and lighter-yielding varieties are better suited to the poorer classes of soil and to localities which are less favoured in the matter of rainfall, whilst the slower-maturing kinds favour richer soils and require a more generous rainfall, but are capable of affording correspondingly heavy returns.

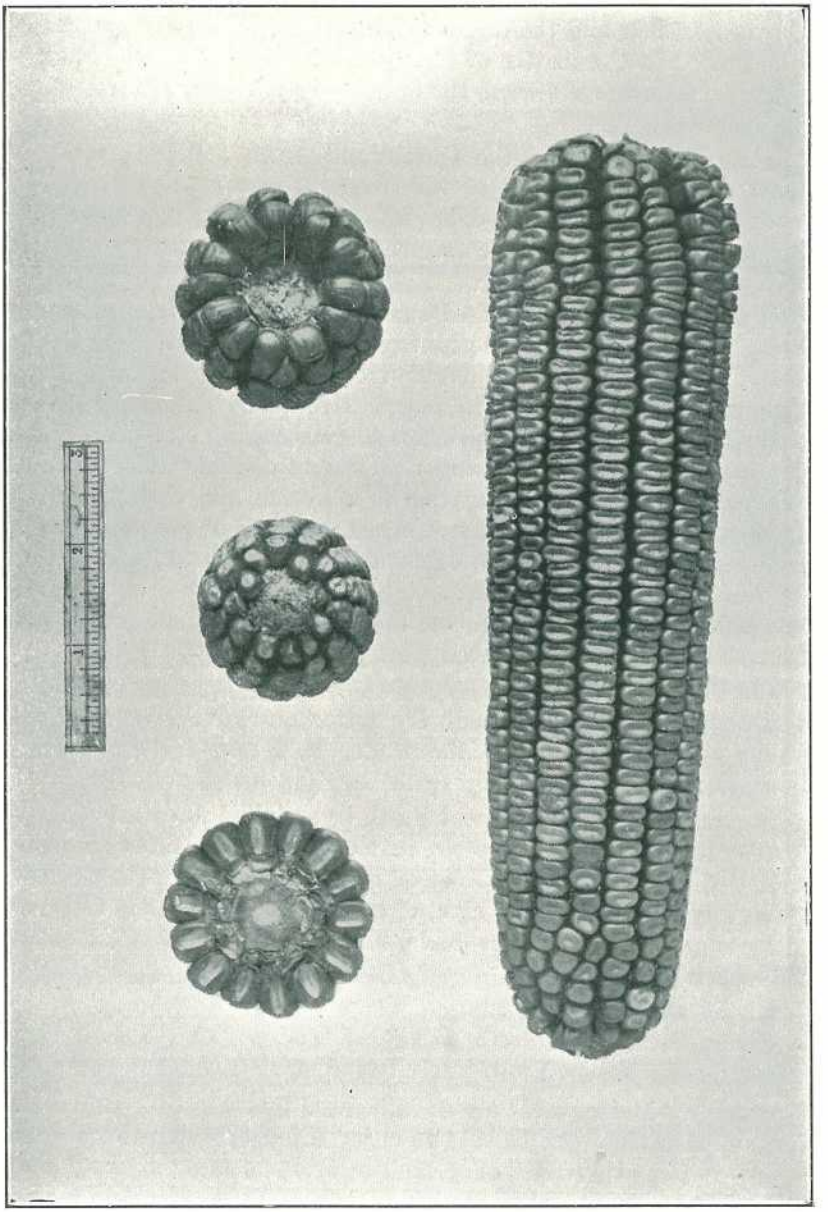


PLATE 10.—TYPICAL EAR OF "GOLDEN BEAUTY" MAIZE.
(Slightly under natural size.)

Successive seasons always present dissimilar features, but data of averages go to prove that, other factors being favourable, the surest crops and the most satisfactory yields are obtained when the rainy and tasselling seasons synchronise.

CHARACTERISTICS AND NOTES ON INDIVIDUAL VARIETIES.

Golden Beauty.—The seed available has been raised from a direct importation made last year. The variety has been grown in the State for several years, and gave good results at the Biggenden State Farm on the forest soils there. It is a strong-stalked and fairly hardy variety, and takes about four and a-half months to mature.

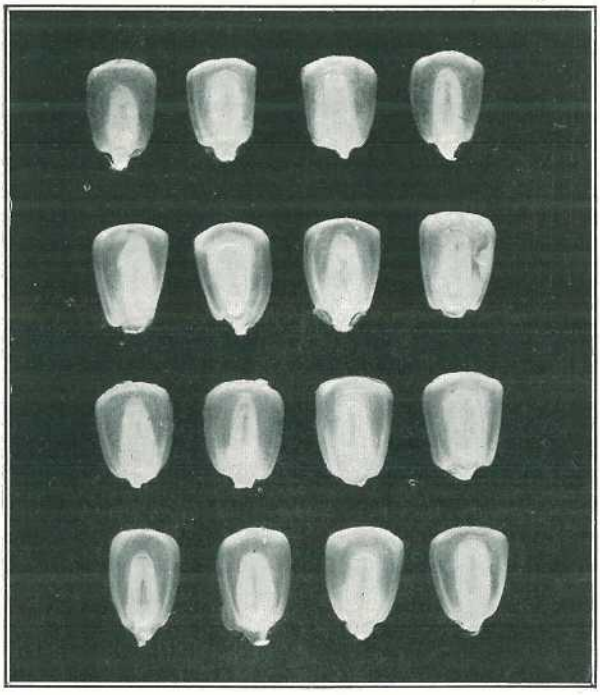


PLATE 11.—TYPICAL GRAIN OF "GOLDEN BEAUTY."

The ears are of medium size, with a somewhat stout red core. In shape they are slightly tapering from base to tip. The rows of grain, usually fourteen in number, are set firmly on the cob; owing to the characteristic shape of the grain (flat brick shaped), with a slightly rounded shoulder, the furrows between the rows are a pronounced characteristic. The grain is of medium size, robust dent type, and of moderate depth; in texture it is horny in character, reddish amber in colour with a distinct yellow cap, carrying a small amount of crown starch. The ears turn down as they approach maturity, and are covered with a light "husk."

PLATE 12—"HILDRETH" MAIZE.
(Showing habit of growth.)

Hildreth.—Grown for seed imported in 1910. The variety originated in Kansas, U.S.A., and has proved to be one of the heaviest and most consistent producers in that State, excelling in yield all the other varieties grown over a series of seasons at the experiment station, and

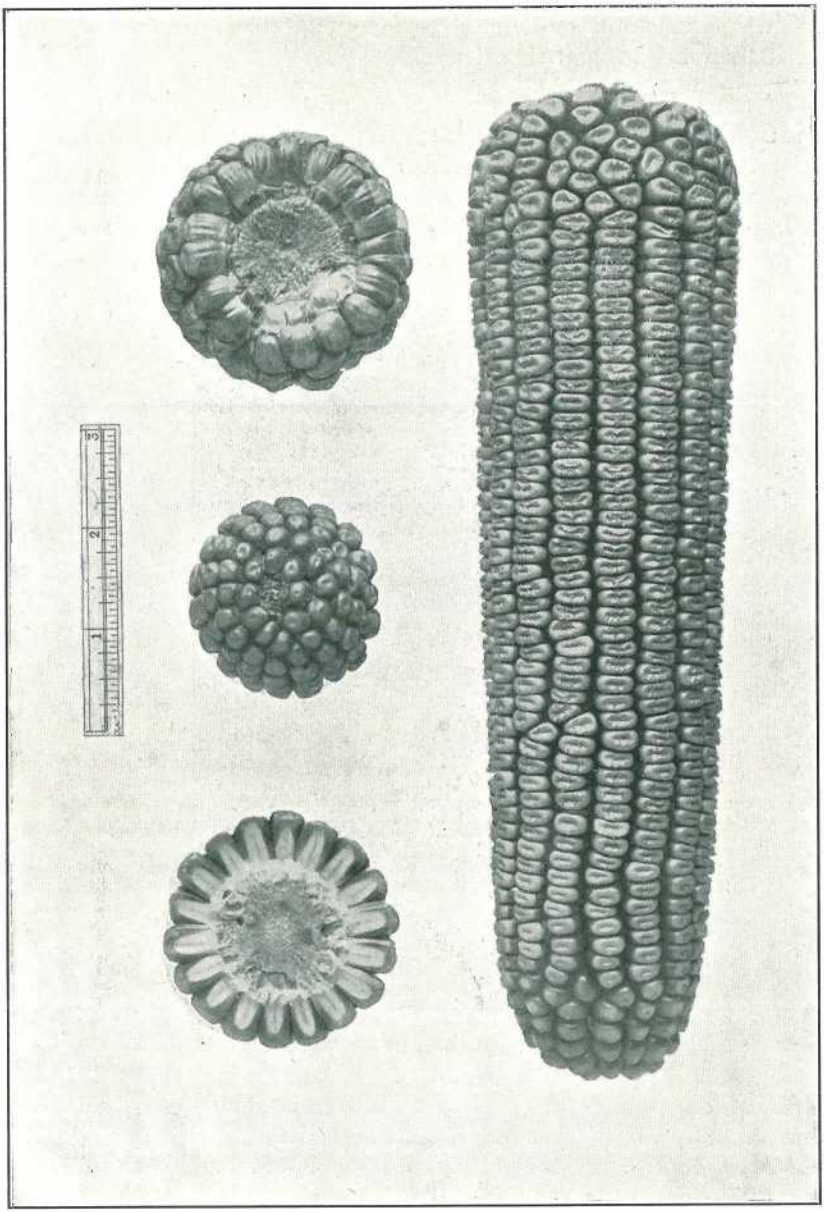


PLATE 13.—TYPICAL EAR OF "HILDRETH" MAIZE.
(Slightly under natural size.)

it is credited also with winning many of the premiums at the corn shows there. Since its introduction to Queensland it has given large returns when grown on the rich scrub soils of the Kingaroy district, and produced 70 bushels per acre last year.

It is a late-maturing corn, taking about five months to mature. The stalks are inclined to be tall and strong—growing on fertile land. Two ears are usually found to a single stalk; these are carried fairly high up on a somewhat short shank. The husk is, if anything, a little short, and this induces a tendency to expose the tip of the ear. Ears are fairly large and stout, cylindrically-shaped up to a point about two-thirds of their height, and then tapering.

The rows of grain are numerous, running from about 18 to 20; these are packed very closely together. Grain is of the dent type, square-shouldered, wedge-shaped, somewhat narrow, and deep; in colour it is a deep yellow; the crown of the grain has an inclination to roughness. The variety possesses the attribute claimed for it—productiveness; but rich soils and a good rainfall are essentials.

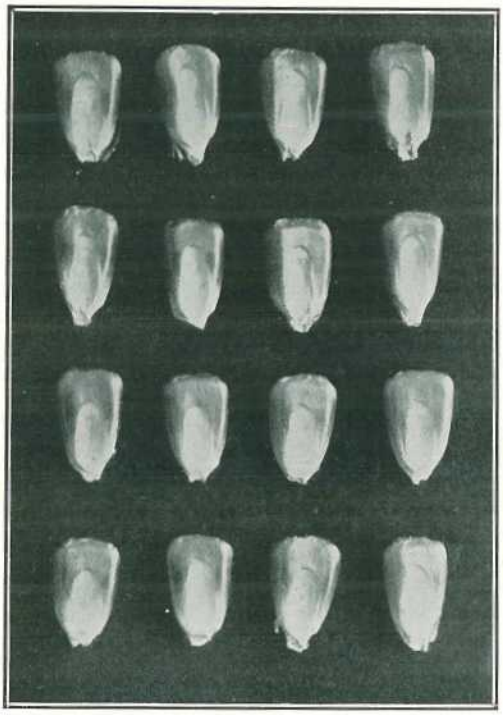


PLATE 14.—TYPICAL GRAIN OF "HILDRETH."

Hiawatha Yellow Dent.—Grown from seed imported last year. The history of this variety credits it as originating in Illinois, U.S.A., twenty-five years ago, when it was then known and exhibited as Mammoth Yellow Dent, and won a 500-dollar premium. Its slow-maturing habit induced Mr. Ziller, of Hiawatha, Brown County, Kansas, to cross it with a quicker-maturing variety, "Legal Tender," and select for a very deep kernel and well-developed ears. In 1906 this breeder secured the premium for the best ten ears of yellow corn at the Kansas State Corn Show.

PLATE 15.—"HIAWATHA YELLOW DENT" MAIZE.
(Illustrating manner in which the ears turn down as they reach maturity.)

This variety is a strong grower, and takes about five months to mature. Two large, fairly uniform ears are generally produced by each stalk; these are borne on a long shank. The ears are well covered with "husk," and turn down as they approach maturity; this characteristic stamps the variety as a most suitable one for wet districts.

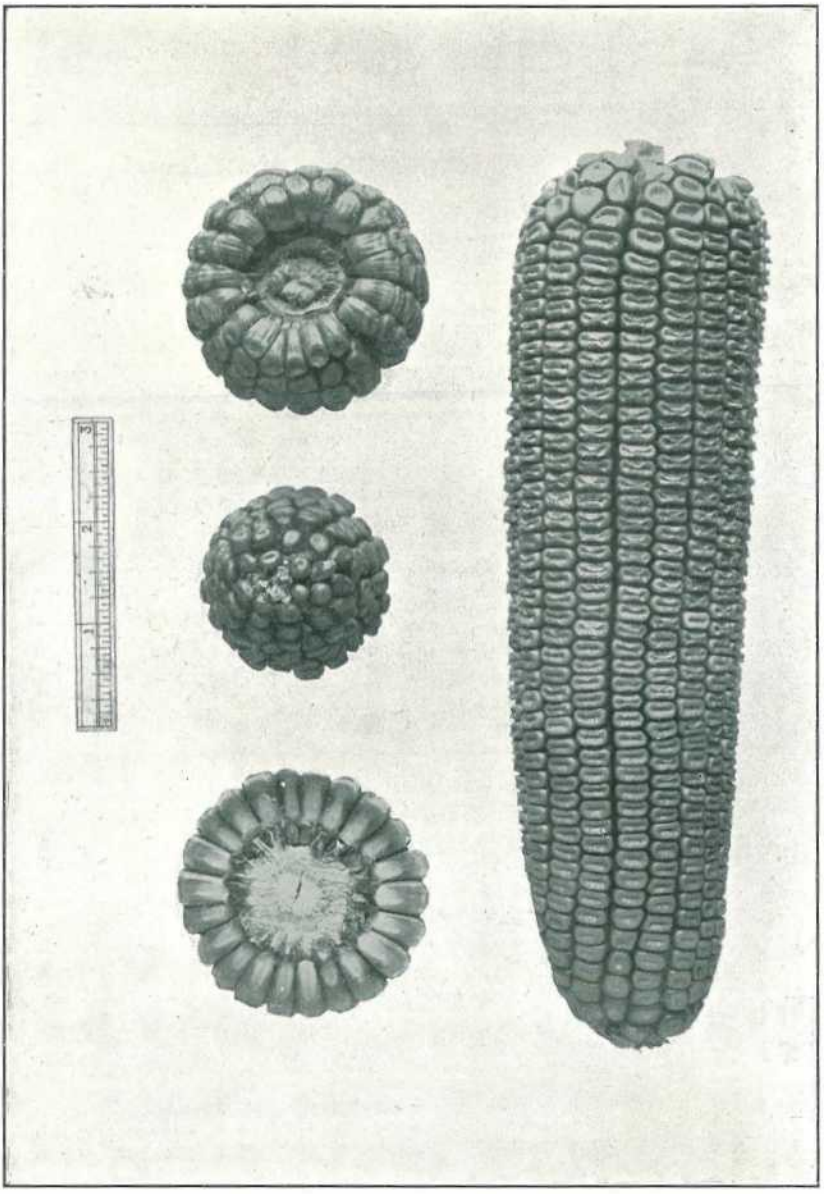


PLATE 16.—TYPICAL EAR OF "HIAWATHA YELLOW DENT" MAIZE. (Slightly under natural size.)

Ears are large, with a correspondingly robust core, red in colour; in shape they are more inclined to be cylindrical than tapering. The rows of grain are set fairly close on the cob; the grain is of moderate size, wedge-shaped, and fairly deep. Shoulders are square, with a deep

indentation and an inclination to roughness on the crown. Colour, medium yellow. The grain is of medium hardness, and inclined to carry crown starch.

This is a prolific variety, and should prove an acquisition for fertile districts where a good rainfall exists.

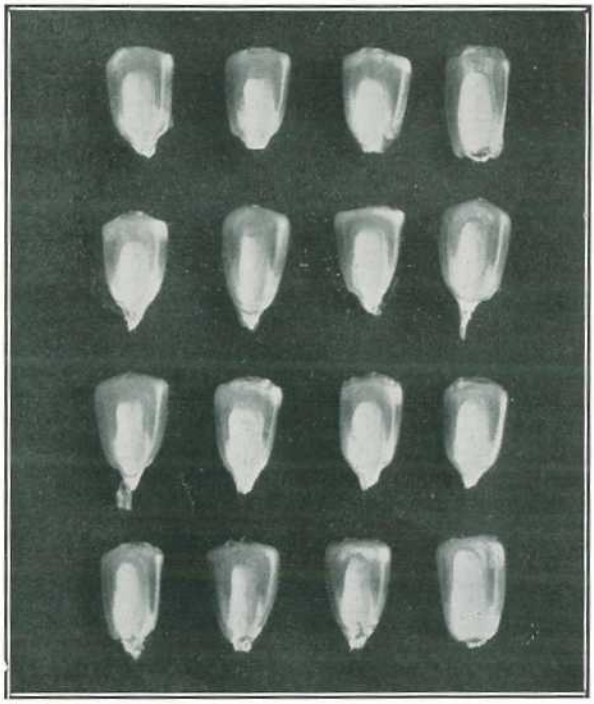


PLATE 17.—TYPICAL GRAIN OF "HIAWATHA YELLOW DENT."

Yellow Dent.—This strain has been raised from seed originating from the United States of America, and has proved itself to be of a hardy character here, and a good yielder. It is stout-stalked, of medium height, and takes from four and a-half to five months to mature. The ears are borne fairly erect on a short shank, and are well protected by the husk. In shape they are inclined to be cylindrical, and of medium size with a core of similar thickness.

The grain is of a characteristic yellow, wedge-shaped, and fairly deep, with a leaning towards a rugged pinch-tip, found in so-called horse-tooth corn. It is of medium hardness, but carries a fair proportion of soft crown starch; is a suitable class of grain for feeding whole. This is a useful variety for coastal and scrub districts where good rainfalls are experienced.

Reid's Yellow Dent.—Grown from seed imported from the United States of America last year. This is regarded as a standard type in the "States," its origin dating back sixty-seven years. The breeders of the corn—Robert Reid and his son James—are credited by American

authorities with the production of the purest and most highly-bred corn extant. The celebrity which this variety has attained is said to be due to its cosmopolitan character, enabling it to adapt itself readily to a new environment.

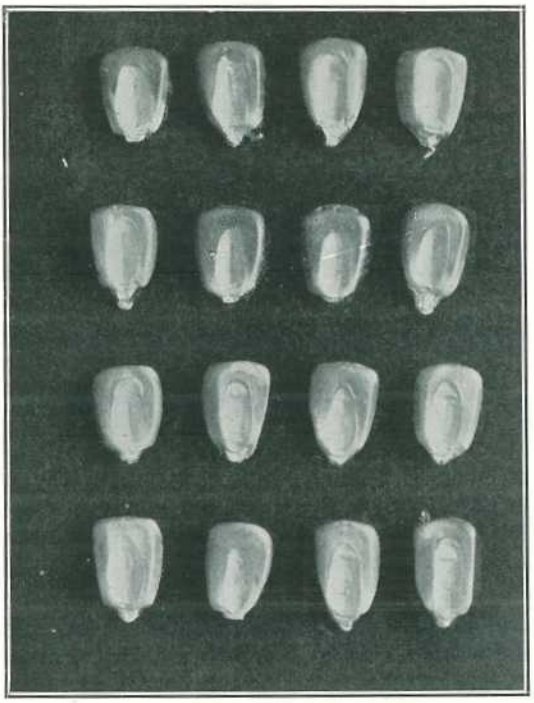


PLATE 18.—TYPICAL GRAIN OF "REID'S YELLOW DENT."

The stalks are of medium height and thickness, and carry rather over the average amount of foliage. The crop takes about four and a-half months to mature.

Ears are even, of medium size and cylindrical, and enclosed in a light husk. The rows of grain are closely packed, and evenly paired on a red core. The grain is only of medium size, square-shouldered, blunt, wedge-shaped, slightly flattened at the tip, of medium width, and moderately deep, carrying a characteristic dent; in colour it is pale yellow at the crown on an amber base. The texture is of medium hardness, showing a distinct horny layer and a relatively small proportion of crown starch.

This is a valuable variety for general cultivation throughout the corn-growing districts of the State, and its characteristics give rise to the opinion that where "Early Leaming" is successful this should also thrive equally as well.

Early Leaming.—Two strains are on hand—one raised from seed imported in 1910, and the other last year. This is the oldest named variety of maize in America, and was originated in Ohio by Mr. J. S. Leaming in 1826.

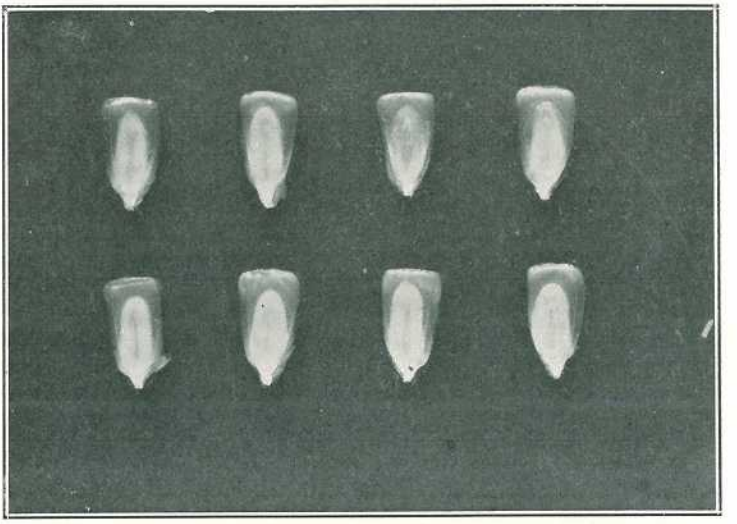


PLATE 19.—TYPE OF "EARLY LEAMING" GRAIN (RAISED FROM SEED IMPORTED, 1910).

The original was said to be a large late-maturing yellow corn, selections being made from this until an early-maturing uniform type

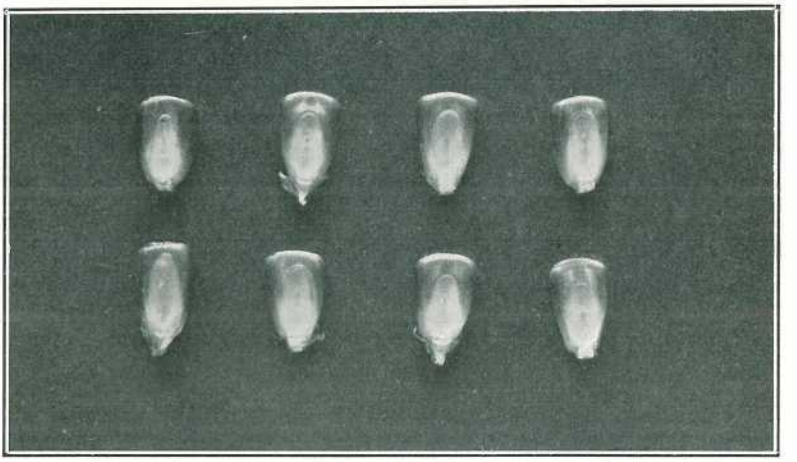


PLATE 20.—TYPE OF "LEAMING" GRAIN (RAISED FROM SEED IMPORTED, 1913).

was established, conforming to a regular-tapering ear with blocky kernels of medium depth and simple dent. The present-day type takes about four months to mature, and favours a stalk medium in height and thickness, with a freedom from suckers. The ears are of moderate length, tapering, and with evenly disposed rows of grain

borne on a red core of medium thickness. The grain is rather under medium size, square-shouldered, wedge-shaped, flattened on one side, and with an inclination to be a little square at the tip; the crown is slightly indented, medium yellow in colour merging to a smooth, polished-looking amber. In texture the grain shows a relatively high proportion of horny starch with a thin cap of crown starch.

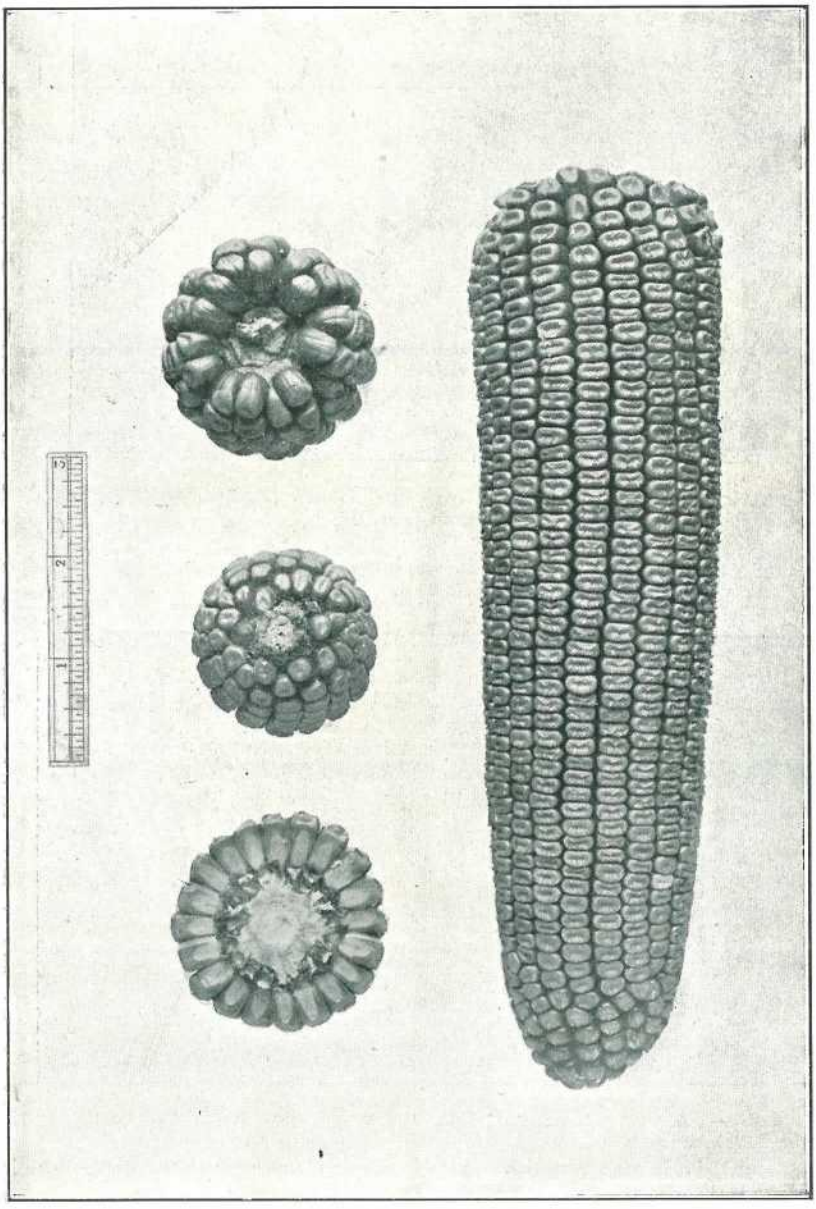


PLATE 21.—TYPICAL EAR OF "EARLY LEAMING" MAIZE.
(Slightly under natural size.)

Importations of "Leaming" have been made by the Department for a number of years. Excellent returns have been recorded from time to time, giving rise to the opinion that it is difficult to name any variety

superior to this for general cultivation in districts situated away from the coast, but still within the corn belt.

Red Butcher.—Grown from seed imported from the United States of America last year. In the States the name of the variety has a sanguinary prefix which has been altered to the present title.

For three years at the Kansas Experiment Station, 1907-1909, this was one of twelve varieties which averaged over 50 bushels per acre. The crop matures in about four months; the stalks are of medium height and thickness. Ears are slightly tapering, of medium size and robust-

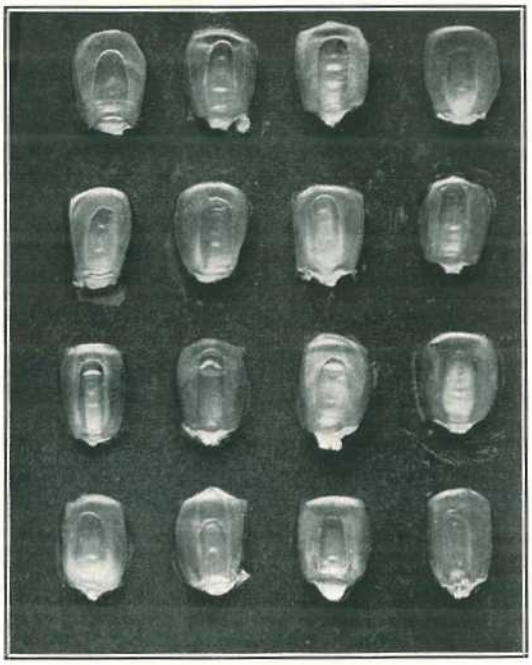


PLATE 22.—TYPICAL GRAIN OF "RED BUTCHER."

ness. The grain is broad and flat, and, except for its characteristic rounded shoulder, is brick-shaped; fourteen to sixteen rows to the ear are the rule, the shape of grain resulting in fairly pronounced furrows between the rows; the colour is blood-red with a pale cream and red-coloured indentation on the crown. In texture, the outside layer is thin and horny, with a relatively high proportion of soft internal starch. The variety has been introduced with the object of supplying a medium-early class of grain to take the place of "Red Hogan," the excellent characteristics of which seem to have been submerged by intermingling with inferior types.

MARKET GARDENING.

NOTES ON RHUBARB-GROWING.

Now is the time to plant rhubarb, which may be grown on almost any well-drained soil; but a rich deep loam yields the best product—the richer and deeper it is, the quicker will be the growth. The bed ought to be trenched to a depth of 2 ft., and very heavily manured with good stable manure mixed with cowyard manure.

To grow the plants from seed, a well-manured seed-bed should be prepared, and the seed sown in August or September, in drills about 1 ft. apart. The young plants will require plenty of water in dry weather, and a light shade will also be beneficial to their growth. Thin out the plants to about 6 in. apart, and let them remain in the seed-bed until the following spring, when they can be transferred to the permanent stand. The rows should not be less than 4 ft. apart, and the plants at least 3 ft. apart in the rows. During the first year the space between the rows may be utilised for growing lettuce or any other low-growing vegetables, but after that the plants will require the whole of the room for their full development. The ground should be kept well cultivated and free from weeds, and all flower stalks should be cut off as soon as they appear, in order that the plants may not exhaust themselves by forming seed.

In the winter of each year a heavy top dressing of coarse manure should be applied, and this must be carefully forked in in the spring, care being taken that the roots are not broken or disturbed in any way. No stalks should be used until the second year, and if left until the third the plants will be all the better. No plant responds more liberally to judicious watering than rhubarb, and in dry weather irrigation gives surprising results in the way of increased yield and general vigour of the plants. Water should be vigorously used when necessary, but at the same time it is well not to overdo it, and thus make the ground sodden. Liquid manure, applied occasionally, is also of great benefit.

Instead of raising the plants from seed, which is a rather slow process, it is often more convenient to plant "crowns"—that is, roots—one or, preferably, two years old. These, planted in the same manner as the seedling, when set out in permanent beds, come on very quickly. Such crowns, if planted in July or August, begin to grow at once, and in September or October the stalks from them are ready for use.

By purchasing crowns, therefore, you can have rhubarb fit to use in two months instead of having to wait for two years for seedlings to come to maturity. It will be found more profitable to purchase strong sturdy crowns, and renew them every third year, than to go to the trouble of raising seedlings, which will probably not be very strong or vigorous.

TOMATOES.

The tomato, being a gross feeder, the soil in which to grow it can hardly be too rich, especially in lime, potash, and phosphoric acid. A perfect tomato soil is a rich sandy loam, well drained, deeply dug or ploughed, and subsoiled. Sow the seed in August or September; and

when the plants are about 6 in. high, thin them out to about 3 ft. apart, and put up a light trellis to train them on.

The plants which have been taken out may be planted in some other part of the garden. Before planting out, clip all the leaves off except the top bud. The plants so treated will start to grow immediately, because they are not obliged to expend their energy in trying to revive the dying leaves. The plants will bear a month earlier.

When the first fruit forms, stop the plant by pinching off the ends of the shoots.

A very good plan to train tomatoes is to erect a framework of hardwood pegs, 18 in. above the ground, nail hardwood battens on the top, and stretch wire netting across it. The young vines must be properly guided and trained through the meshes, and not be allowed to fall back again. When the vines are full grown, the top of the netting is a complete mass of fruit and leaves, and all the fruit is clean.

Tomatoes may also be trained on stakes. As soon as the planting is completed, a split stake, 5 ft. in length, is firmly set at each plant, and about the time the fruit is setting each plant is tied with common cord. The string is tied firmly round the stake, and loosely about the stem of the plant, so as not to interfere with its growth. Care must also be taken not to allow the fruit to cluster, so as to rub against the stake.

The sprouts or auxiliaries will grow very rapidly, and must be constantly pinched off. Three tyings are usually necessary up to the time when five good clusters of fruit have set. When these aggregate 20 or 25 tomatoes, the top is pinched off, and the whole strength of the plants is centred in the production of firm, bright, smooth tomatoes, of good and uniform size. Pinching back the suckers tends to increase the size of the leaves, making shade for the fruit. Constant systematic pruning forces the plant into fruiting; therefore, carefully remove all suckers.

Tomatoes mature in three or four months, according to the soil, season, and climate.

Manure for Tomatoes: It is a prevalent idea that the tomato will not stand heavy manuring. This is only true of the crop after the fruit has set. In the early stages of development, nitrogen, phosphoric acid, and potash may be liberally supplied with advantage, but, after the fruit has set, manuring with farmyard manure or other stimulating fertilisers delays the development and ripening of the fruit.

A good manure is made up as follows:—

2 parts of nitrate of soda;
2 parts of bonemeal;
3 parts of kainit;
4 parts of superphosphate.

Of this mixture, 1 oz. per square yard of soil may be applied weekly, from the time that the plants are established till the fruit has set. Superphosphate has been found to hasten the maturing of the fruit.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF MAY, 1914.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lady Melba	Holstein	6 Mar., 1914	928	3·8	39·28	
Miss Lark ...	Ayrshire	27 Dec., 1913	929	3·6	37·16	
Gretchen ...	Holstein	6 May, 1914	721	4·2	33·96	
Madame Melba	,, ...	10 Nov., 1913	667	4·2	31·47	
Lady May ...	Ayrshire	4 May, 1914	685	4·0	31·06	
St. Elizabeth	Jersey	16 April ,,	431	6·1	30·75	
Nina ...	Shorthorn... ...	5 April ,,	700	3·6	28·00	
Miss Jean ...	Ayrshire	13 Jan. ,,	463	5·2	27·95	
Burton's Lily	Shorthorn... ...	29 Dec., 1913	510	4·6	26·39	
Miss Melba	Holstein	22 Jan. ,,	508	4·6	26·29	
Daisy ...	,, ...	14 Feb. ,,	556	4·2	26·15	
Queen Kate	Ayrshire	4 Jan., 1914	583	4·0	26·05	
Lavinia's Pride	,, ...	11 Dec., 1913	577	4·0	25·78	
Glen ...	Shorthorn... ...	27 Oct. ,,	493	4·6	25·50	
Silver Nell ...	,, ...	26 Sept. ,,	396	5·2	23·90	
Lady's Maid	,, ...	17 Mar., 1914	592	3·6	23·68	
Rosine ...	Ayrshire	27 Nov., 1913	443	4·6	23·50	
Lady Loch...	,, ...	31 Aug. ,,	411	5·0	23·19	
Miss Bell ...	Jersey	25 Sept. ,,	459	4·2	21·69	
Bella ...	Ayrshire	16 Dec. ,,	373	5·0	21·05	
Skylark ...	,, ...	2 Feb., 1914	447	4·1	20·99	

PROTECTION OF BANANAS FROM FLYING FOXES.

There are two methods of protecting ripening bananas from flying foxes, grasshoppers, &c.—one of which was adopted in this State with much success. That was to enclose the bunches of fruit in stocking-net bags, specially made for the purpose at the cotton-mills of Messrs. Joyce Brothers, at Ipswich. Another plan is said to be adopted in Papua, which is to wrap the bunch in dry banana leaves or grass. We have seen large areas of land under bananas on the southern and south-eastern coast of Papua; but such a practice did not come under our notice. It may be carried out in more inland districts. Mr. H. Tryon, Government Entomologist, in a report on the subject of protection of bananas, says that in Honolulu the growers not only wrap up the bunches of green bananas, but despatch them to California when so covered; a fact that accounts for the excellent condition in which they are generally received.

Poultry.

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

One thousand eight hundred and forty eggs were laid during the month. The slight attack of chicken-pox reported last month has since affected nearly all the pens. Although the attack has been very mild, it has been the cause of putting almost all the birds, except those in three leading pens, off their food, with the result that they have gone off in laying and many have gone into moult. The following pens have been most affected:—J. Zahl, Range Poultry Farm, and A. H. Padman. Three of these pens have five birds in moult. Laying improved towards the end of the month, and better results are anticipated for June. T. Fanning wins the monthly prize.

The following are the individual records:—

Competitors.	Breed.	May.	Total.
A. T. Coomber, Bundaderg	White Leghorns ...	107	217
T. Fanning, Ashgrove, Brisbane ...	Do.	114	212
Kelvin Grove Poultry Farm, Brisbane ...	Do.	108	192
Loloma Poultry Farm, Rockdale, N.S.W.	Do.	93	146
Mrs. Bieber, Childers	Brown Leghorns ...	57	132
George E. Austin, Boonah	White Leghorns ...	53	130
Loloma Poultry Farm, Rockdale, N.S.W.	R. I. Reds	87	127
J. Gosley, Childers	White Leghorns ...	52	112
Cowan Bros., Burwood, N.S.W. ...	Do.	74	118
R. Jobling, Wallsend, N.S.W.	Do.	42	109
Moritz Bros., Kalangadoo, S.A.	Do.	50	108
J. R. Wilson, Eudlo	Do.	47	102
J. Kilroe, care of Finney, Isles, Brisbane	Do. (No. 2)	30	102
J. F. Coates, Rockhampton	Black Orpingtons ...	67	90
A. F. Camkin, Kogarah, N.S.W. ...	White Leghorns ...	67	88
J. M. Manson, Brisbane	Do. (No. 1)	67	86
J. Kilroe, care of Finney, Isles, Brisbane	Do. (No. 1)	31	85
J. D. Nicholson, Arncliffe, N.S.W. ...	Do.	53	82
Mrs. Munro, Sunnyside, Warwick ..	Do.	21	78
Range Poultry Farm, Toowoomba ...	Do.	19	77
Mrs. W. D. Bradburne, Kogarah, N.S.W.	Do.	32	72
A. H. Padman, Adelaide, S.A.	Do.	27	71
C. M. Jones, Rockhampton	Do.	39	68
George Tomlinson, Boonah	Do.	48	67
Marville Poultry Farm, Moorabbin, Victoria	Do.	39	66
J. N. Waugh, Bankstown, N.S.W. ...	Do.	49	66
J. T. Coates, North Rockhampton ...	Do.	21	66
R. Burns, Sladevale, Warwick	Black Orpingtons (No. 1)	47	64
J. Zahl, Boonah	White Leghorns ...	16	62
F. McCauley, Clifton	Do.	18	54
E. Le Breton, Milton	Do.	32	53
J. M. Manson, Brisbane	Do. (No. 2)	42	51
Derrylin Poultry Farm, Mutdapilly ...	Do.	22	51
J. Franklin, Coolabunia	Do.	31	49
J. Murchie, Childers	Brown Leghorns ...	16	47
R. Burns, Sladevale, Warwick	Black Orpingtons (No. 2)	27	44
E. V. Bennett, Kalangadoo, S.A. ...	White Leghorns ...	25	44
R. Burns, Sladevale, Warwick	S. L. Wyandottes ...	38	42
Douglas Moreton, Coraki, N.S.W. ...	White Leghorns ...	24	39
T. Fanning, Ashgrove, Brisbane ...	Black Orpingtons ...	8	8
Total	...	1,840	3,477

State Farms.

NOTES FROM KAMERUNGA STATE NURSERY—MAY, 1914.

BY THE MANAGER.

The rainfall for month of May totalled 3·80 in., number of days on which rain fell being 17; maximum solar reading, 152 degrees Fahr.; minimum terrestrial reading, 54 degrees Fahr. I give these readings, as it is under these conditions that plants grow and not under maximum and minimum in shade.

With regard to crops grown for seed, the small plots of cowpeas, soya, sesame, and white panicum have now been harvested, but, owing to the long drawn-out wet season, a large proportion of the seed was spoilt in the field. Coffee: Small pickings are now coming in, some being prepared for seed and dried in ashes, the balance being kept as clean parchment. As was expected, after the dry months experienced during the latter half of last year, when the trees flowered and seed was setting, the beans are small.

Cardamoms are also very small, for the same reason.

Gros Michel bananas, although growing in poor soil, have yielded some fine quality fruit, though I have no doubt the bunches would be considerably larger on good soil. As it is, it is only those which have been manured that give anything like decent bunches with fruit of good quality. One of Mr. Brünnich's formulas was the one used, viz.:—

1 lb. sulphate of potash
1½ lb. superphosphate
1 1/10 dried blood
} per stool.

I prefer nitrogen in the form of dried blood in this wet climate, as it appears to hold better in the soil, but, if I had had any nitrate of soda in stock during the dry months of last year, a top dressing would have undoubtedly been very beneficial.

The wet season now being over, cultivation between bananas should be done where possible and weeds, &c., buried to provide humus. Where implements cannot be used, the surface of ground should be broken with hoe or fork hoe, so as to leave a soil mulch and enable the soil to get aerated and warmed after all the wet.

BUNGEWORGORAI—ROMA.

Manager's report for month ending 13th June, 1914:—

Meteorological.—The conditions mentioned as prevailing at time of submitting previous report have undergone a change, seasonable weather now being experienced. The result has been that a complete cessation of summer growth has taken place, excepting in isolated situations on the higher ground. So far no damage has been observed where likely to occur.

The maximum temperature recorded was 83·0; average, 69·6.

The minimum temperature recorded was 31·5; average, 43·3.

Rainfall.—·92, representing two wet days.

Winter Crops (Cereals).—All the experiment blocks have been sown, and are above ground, an A1 germination having taken place. The following sowings have been made, viz.:—

Thirteen quarter acres manurial experiments; 44 eighth acres, 29 new crossbreds, 15 named varieties; 5 sixteenths acres, 4 new crossbreds, 1 named variety; 77 5-chain drills, 44 new crossbreds, 18 named varieties of wheats, 15 varieties of oats; 4 blocks, 1·4 acres, variety tests; 2 blocks, ·57 acres, variety tests; 1 block, 11½ acres, variety tests; 2 blocks, 2½ acres, variety tests; 1 block, 5½ acres, variety tests; 631, ½-chain drills of crossbreds in the F1 to F6 generations.

In addition to the foregoing, 24 acres have been sown as a chance crop, a green manurial crop having just been ploughed in; consequently there is a complete absence of reserve moisture, and the crop will have to depend wholly upon precipitation experienced during the growing period.

Orchard (Deciduous).—The trees in most instances are becoming denuded of foliage. The plums mentioned in last report as having proved unremunerative have been removed.

Citrus.—With the exception of the "Valencia Late" and "Mediterranean Sweet" oranges, the crop in this branch has been removed, and the better quality of the fruit marketed, satisfactory prices being realised.

Cowpeas.—Prior to frosts being experienced, specimen plants were secured for exhibition purposes; some of the new crossbreds demonstrating in a marked degree the possibilities of this class of crop for green manuring or fodder purposes on the light soils of this district.

Teff Grass.—The harvesting of the larger area sown with this crop was accomplished during the period under review. From the area, one-fifth of an acre approximately, one large wagon load of hay was obtained, which yielded on being threshed 235 lb. of seed, equal to about half a ton per acre. Under the prevailing conditions of this season, this grass has done well, and, though it is rather too early to advocate the extensive sowing of it, its behaviour warrants it being recommended to farmers for the purpose of making trial sowings in different districts. This would greatly facilitate the determining of its suitability or otherwise for growing in this State.

From the sowings made here, it has proved itself exceedingly hardy under adverse conditions, and responds with marvellous rapidity when congenial ones ensue. It is rather weak in the straw, and, if permitted to stand long after the heads have fully developed, is inclined to go down or lodge upon rain being experienced, making harvesting extremely difficult, and, if the crop is thick, well nigh impossible with machinery. For this reason, on our soils at least, it will be necessary to harvest at the stage aforementioned. If cut at this time, sufficient second growth will be forthcoming to furnish seed for the following season's requirements. As a grazing crop no endeavour has been made here to ascertain its value. Seed available at 2s. 6d. per lb.

General.—Applications for seed wheat still come to hand. A heavy demand exists for vine cuttings, and a slight difficulty may be experienced in meeting the clients' requirements.

Live stock of all descriptions look exceptionally well.

WARREN.

The acting manager reports for the month of May:—

Weather conditions during the month have been exceptionally trying, not a point of rain having fallen. This, following up the dry month of April, has made conditions rather critical round this district, signs of drought being very evident. In spite of this, however, the farm is looking exceptionally well, and all the crops, although in need of rain, are progressing in a satisfactory manner.

Cereals.—The cereal crops are growing well, and in spite of the dry weather conditions are presenting a lovely green appearance. The three selected varieties are stooling out well and will make excellent hay. The block sown with Californian Feed Barley is literally "crying out" for more rain, and the crop is presenting a yellowish colour.

Lucerne.—This is growing well and has been again cultivated. Part of the lucerne paddock is to be subsoiled per means of explosives.

Maize.—The maize crop has been completely harvested, and only fair yields resulted. The Boone County White variety has proved itself superior in every way to the other two varieties. This only emphasises the utility of the white variety in a dry district like ours. The prejudice against the white maize will have to be lived down.* Twelve acres of the maize land have been put under the plough, and are being prepared for the reception of cereals when the rain comes.

The orchard has been again cultivated and the ground round the trees has been dug up.

Mandarins and lemons have been marketed, and old fruit carted away.

Potatoes.—This crop has been constantly cultivated. The tubers have set well, and have grown splendidly. Towards the end of the month three severe frosts were experienced, and, as a result, the potato plants suffered. The crop now presents a blackened appearance, but the tubers are in no way affected.

Clearing operations are being carried out with the aid of explosives, and a number of trees have been removed.

Half an acre of Rhodes grass has been cut. This was allowed to dry and then made into bales for the Panama Exposition.

The Dairy.—Dairying operations throughout the month have occupied much time and labour. Although droughty conditions and westerly winds prevailed, the herd, as a whole, milked very well, giving

* White maize was grown by several farmers fifty years ago on the Brisbane River and Oxley Creek, but it was not appreciated by buyers, and its cultivation was abandoned.—Ed. "Q.A.J."

good butter fat tests. This is largely due to the fact that we rug our cows during the cold weather. Few farmers round this district recognise the value of rugging their herds, and it is seldom done. They do not realise that the unrugged cows, on cold nights when the theremometer is registering below freezing point, require something to keep them warm. If this warmth is not created artificially by man, then nature provides it, the cow utilising the natural fats in its body which create heat. The large percentage of these fats is extracted from the milk, and this is the chief reason for low tests in winter time. The extra cost of rugging cows is well repaid in higher butter fat tests.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MAY, 1913 AND 1914, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	May.	No. of Years' Records.	May, 1914.	May, 1913.		May.	No. of Years' Records.	May, 1914.	May, 1913.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	2·11	13	2·40	3·37	Nanango	1·70	27	1·39	3·76
Cairns	4·57	27	6·17	7·52	Rockhampton ...	1·70	27	Nil	3·45
Cardwell	3·69	27	6·20	8·96	Woodford	3·02	27	3·68	6·86
Cooktown	2·92	27	6·27	5·72	Yandina	4·85	21	7·91	7·19
Herberton	1·60	27	1·59	3·63					
Ingham	3·47	22	7·69	5·33					
Innisfail	13·25	27	15·76	12·84	*Darling Downs.*				
Mossman	2·10	5	5·41	4·27					
Townsville	1·46	30	0·60	2·26	Dalby	1·48	27	1·09	2·47
					Emu Vale	1·12	17	2·98	2·05
Central Coast.					Jimbour	1·41	24	1·08	2·22
					Miles	1·79	27	1·02	2·61
Ayr	1·22	27	0·39	2·02	Stanthorpe ...	1·75	27	3·81	3·31
Bowen	1·43	27	0·47	1·71	Toowoomba ...	2·27	27	3·82	5·92
Charters Towers ...	0·91	27	0·20	1·46	Warwick	1·61	27	3·93	4·16
Mackay	4·19	27	3·08	4·65					
Proserpine	6·11	11	4·06	6·54					
St. Lawrence ...	1·97	27	0·28	2·43	*Maranoa.*				
					Roma	1·51	25	1·18	3·19
South Coast.									
					State Farms, &c.				
Crohamhurst ...	4·91	20	6·32	8·13					
Biggenden	2·09	14	0·96	4·06	Gatton College ...	1·96	14	2·25	3·49
Bundaberg	2·93	27	0·96	5·31	Gindie	1·11	13	0·01	3·69
Brisbane	2·98	63	3·63	6·32	Kamerunga Nurs'y	4·37	23	3·80	8·48
Childers	2·59	19	1·14	5·89	Kairi	...	...	1·87	2·18
Esk	2·29	27	2·71	4·05	Sugar Experiment Station, Mackay	3·81	16	3·89	4·36
Gayndah	1·74	27	0·67	3·49					
Gympie	2·83	27	1·96	4·09	Bungeworgorai ...	...	...	1·43	3·69
Glasshouse M'tains	2·82	6	5·27	..	Warren	...	...	Nil	2·76
Kilkivan	2·25	27	0·40	6·41	Hermitage ...	0·91	7	3·49	2·96
Maryborough ...	3·08	27	1·82	7·21					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for May this year and for the same period of 1913, having been compiled from telegraphic reports, are subject to revision.

The Orchard.

A JAPANESE FORMULA FOR DESTROYING THE WOOLLY APHIS.

"The Fruit World" (May) publishes the following remedy for Woolly Aphis:—

"Mr. T. Machida, of Japan, has recently found a very satisfactory wash formula, which has been found to be of much value in the control of the Woolly Apple Aphis. His recommendations for the various ingredients to be used are as follows:—

Rape-seed oil	3⅓ pints.
Sulphur	1½ oz.
Turpentine	7⅓ oz.

The rape-seed oil should be boiled alone for a very short time, followed by adding the turpentine slowly, stirring continually until they are thoroughly mixed. Stir in the required amount of well crushed sulphur. Use a strong fire and allow to cool, when the mixture assumes a darkish colour. Paint the attacked parts of fruit trees. This wash can also be recommended for use in the control of other aphides and the destruction of their eggs.—S. Nakayama, Stanford University."

The above was submitted to Mr. C. Ross, F.R.H.S., Instructor in Fruit Culture, and he thinks that the remedy would be well worth a trial.

DRYING BANANAS.

The manufacture of what are known as "Banana Figs" is an important industry in the West Indies, Mexico, and to some extent in other banana-producing countries. The simplicity of the process (particularly in a climate like Southern and Central Queensland), the abundance and cheapness of the fruit, and the excellent flavour and keeping qualities of the dried fruits should afford strong inducement to establish a trade in banana figs, which, in Jamaica, has assumed considerable importance. Eleven factories on that island are exclusively occupied with the manufacture of banana figs. These can be sold in Hamburg at the rate of 300 56-lb. boxes monthly at about 42s. to 43s. per cwt. ex store, Hamburg. In the English market the dried fruit sells at from 35s. to 38s. per cwt. In 1913, there were exported from Jamaica 9,389 packages of banana figs, valued at £7,808.

The object of drying any material is to prevent deterioration by fungus growth, which can only do its destructive work in the presence of moisture. The simplest and most natural form of drying fruits is to expose them to the sun and air; but in some countries the uncertainty of the weather has led to various methods of artificial drying.

We are, however, here only concerned with sun-drying, to which, as stated, the climate of Queensland particularly lends itself. In parts of

Mexico, where the climate is very dry, the ripe fruits are exposed to the sun till the skin begins to wrinkle. They are then peeled, and again exposed until an efflorescence of sugar appears on the surface, as in dried figs. They are then pressed in masses of 25 lb. each. This process is only practicable in dry climates. The fruits usually are allowed to thoroughly ripen. Then the skin is removed, after which they are cut lengthwise into four slices. These are then laid on a trellis-like stand, usually of bamboo, in the sun. The fruit soon becomes covered with a white sugary powder deposited from its own juices. When this occurs, they are ready to be packed in boxes, where they will keep for years. Such banana figs have been known to keep good for sixteen years. The boxes (cardboard) contain about 15 to 20 of the fruit.

Another good method is to boil the fruit rapidly in water to which sulphate of lime has been added. After boiling, the fruit is exposed to the sun on bamboo trays or on anything which is clean and permits the free action of air and light. As an easy branch of domestic industry, the drying of the banana affords promise of important results to the prosperity of our coast farmers.

THE CULTIVATION AND USES OF THE ROSELLA.

BY DANIEL JONES.

At the request of some of our readers who have only lately taken up farming pursuits, we republish the following article on the Rosella, which appeared in the Journal in May, 1900:—

The Rosella (*Hibiscus Sabdariffa*) is one of our most valuable fruits, and, from the standpoint of the thrifty housekeeper, few edibles in the range of domestic cookery lend themselves more usefully to the stocking of a housewife's cupboard. In dealing with this fruit, the writer will, as briefly as possible, refer to the cultivation of the plant as well as indicate a few methods of preparing the fruit for domestic needs.

SEED.

The most important matter to attend to, in the first instance, is to procure sound, fertile seed. Seed grown in the Northern part of the State is usually safer to use than that grown in our Southern districts, it being on the whole better developed and more likely to be fertile. The Northern growers having a longer maturing season, owing to the absence of frost, a fuller germination and hence a better quality of seed is produced by them. Nevertheless, in certain seasons in our Moreton districts, it is possible to save seed fully equal to that grown in more tropical parts; yet it is by no means certain that the season may prove propitious, and the local seed may turn out barren, although, to the inexperienced eye, it may appear otherwise.

SOIL.

Any moderately good soil will grow rosellas well. Land with a clay subsoil, if the latter be near the surface, had better be avoided if cultivating on a large scale; but for an allotment garden, where only a few

trees are grown, the plant, with an average amount of attention, can be cultivated well enough to give returns sufficient to fill the cupboard for family needs, though perhaps not on so lavish a scale as if grown under more favourable conditions.

The shrub being hardy and, as a rule, fairly ornamental, given fair treatment, is calculated to adorn and prove useful in the kitchen garden no less than in the field.

SOWING.

My practice was to fix upon small patches of clean soil for a seed bed contiguous to the area proposed to be set out. For instance, when planting several acres, I found, by my method of setting, I could treat a much larger area with less labour, and do it more efficiently, by drawing from the nearest seed beds as the transplanting proceeded. For the ordinary kitchen garden it will suffice to mark out a plot a few feet square and lightly cover the seeds, well watering them and keeping the plot free of weeds until the plants are about 6 in. high, and then set them out in rows about 6 ft. apart. If the grower is not disposed to start his seed from beds, the latter can be sown where the bushes are to remain, and thus the trouble of transplanting is saved; but precaution must be taken to have a few spare plants to meet the contingency of having some destroyed by grubs or other causes, so that the vacant spaces can be filled up. The best time to establish seed beds is during the month of October. Early sowing is recommended in the Southern parts of the State, as, in the event of early frosts coming on, the maturing of the fruit will be seriously affected.

I have observed that late plantings in November generally prove fruitful, but, owing to the shortened period for attaining maturity, the plants will only be imperfectly grown, and produce but a proportionately limited crop. Hence, to obtain the most satisfactory results, early propagation of the plant is imperative. Of course, in our Northern regions and in part of our Southern coastal districts, which are comparatively immune from early frosts, the planting season can be safely put off until November or the early part of December without undue risk to the crop.

TRANSPLANTING.

In the ordinary course of garden work, the transplanting is usually performed by the simple removal of the plants from the seed bed, without unduly tearing the tender root. A small hand fork for loosening the soil, so that the plant can be lifted in good order, is all that is needful. The plants having been raised, set the plants out in regular rows, and in well-firmed fertile soil, giving due heed to the equal extension of the root fibres, which not only helps to hold the plant firm as against strong winds which often seriously affect the shrub when in vigorous growth, as it acquires a head considerably out of proportion to its foothold, but it also enables the roots by the regular radiation to find more plant food for the sustenance and early development of the bush—all of which, though apparently trivial precautions, nevertheless have a very important bearing on the cultivation of this fruit. Perhaps my own practice in

handling this crop as a feature of field and orchard operations may now be brought in. During my early orchard efforts, while my young trees were being planted out, it became necessary to discover what catch crop could be cultivated with advantage between the rows of orchard trees. My choice, for some seasons, fell on the rosella as being a crop which would not unduly interfere either with the cultivation of my fruit trees or exhaust the soil to any serious extent. The first lesson in orchard operations, more especially with young trees, is to have and keep your land clean from weeds at the least possible cost, which at once suggests the employment of labour-saving machinery. I determined to try a system of my own devising, which proved very successful.

As my planting operations necessarily spread over several acres of orchard, and at most two rows of plants could be set in between each row of fruit trees, in order to facilitate transplanting over this area, I, as before stated, selected suitable spaces contiguous to my proposed planting areas for seed beds, sowing the seed not so thickly as ordinary for reasons hereafter given. These beds were well watered and kept clean, so that in the transfer of plants no weeds would be conveyed to the orchard land. Most persons acquainted with the routine of orchard work will appreciate the necessity for keeping the land clean to the very last possible moment by the aid of horse implements. Immediately after running the harrows or scarifier over the land and as soon as the soil was in a satisfactory condition, I pegged out my line of drills between the rows of fruit trees, and with an American post-hole digger, with one drive of the implement, raised the necessary amount of soil to enable the transplanted plant to occupy the space, and thus rapidly traversed my length of drill. My next operation was to pick up the plant and soil with the digger from the nearest seed bed, and transfer plant and soil into the hole prepared for it.

The opening and closing mechanism of the digger lends itself most perfectly to this work, and a pressure of the foot on each side of the plant is all that is needed to permanently fix it in its place. Thus the plant is set with the soil at its root undisturbed, and it continues to grow without check.—This system I have successfully adopted in transplanting melons and other plants of a delicate nature that usually do not thrive under harsher treatment. For filling up misses in the rows I have found with many crops this instrument quite as valuable as in its legitimate use as a post-hole digger. But an implement that will satisfactorily perform in some soils may prove a comparative failure in others, hence I do not claim that in all soils success will necessarily follow. I am quite aware that the waxy black soils or heavy clays are not best adapted for my system, but on such soils as I then worked—red loam of a sandy nature—or any of our light scrub soils I know of no better system to adopt. The propagation of this plant by cuttings is not commonly adopted, and indeed is not as satisfactory as from seedling plants; still there are times when the system will prove worthy of a trial. It may be that from failure of the seed to germinate there are not enough plants to fill the area or to supply misses in the rows transplanted. As

it is, however, imperative to replace them, propagation from cuttings, or, more properly, branches, will be expedient. When the shrubs are 1 ft. or 18 in. high, select from your most vigorous and bushy shrub a couple of the lower branches. Do not cut them, but, with a gentle snatch, break off the wood close to the main stem of the shrub. It will break off very easily, and on examination of the branch you will observe the edging of the break will indicate a strong rim of bark which will, on transplanting, quickly become callous and soon provide a good root-hold for the shrub. Bushes propagated in this way in some seasons bear when the more vigorous and earlier shrubs carry little or no fruit, but they are invariably more stunted in growth, yet usually yield a fair crop. Thus, by adopting any of the systems here described, the prospective grower can hardly fail. With a moderate rainfall, rosellas will grow luxuriantly in any locality where the soil is suitable, and when winter frosts do not set in too early to allow of the proper maturing of fruit. Too exposed situations should, if possible, be avoided, as high winds, blowing on the bush with its luxuriant foliage, often break down the branches, and, in times of continued wet weather, blow the shrubs over.

PICKING THE FRUIT.

This is a rather monotonous occupation for adults, and is more suitable for the young folks. As soon as the fruit is matured, it is advisable to lose no time in gathering. When this work is delayed, I have observed a tendency on the part of the fruit stalk to so toughen as to be an impediment to quick gathering, and, moreover, it leaves the fruit exposed after maturity on the shrubs to become to some extent deteriorated by the attacks of aphis, which often affect it at this stage. In picking for market, care should be observed to pick the fruit as free as possible from stalks, leaves, &c., as, when required by jam factories, the presence of such superfluous matter will militate against its sale.

SHELLING.

The removal of the edible covering from the seed pod is a somewhat wearisome business, more especially when it depends on hand labour. Usually, the pod is taken in the hand and the covering is dragged off piecemeal, and a knife is employed to sever the base of the pod, which facilitates the removal of the covering, both of which operations are rather slow. Here comes in the truth of the old adage that "necessity is the mother of invention," and, as a result, an invention is to be obtained from some of our city seedsmen that overcomes the difficulty of separating the pods from the fruit, and, the cost of the instrument being moderate, any grower on a large scale who requires to separate the fruit will do well to purchase one. The diagram shows two forms of the instrument. Fig. 1 was invented and patented by Mr. T. Chalk, of Coorparoo; and

FIG. 1.

Fig. 2 is an improvement on it, which I made for my own use. The difference in the two instruments is that the piston in mine is movable

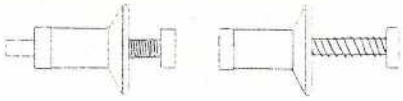


FIG. 2.

and is supplied with a spring, and that, being so short, it can be worked with one hand whilst the fruit is held in the other. Those who care to construct the apparatus for themselves can easily do so with little trouble or cost. My appliance was home-made, and, although crude in appearance, answered its purpose very well. To describe the article, simple though it be, is not very easy; but the outlines being given, the ingenious grower will perhaps be able to, by help of the illustration here given, seize upon the design. It can be made by taking a common cotton-reel and whittling down one end to receive a ferrule, for which I used a small brass cartridge-case. This fits on the end of the reel and acts as a cutter, which is worked by taking the pod in one hand and pressing the ferrule into the stalk-end of the pod and giving it at the same time a slight turn, which causes the cutter to pass clean through the covering, and so relieves the pod. To expel the latter from its covering, you make a small pusher from a piece of round wood that will just work through the hole in the centre of the reel. This piece of wood is made with a flat head, so that it rests against the palm of the hand without hurting it when pressing the pod out, while between the top of the pusher and the reel-head is put a small spiral spring made out of any light wire. This is put on to draw back the pusher after it has driven out the pod, and thus you can quickly and easily prepare this fruit for use.

UTILISING THE FRUIT.

Most housewives are familiar with the various uses of the rosella. For jam-making it is well adapted, making a palatable, easily-kept product, if put up in earthenware or glass. Unfortunately, rosellas contain an acid principle which precludes putting up this class of fruit in ordinary tinware, and hence some failures have been experienced in this respect. For pickles the fruit is well adapted, and it makes an excellent condiment. In my own experience, I have found that the best method of handling the fruit was to dry it after removing the pod from the capsule, which, if done with the instrument before described, cuts out the covering nearly whole, which is thus better adapted for drying purposes. I have kept the dried fruit in jars and tins for two or three years in good order. Rosella-growers would do well to give this mode of peparing the fruit more attention, for I have found it far and away the best in saving the crop. All that is necessary to do in drying is to prepare the fruit as I have shown, and, in some roomy, airy position (not necessarily in the sun), place the fruit either on trays or sheets on the floor, allowing as much air to pass through and over the fruit as possible. In a few days all superfluous moisture will have evaporated, and the dried article can be packed away in jars. By this means rosellas can be had in good condition all the year round. All that is needful, when required for use for jam, tarts, &c., is to take the quantity necessary

and pour over the fruit a little water, when it will absorb the water and resolve itself into apparently fresh fruit. The large grower has in this method a certain way of keeping such surplus fruit that may not be in immediate demand, or that the low prices ruling may deter him from marketing as ordinary fruit. I am of opinion that fruit put up in this form, and exported to the London market, should give better results than the already proved failures in the form of jams.

It is not commonly known that in the utilisation of the choko, now fast becoming a popular vegetable, that very pleasant tarts can be made by using that vegetable (*Sechium edule*) in conjunction with the rosella. It is well known that many object to what they term the excessive tartness of the rosella. Using it in conjunction with the choko this tartness is modified, and tends to make both these fruits more appetising. In fact, rosellas are specially adapted for blending with less tart fruit, as they give a flavour to many fruits and vegetables which otherwise would not be so acceptable for table use.

WINE-MAKING.

This is a further use for rosellas. Although I have no personal experience in this method of dealing with the fruit, I know that a good palatable beverage is made from rosellas. To those who care to try to utilise this fruit in this manner, I give here a recipe sent me by a friend who has a wide reputation as a maker of rosella wine:—

ROSELLA WINE.

Put your fruit into a cask that has one head out. Pour boiling water over the fruit, rather more than enough to cover it. Let this stand for about three days—stir now and again.

At the end of three days, strain the liquor into another cask—*this cask to have both heads in*. Then for every gallon of liquor take 3 lb. of sugar, and make a good thick syrup of same.

Pour this syrup while hot into the liquor, and stir well.

Leave the cask with the bung out until fermentation starts. Should this not occur, say, in twenty-four hours, add a bottle of yeast. Keep this cask in as even a temperature as possible, as this will help the fermentation.

In the process of fermentation, you will lose some of your liquor. Should it ferment thoroughly, save the liquor that overflows from the bung-hole, and put it back into the cask; but should you find this not enough to keep your cask full, add a little warm water.

When the liquor has almost finished fermenting—say when it stands at 3 degrees density by the saccharometer (Beaumè)—bung up the cask and leave for three months. Then bottle.

ROSELLA FIBRE.

From *Hibiscus Sabariffa* fibre has been repeatedly made, specimens of which and of cloth manufactured from it are to be seen in the museum of the Agricultural Department, William street. Some few years ago, a local grower gave the matter of the production of this plant considerable attention, specially in view of the utilisation of his crop for fibre

purposes. I am of opinion that his failure to go on with the matter was consequent on want of machinery to prepare the fibre, which is a drawback only too patent with regard to the development of many industries of this character in Queensland.

DISEASES.

The diseases affecting this plant are not usually very formidable, although in certain seasons a grub attacks the roots of the bushes, and a disease, apparently fungoid in character, sometimes affects the shrub. The common aphis is usually present in quantity on matured fruit; but, on the whole, while this crop is, in common with others, susceptible to occasional serious injury from pests, it is hardy, useful for many purposes, and profitable to grow.

BANANAS AT BIGGENDEN.

That the soil of Biggenden can produce bananas as good as any in the North, or any other banana district in the South, is evidenced by the size of the fruit and bunches produced on their Red Hill Farm, Biggenden, by Messrs. Waldock Brothers. The variety is the Cavendish, and the number of fruits was nineteen dozen and four on one bunch and seventeen dozen on another—all equal to those here illustrated. The

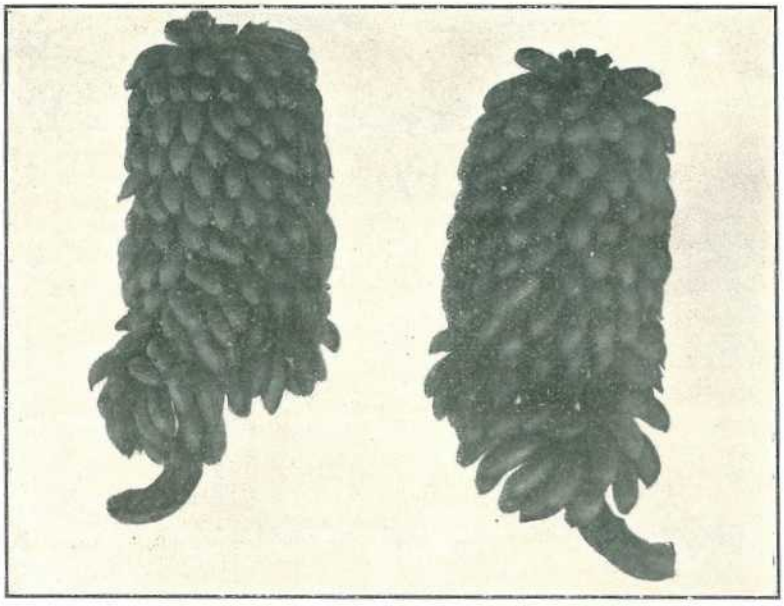


PLATE 23.—BANANAS FROM BIGGENDEN.

volcanic red soil on which the plants are growing must be very rich, as no manure was given to them at any time.

Mr. Ross, Instructor in Fruit Culture, says that there are many localities on the Biggenden Line where bananas on a moderate scale would succeed, but not west of Biggenden.

A FRUITFUL POMEGRANATE TREE.

Mr. C. F. Dennis, in addition to rice-growing, also raises orchard fruits, amongst which is a pomegranate tree only two-and-a-half years

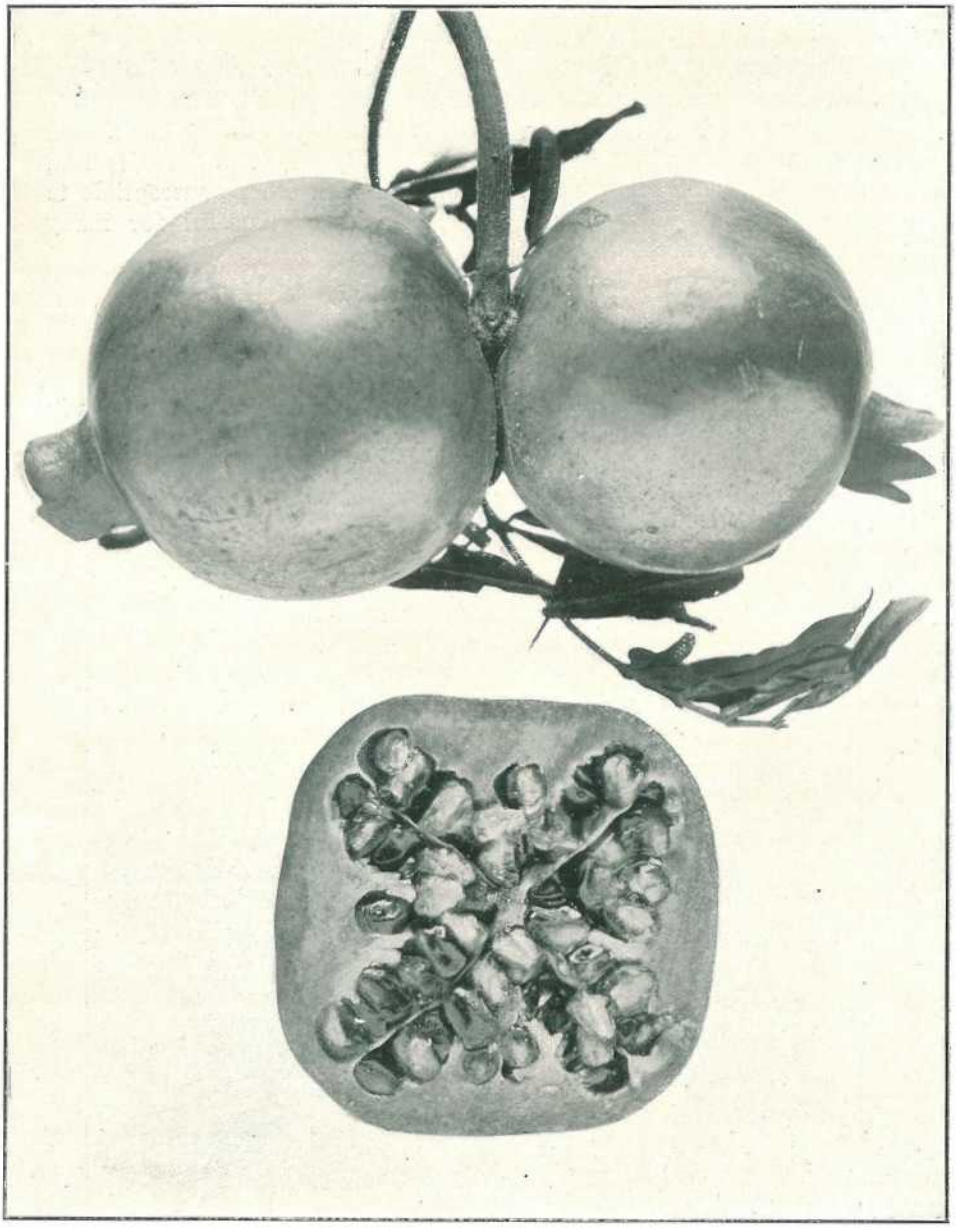


PLATE 24.—POMEGRANATES GROWN AT BULIMBA.

old which has borne this season eleven fruits equal in size to those here illustrated. The pomegranate tree, he says, is easily grown from cuttings.

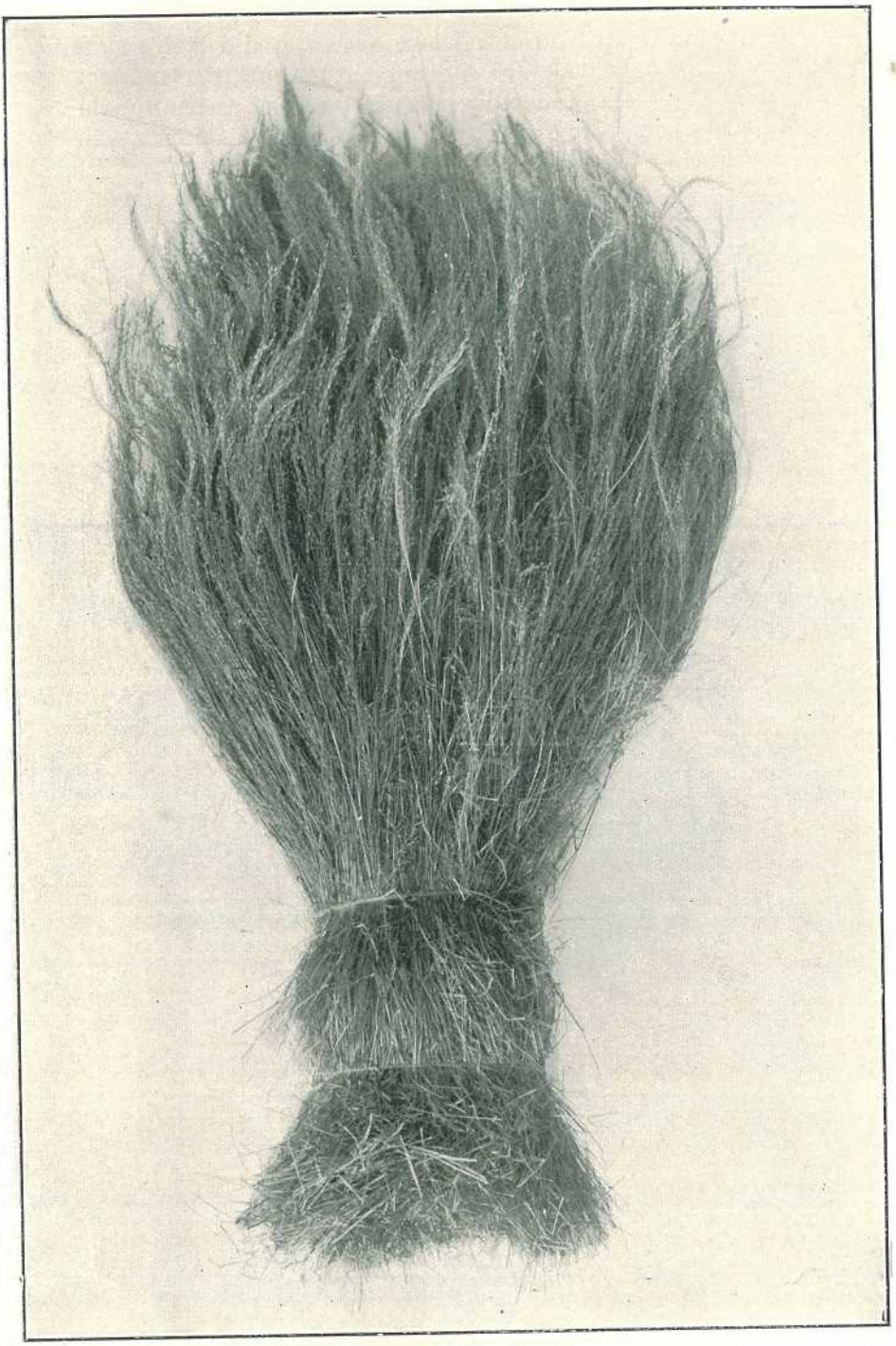


PLATE 25.—TEFF GRASS.
(For Description, *see* April and May numbers of the Journal.)

CITRUS FRUITS IN THE WESTERN DISTRICTS.

Whilst the Roma district has long ago enjoyed a high reputation for the cultivation of the grape vine and citrus fruits, the lands further to the East have been gradually coming to the front as fruit-producers, owing to the persistent experiments by enthusiastic farmers. In the neighbourhood of Miles, Mr. Jas. Y. Just has a selection, about 7 miles

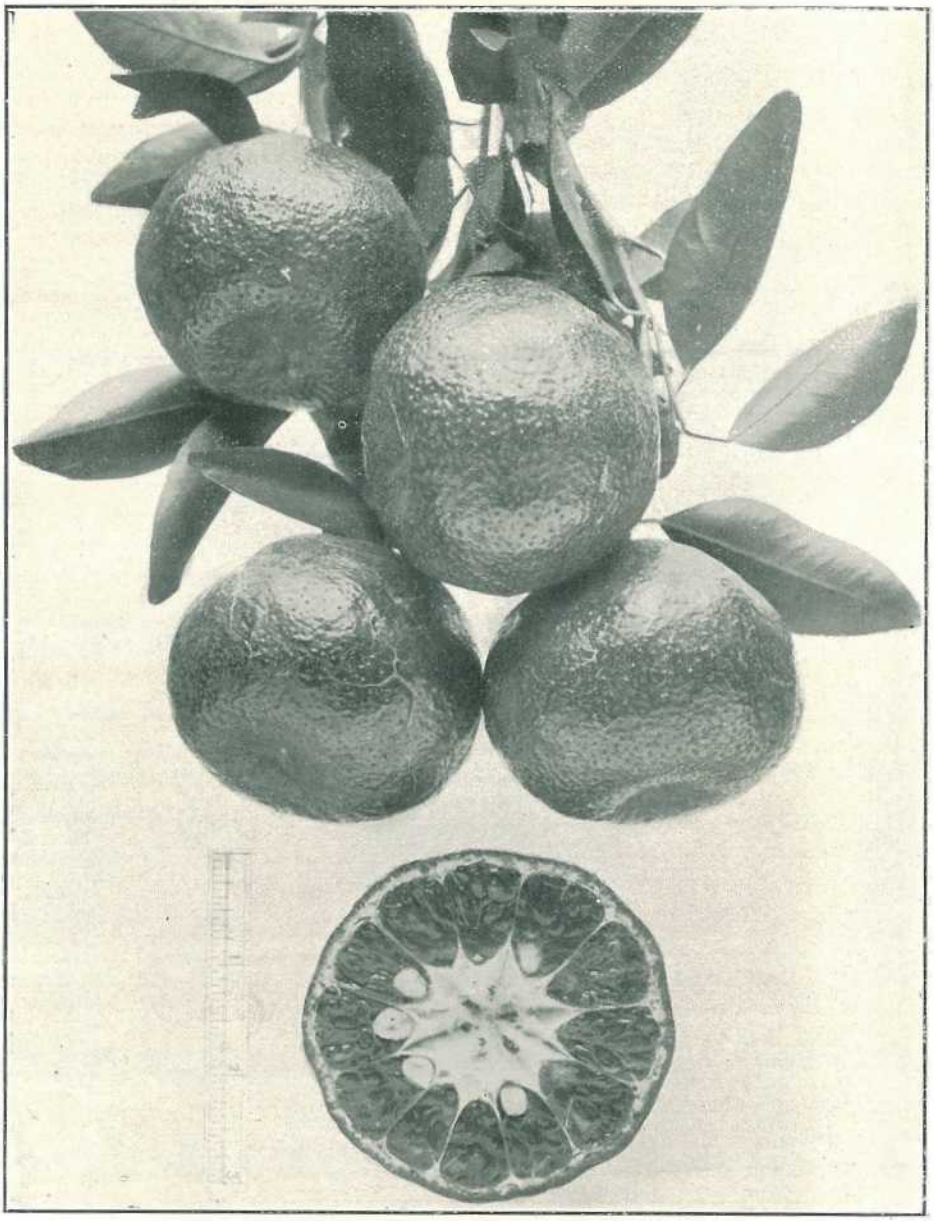


PLATE 26.—BEAUTY OF GLEN RETREAT AND SECTION OF SICILIAN LEMON, GROWN AT "CAMISLA," NEAR MILES.

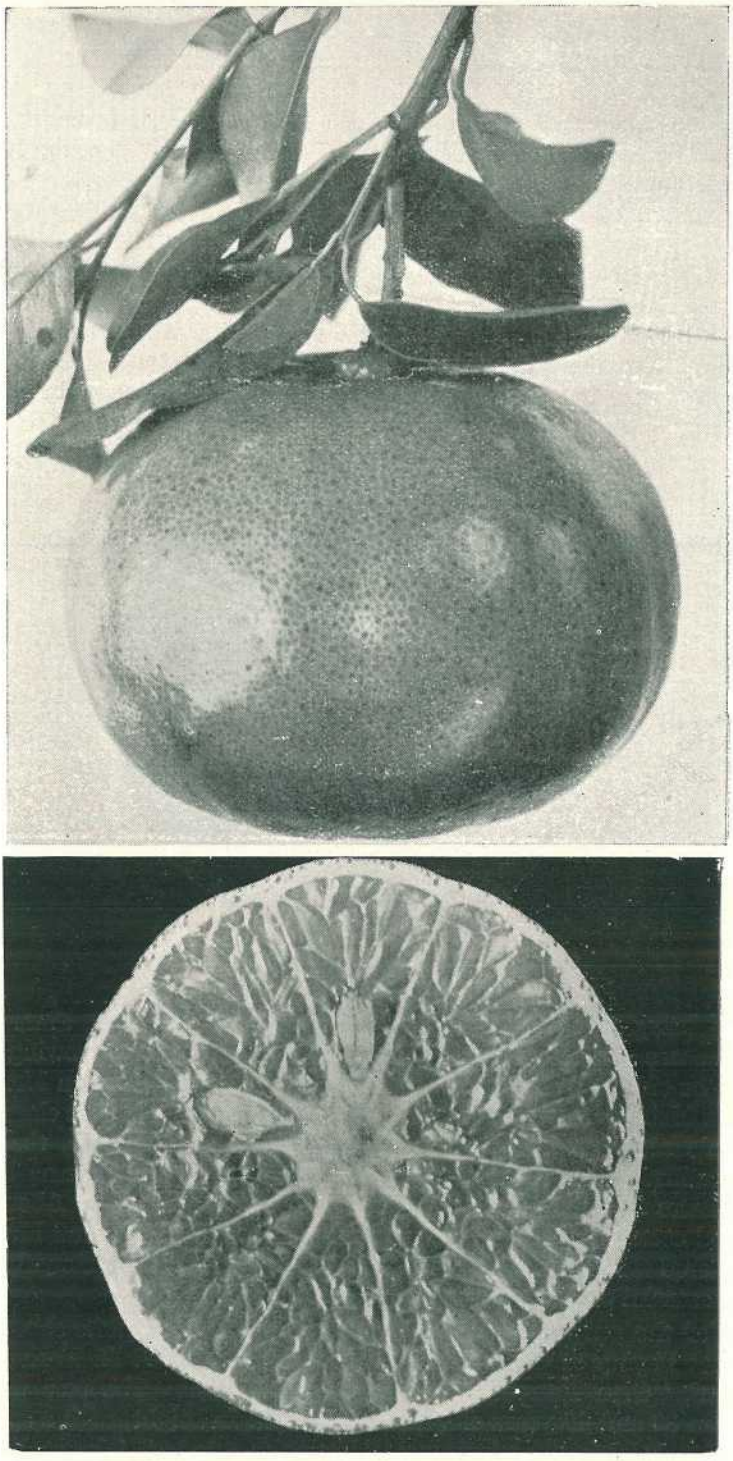
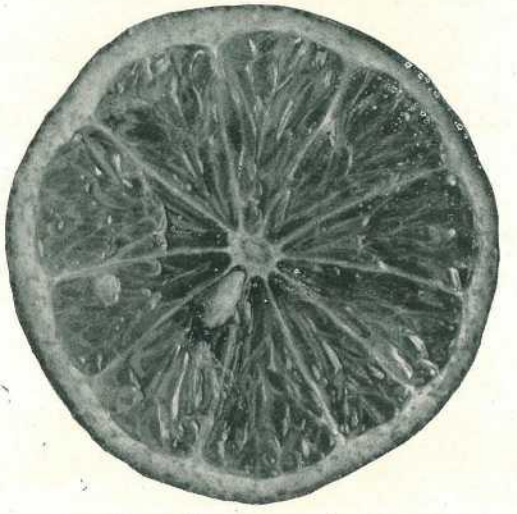


PLATE 27.—BEAUTY OF GLEN RETREAT, ORIGINALLY GROWN AT ENOGGERA

beyond the township, known as "Camisla," on the Western Railway Line. The soil here is ideal for fruit, consisting of a light volcanic loam overlying a subsoil of gravel resting on a loose rock bottom at a depth of from 4 ft. to 6 ft. Here Mr. Just has some very fine Beauty of Glen Retreat mandarins, a sample of which Mr. T. C. Just brought to this office. The trees are now four years old, and are bearing heavily, notwithstanding their having passed through the ordeal of three successive summers of extreme heat and dryness, and during that time not having received any artificial watering. The fruits here illustrated will serve to give an idea of the excellence of the growth, although they are somewhat reduced from the natural size. Lemons also succeed as well on "Camisla" as in the Barcaldine district, which has long been celebrated for the fine lemons grown in the district. The trees at "Camisla" are four years old, and the fruit is large, very bright, and thin-skinned, and may be considered quite equal to the imported Italian



PLTAE 28.—SICILIAN LEMON.

lemon, being of Sicilian origin. When Mr. E. E. Wood, from Texas, U.S.A., was at Miles studying the conditions for cotton-growing in the West, he obtained some very fine bolls of Uplands cotton on Mr. Just's farm, which he stated surpassed in quality any cotton of this class grown in the United States. In the June issue of this Journal, the source whence Mr. Wood obtained these bolls was given as Dulacca; but Mr. Just states that they came from his son's farm near Miles. About 1 ton of good cotton was obtained from the small area planted, and Mr. Wood considered that the soil and climate of the district were eminently suited for successful cotton-growing.

For the purpose of comparison, we reproduce a plate showing the original Beauty of Glen Retreat, as grown by Mr. W. H. Parker in his orchard, "Glen Retreat," at Enoggera, in 1900. The tree was then between 30 and 40 years old, measured 22 ft. in height, with a spread of branches of 24 ft. The fruit was of large size—up to 3½ in. in diameter; the skin very smooth and thin, and shining as though polished with an oily cloth, and semi-transparent.

Tropical Industries.

FIBRE FROM THE MUSA OR BANANA FAMILY.

By T. BINNIE.

In these days—when material for the making of paper, cordage, and bags for the holding of all sorts of produce during transport is in great demand—there is no raw material which may be utilised in the manufacture of any of these articles which is beneath the notice of those living in a country which, from its soil and climatic conditions, is suited to the growth and production of such raw material. Any addition, therefore, to the production of a country (which does not rob it of its natural riches) is at once adding to that country's capital.

The most valuable Musa fibre is undoubtedly that yielded by *Musa textilis*. There is a very large number of varieties of this, all differing in habit and in quality of fibre yielded by them; but I question if there is much difference between the Tangngon (*sic.*) variety (which is one of the best grown in Southern Mindanao, Philippine Islands) and the wild banana. For centuries the fibre from the *Musa textilis* was the only material the natives of the Philippine Islands could obtain wherewith to clothe themselves and make ropes, nets, and sails for their canoes and larger boats, so that, from generation to generation, selection was made of rootstocks of plants which yielded a strong, coarse fibre for rope-making, a better fibre for the making of canvas, and a still finer fibre for the making of their wearing apparel, until there have been evolved the varieties known to commerce as Manila hemp, Abacà, or *Musa textilis* grown simply for its fibre. This bears no edible fruit, and is, therefore, distinct from the banana of commerce, from which also a fibre can be obtained, which, while it is not so strong as that obtained from *Musa textilis*, is still of value. This and fibres from other members of the family will be dealt with later on.

Musa textilis is one of the most important sources of supply for cordage fibres, and at the present time the Philippine Islands enjoy a practical monopoly, and control the trade, which amounts to over 150,000 tons per annum. It has been considered that it was only in the Philippine Islands that this valuable fibre can be produced. Lately, however, British North Borneo has been steadily producing this article, and the export of fibre thence is increasing.

For its successful cultivation a locality such as the Johnstone and Russell Rivers, where the rainfall is heavy and regular, would be necessary.

This plant thrives best in volcanic soils containing vegetable matter or humus; hence the virgin scrubs of North Queensland would be eminently suitable. As in most of these places there are perennial running streams, it would be easy to pick spots where the water could be

led on to the land and in times of dry weather the crop irrigated as desired.

Almost any lay of land will do for Manila hemp as long as it is not too swampy or too steep. It thrives best on rich flat land, and does not much mind a flood so long as the water does not stand too long on the land or leave it swampy—in fact, one of the best plantations the writer saw in the Philippines was on a delta at the mouth of a small river, which with the least fall of rain in the mountains at the back flooded the whole place, leaving a heavy deposit of silt after each flood; but the ground was naturally drained, and the water came up and went down quickly.

Manila hemp will not stand any long stretch of dry weather. The stems are composed of layers which contain the fibre, and which in times of drought dry up and wither, when the fibre they contain is rendered useless.

Although seed is produced, propagation by this means is slow and uncertain, although useful for producing new blood, and is not generally adopted. Plantations are usually established by suckers, or corms, in a similar manner to banana plantations; the suckers, or corms, planted 8 to 10 ft. apart.

On scrub lands, cultivation by horse implements being impossible, the expense of weeding can be minimised by planting some cover crop of a leguminous plant, which, while it would keep down all weeds, would at the same time enrich the soil by supplying it with nitrogen and incidentally with humus. From my experience in the Philippines and elsewhere, I would recommend the Mungo Bean (*Phaseolus Mungo*) or the Sensitive Plant (*Mimosa pudica*) for this purpose. These are both legumes, and while the former is an annual the latter is perennial; but, of course, as the Musa plants only take about 15 months to mature, they soon cover the ground and by their shade kill any other growth between the rows; it is only for a short time that heavy weeding has to be done, although it will afterwards be necessary from time to time to go through the area and cut such plants as thrive in the shade in all tropical scrubs.

The planting of *Musa textilis* does not differ from that adopted for the fruiting banana. The cost, exclusive of the cost of plant, should be done for under £3 per acre. The best time for planting would, in Queensland, be from January to the end of March.

The cost of planting and keeping the plantation in order until such time as it begins to produce should not be more, in Queensland, than £10 per acre.

Manila hemp suckers take longer to sprout than the ordinary banana, and send out fewer shoots; but in 3 weeks or so from the time the sucker is put in, if the weather is at all favourable, the first shoot will be seen, and will soon be succeeded by one or two more.* It will be at least 12 months before the first shoot is fully matured and ready to throw out its

* W. Fawcett, late Director of Public Gardens and Plantations in Jamaica, in his late excellent work on the banana (Duckworth and Co., London), says that when the plant—*M. textilis*—is mature it consists of a stool of 12 to 30 stalks, of which 2 to 4 only can be harvested at the same time.—Ed. "Q.A.J."

fruit spathe. When this appears is the best time to cut the stem down for fibre. If so desired, however, it can be utilised earlier, but the percentage of fibre obtained is lower. This is to some extent compensated for by the finer quality of the hemp obtained.

At the age of 12 months the main stem will be nearly fully matured,† two or three others will be of considerable size, and some four or five small suckers will be coming on. In a very short time the ground will be pretty well shaded by the leaves of the maturing plants and the suckers. As the old stems are cut down, the young suckers grow up and take their place.

When it has arrived at this stage, a Manila hemp plantation requires scarcely any attention as long as the workers do not open it up too freely by cutting over-many stems or allowing the scrub plants to encroach too much.

As this crop lasts from 15 to 20 years from the one planting (in fact, I have seen plantations in the Philippines which have not been replanted for over 30 years and are still bearing well), its economic value becomes at once apparent.

From 12 to 15‡ months after planting, the parent suckers throw out their flower head, when they are ready for cutting. At this time the three is at its best, and the leaving of the stalk longer will lead to deterioration and consequent loss.

The stems are cut as close to the ground as possible. The reason for this is that by doing so the after suckers will start from under the ground instead of high up on the old butt, and thus the roots of the after stalks will have a firmer hold of the ground, be more robust, not so easily blown over, and the life of the stool will be prolonged. About 1 ft. of the stalk is cut away, as this contains very little fibre, and that of a poor quality. The top from where the leaves spring is then cut off, and each leaf sheath, of which the stem will be found to be composed, is detached from the others. The fibre is found just below the outer surface of each leaf stalk. The core or the sheaths of the later leaf growth, while containing a very fine fibre, is, under the old method of extraction, thrown away, as the fibre is too fine and slender to stand the strain placed upon it by the strippers under this method; but the newer methods and more perfect machinery mentioned below will no doubt save all this, and will result in the extraction of a more valuable fibre. After cutting down, the operator sits down, and, with a wooden or bone knife and with the leaf sheath on his lap, gently passes the knife between the outer covering of fibre and the cellular tissue below. He separates the fibre in strips about 3 in. wide, and, by giving a smart twitch outwards and upwards, brings away a strip or ribbon of the cuticle with the fibre in it from the whole length of the sheath. This is called a "tuxie"; and there are generally three or four tuxies from each leaf sheath, and from 12 to 20 leaf sheaths to each stem.

† Fawcett says the plant attains its highest textile strength in two to three years.—Ed. "Q.A.J."

‡ Two to three years' according to Fawcett.—Ed. "Q.A.J."

As the operator approaches the heart of the stem, it must be left to his experience to decide as to the value of the fibre contained in the core. These tuxies (or ribbons) are then conveyed to the stripper, who may be in a central position with many others, or more often close to the tuxier, and working under contract at so much per lb. of dried fibre delivered. Generally, one man cutting down and tuxying will keep at least two men stripping; but this is usually arranged for by the men themselves.

The appliances used for the extraction of the fibre have been of the most primitive and (apart from the labour) inexpensive character. The stripper passes the tuxies through the machine, which consists of a blunt knife held firmly by a bamboo spring on to a flat piece of hardwood; he releases the knife by means of a treadle connected with the spring, and places the tuxie between the knife and the board, leaving a short piece of the tuxie towards himself, which he wraps round a short piece of wood and then releasing the treadle, thus causing the knife to be pressed firmly against the tuxie, which he draws sharply towards himself, the pressure thus freeing the pulp from the fibre by a scraping action. The tuxie is then reversed, and the part that remains unstripped is then pulled through the machine in the same manner, which leaves many strands of clean fibre in the operator's hand. The strain, however, on the fibre breaks away about 50 per cent. of it, which, under the old system, was left on the ground to rot. After this operation, the resulting fibre is hung over racks to dry; and, if the weather is at all fine, about 4 or 5 hours will be long enough to complete the drying. The fibre will not deteriorate by being left out in the dew or a little rain—in fact, it bleaches it.

After drying, the fibre is put up in hanks, which are then put into bundles weighing about 137 lb. These are then sold to the merchants. The bales are generally from 3 to 4 cwt. each, and put together at the port of shipment where the hemp is graded by experts.*

Manila hemp is worth from £15 to £25, and even as high as £30 per ton, according to grade in Manila, and the Queensland grower would have the benefit of freight as well as the export tax levied in the Philippines on all such material shipped to foreign countries from there; so that it would be perfectly safe to put the Australian price down at £20 per ton for the material produced by the machine mentioned below, and no doubt the Commonwealth Government would further assist by placing an import duty on such material.

A planting 10 ft. by 10 ft. will give about 480 stools to the acre, from each of which in the second year 2 stalks should be cut and after that 5 stalks or more per stool.

Under the old system the weight of fibre from each 100 lb. of stalk would average about 2 per cent., but with the machines now being tried the percentage should be at least 4. The stalks should average 75 lb., which will give 72,000 lb. of stalk per acre in the second year, from which at least 1 ton 5 cwt. of fibre should be extracted, or a return of

* This process was fully described and the primitive machine illustrated in the "Queensland Agricultural Journal" for May, 1904, and January, 1906.—Ed. "Q.A.J."

£25 per acre gross. In the succeeding years there should be produced 3 tons 4 cwt. per acre, from which a gross return of £64 per acre may be expected; and, as the cost of harvesting and subsequent manipulation should not be heavy under the new system, this should leave a good margin for profit on the original outlay.

American ingenuity is being taxed to its utmost to cheapen the process of extraction, and a number of machines more or less successful are now on their trial.

A "crusher" has been invented in America for which it is claimed that it will handle the entire stalks of Musa in somewhat the same manner as sugar-cane is crushed. The crushed fibre and pulp come out fairly dry, and are lifted up about 12 ft. and then dropped into an ingeniously constructed dryer, where in 2 or 3 hours the crushed material becomes so dry that the pulp can be easily shaken away from the fibre.

These machines are being installed in the Philippines, and it is claimed for them that they, being light and simple in construction, can be easily shifted from place to place and thus deal with small planters' crops easily and cheaply; they will save 100 per cent. more fibre than under the old system; and that the price of the fibre will be well up to the average, as the process will actually produce a better article than that which has been subjected to the heavy strain of the old system of stripping.

This fibre would be cheaper than cotton for the manufacture of paper for the making of bags for the transport of flour, sugar, cement, &c.; and the demand for material for the making of cordage of all kinds and binder twine is increasing daily.

Certainly, where bananas are grown for their fruit only, there is an enormous waste of fibre in the stalks left on the ground; and as very often by-products have been known to be the means of lifting languishing industries to the front ranks of profit-making propositions, so these machines may be the means of largely stimulating the growing of bananas in Northern Queensland, and may assist in the opening up of the lands on the Daintree, Bloomfield, and other places out of reach of the existing central sugar-mills.

There is no reason why central crushers may not be established on somewhat the same terms as the central sugar-mill system and at a very much less cost. Such would enrich the country by keeping the money in it which at present is sent to other countries for the purchase of commodities which Nature has declared can be grown here.

If these machines can be adapted to the treatment of other fibre plants—such as sisal hemp and all aloes, bowstring, pineapple, blady grass, &c.—they may revolutionise the paper and textile industry generally, as many of the plants which we now look upon as noxious weeds may thus become sources of great wealth.

Musa textilis has been growing in Brisbane since 1862, and at Kamerunga State Nursery for the last 20 years, where plants can be obtained; and I have no doubt the Department could arrange for a supply of rootstocks of the best varieties from Mindanao, Philippine

Islands. Other varieties of this genus are known to produce most valuable fibre. In this country, at least three varieties of the wild banana are known to produce good fibre—not to mention many of the varieties of Musa at present cultivated only for their fruit.

To sum up:—The climatic conditions of North Queensland are in places favourable to the successful growth of the Musa varieties, as witness the wild banana, which is indigenous, and the fruit-bearing varieties which have been introduced. There is an ever-increasing demand for the fibre in every country and within the Commonwealth, and the sources of supply of the material from which paper is manufactured are every day becoming more limited.

The growing of the Musa, as has been shown, is neither a difficult nor costly undertaking, and is suitable for small settlers with little capital.

The cry is "People our Tropics"; and any new industry that can be started and conducted profitably must be a means to that end.

The plantation, once established, needs no expensive replanting for at least 15 years.

And, lastly, there is a vast area of the most fertile country in the world awaiting the axe of the pioneer, with timber on it which would in itself render the work of clearing profitable.

PROSPECTS FOR QUEENSLAND.

Although the alluring prospect is held out to Queensland planters as to the profits to be derived from the production of fibre from *Musa textilis*, it must not be forgotten that the profit returns are based by Mr. Binnie on the results of the cultivation and manufacture of the fibre in countries where coloured labour is employed. In Queensland not only would field labour be needed, but also mechanical labour, and the latter with machines which, up to the present, have not proved satisfactory. To obtain 1 ton of banana fibre, it will be necessary to handle nearly 100 tons of fresh stems, as each trunk yields on an average a little under 1 lb. of fibre, and, under present conditions of extraction, two men cutting down plants and separating the fibre will not prepare more than 25 lb. per day. A number of machines for the purpose of extracting the fibre economically have been introduced, but none have come into general use. Taking 25 lb. of clean fibre as a day's work for two men, this means, at £30 per ton, a little over 3s. a day, exclusive of rations for workers. In a country where farm labour is reckoned at 8s. to 10s. per day, such a return would result in dead loss. Hence we cannot see how, in the absence of automatic machinery, the production of Manila hemp can be considered as a payable proposition for Queensland farmers.

Sir Daniel Morris, in a communication to the Jamaica Agricultural Society (Joun. Jam. Ag. Soc., x. 2, 1906) said: "A banana stem just after fruiting, if cut about 2 ft. above the ground and denuded of foliage, weighs 108 lb. This, being divided into lengths of 2½ ft. each and split longitudinally into several pieces, was prepared by beating and washing by hand, and yielded 25 oz. of clean marketable fibre, which

is at the rate of 1·44 per cent. of the gross weight. A smaller banana weighed 41 lb. This was divided into lengths of 2½ ft. each, and, after being split into several pieces longitudinally, was prepared by hand and yielded 6¾ oz. of clean fibre, or at the rate of 1·02 per cent. of the gross weight."

ANOTHER NEW FIBRE DECORTICATOR.

We have received from the inventor the following description of a new machine ("La Française") for scutching sisal, flax, hemp, ramie, hibiscus, jute, banana, and other fibres, adapted to the above work. This cannot, however, be described as a new invention, since M. Félicien Michotte (the inventor) took out his final patents in 1910, after having spent some years in experimenting with mechanical decorticating of many textiles.

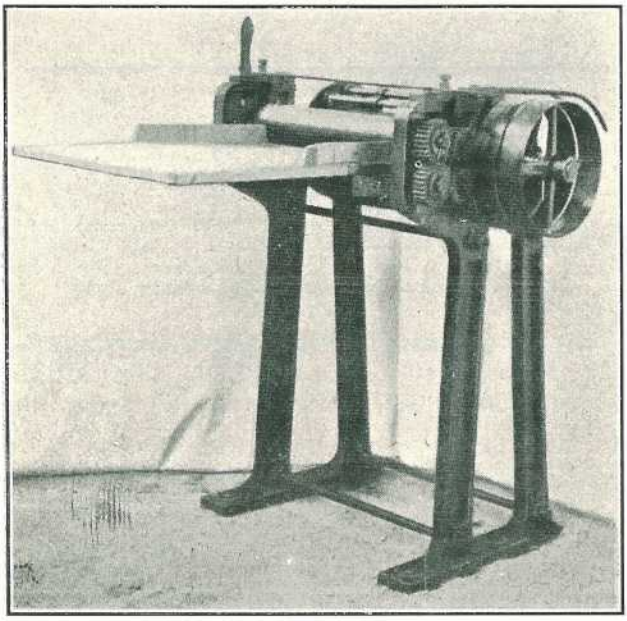


PLATE 29.—"LA FRANÇAISE" FIBRE DECORTICATOR.

The advantages claimed for this perfected machine ("La Française") are summed up as follows:—

(1) The machine can be regulated without difficulty for the treatment of leaves or stems, whatever their size, without any sorting out or grading.

(2) The machine may be set up to work in the field, and removed as the harvest proceeds to further portions of the estate.

(3) The mechanism and its working are so simple that it can be worked by the merest tyro. All the workman has to do is to spread the leaves or stalks on the running table, let them enter the machine, which automatically conveys them to the beater, when they emerge in the form of decorticated fibre.

(4) Care of the Machine.—"La Française" requires very little attention. A little oil supplied to spindles and axles, a little grease to the cog-wheels, and a general cleaning from time to time. Thanks to its strong and careful construction, no breakage can occur, and no irregularity has to be overcome; hence no special supervision is needed. All the parts are constructed of chosen materials—steel and bronze—thus assuring long service with a minimum of wear and tear.

(5) The machine is essentially portable. Its weight is less than 400 kilos. (900 lb.), which weight is easily divisible, as the machine can be taken to pieces by the simple unscrewing of some nuts. Thus it can be transported even to the most inaccessible localities.

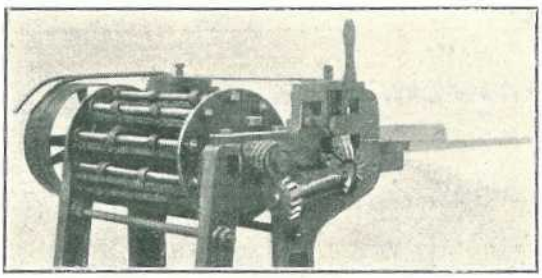


PLATE 30.—"LA FRANÇAISE." (INTERIOR VIEW.)

(6) The work performed by it is perfect, rapid, and economical. The leaves or stalks are treated by direct attack, and the decortication is effected in one passage through the machine.

The leaves are not worked off singly, but may even be passed through in bundles which are almost instantaneously decorticated and cleaned, without breakage or tearing out of the fibres, and practically without appreciable waste. Thus the leaves or stalks have not to pass through the beater several times, as is the case with other machines.

(7) A peculiarity of the machine is that in the case of leafy stalks no preliminary hand labour is required to remove the leaves (as, say, in the case of ramie). It effects this part of the work automatically.

(8) The motive power is economical. An engine of from ½ to 2 h.p. enables the employment of any sort of motor—steam, water, petrol, electricity, or horses. Finally, the build of the machine enables it to be easily set up on any kind of country.

"La Française" will treat about 1,200 kilos. (2,700 lb.) of dry leaves or stalks and 2,500 kilos. (5,620 lb.) of green in a day of 10 hours, producing about 150 kilos. (337 lb.) of dry fibre. Consequently it is equal to decorticating in 5 days the crop of a hectare (2½ acres) of hemp, representing 12,000 kilos. (27,000 lb.) of stalks or leaves.

As regards ramie, which valuable fibre has so far defied all machines, it is claimed for "La Française" that the ribbons are mechanically delivered as China grass, which is worth in the market from £45 to £50 per ton. The weight of green stems of this fibre plant treated in 10 hours is claimed to be about 10,000 kilos. (22,500 lb.), and a single machine can consequently treat in 7 days the crop from 2½ acres, which averages 75,000 kilos. (168,750 lb.).

In the case of sisal and other agaves and aloes and the banana, the machine, by a simple modification of its parts, can treat all such textile leaves, provided they are not thicker than 4 to 5 centimetres (about 1⅗ to 2 in.). Larger sisal leaves could, of course, be first passed through rollers and crushed; but this is also provided for in "La Française No. 2."

The quantity of fibre contained in these various textiles being very variable, the production of the machine varies from 150 to 350 kilos. (330 to 787 lb.) in 10 hours.

Total weight of the machine, 350 kilos. (875 lb.).

Height, 3 ft. 6in.; breadth, 3 ft. 3 in.

Price (at the works), complete, 1,400 francs (£58 10s.).

All information may be obtained from M. Félicien Michotte, engineer, 45 Avenue Trudaine Paris France.

NEGLECTED INDUSTRIES.

SILK WORMS AND HOW TO REAR THEM.

For a long time efforts have been made to establish the industry of silk production in this State. As far back as the early sixties some enthusiasm was exhibited in the suburbs and country districts in the neighbourhood of Brisbane, especially amongst the pupils of the State or, as they were then called, Primary Schools. In almost every country home silk worms were raised, mulberry trees were grown, and numbers of cocoons were produced. The writer once made up two small bales of Queensland cocoons obtained at Oxley Creek some years ago, and they were sold, if I remember rightly, at 12s. 6d. or 13s. 6d. per lb. The price of Queensland raw silk in the home market may vary from 2s. 6d. to 17s. per lb., according to colour-grading and other factors. The highest-priced silk in the European market is the Italian, which, according to a report by Messrs. Durant, Bevan, and Co., London, is worth from 18s. to 19s. per lb.

For young people the rearing and management of the silk worm is an agreeable and fascinating pastime, and country and suburban children would find both pleasure and profit in its cultivation. There is a very great demand for silk in America, in France, and other European countries, and even in India, which at one time used to export enormous quantities to Europe, yet where the production has dropped to 2,400,000 lb. annually, and now has to import for its own consumption some

240,000 lb. annually. In India the industry is entirely what it could be made in Queensland—a cottage one, carried on in their spare time by women and children. One woman with the help of a daughter can feed

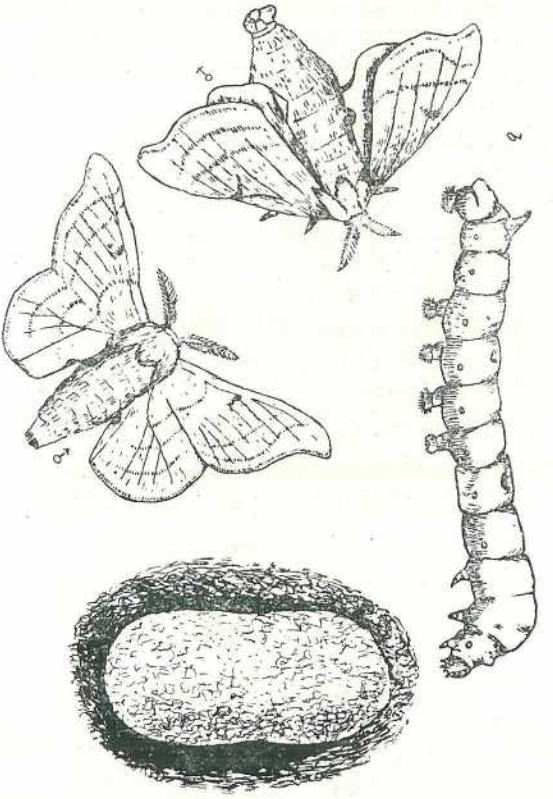


Fig. 1.

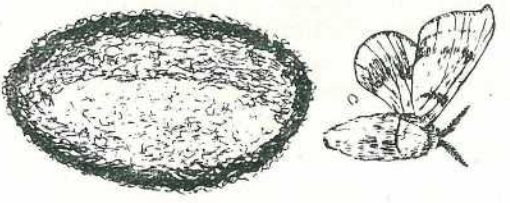


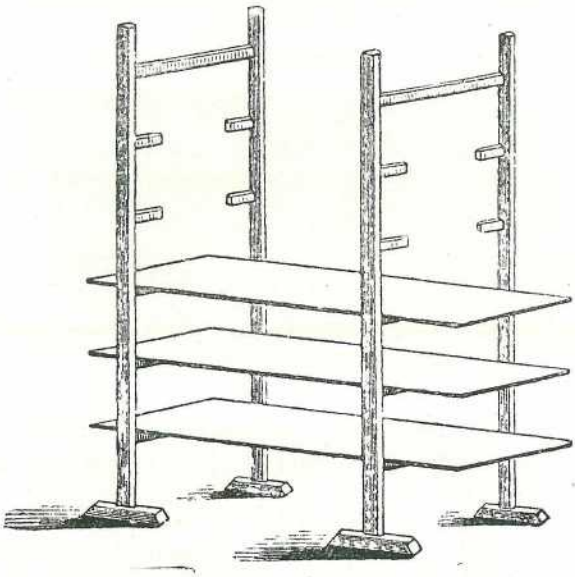
Fig. 2.

the produce of an ounce of eggs (about 40,000 worms) yielding within a month 82 lb. of raw cocoons, worth in that country about 37s. It will thus be seen that the margin of profit is small, and even with cheap

India labour the industry would not be a paying one with hired labour; but it would provide our boys and girls with a good amount of pocket money, without in the least interfering with their school work or household duties.

HOW TO MANAGE THE WORMS.

The eggs should be placed in trays made of stiff white paper, and fully exposed to the heat of the sun, and should remain undisturbed



until they begin to hatch. As the young worms appear, they should be removed into other trays, and fed on mulberry leaves, the leaf of the white mulberry being the best for this purpose; but the black mulberry, lettuce, and young grape leaves also form good food—lettuce especially—for very young worms. They should now be kept in a room at a tempera-

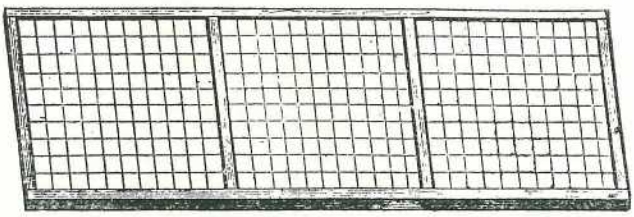


FIG. 1.—Wire-work shelf (after Roman).

ture of from 60 to 70 degrees Fahr., well ventilated and free from damp or too much dryness.

In lifting the worms from one tray to another, they should not be touched with the hands, but removed with a camel hair pencil. The caterpillar moults four times, each moulting taking four days, and thirty-two days after hatching it will have attained its full growth, when it will cease to eat and prepares to spin. There are several ways of

preparing a suitable place for the worm to spin its cocoon. One is to twist up a bit of writing paper in the form of a cornucopia, and affix it to the wall of the room. Into each of these, a single worm should be placed. Here it remains quietly whilst it spins its cocoon, within which lies the chrysalis. In Europe and Japan the worms are made to spin in straw crates or in sticks and grasses. On the fourth or fifth day after spinning, when the worms have changed into chrysalides within the cocoons, they should be collected from the paper receptacles or the other spinning places, keeping any double cocoons separate, as well as imperfect ones, as these cannot be spun.

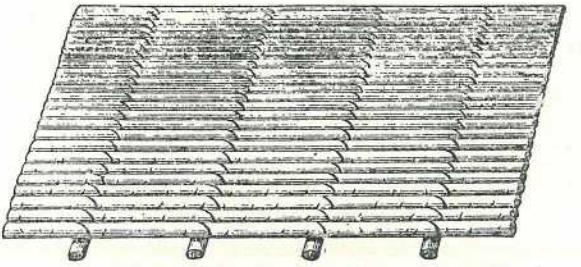


FIG. 1.—Shelf made of canes (after Roman).

When the spinning has been completed (in about three to five days, with another three days for the formation of the chrysalis), the chrysalis must be killed. This can be done in a Queensland summer by exposing the cocoon to the sun (in Europe they are steamed). In sun-drying, after the cocoons have been three days in the sun, they should be spread out thinly in the shade for a month, when the chrysalis inside will be perfectly dry, and the cocoons may then be kept for any length of time.

VARIETIES OF SILK WORMS.

There are varieties of silk worms other than the mulberry worm. Such are:—The Tusser, which feeds on a variety of plants; the Muga; and the Eri (here depicted), the latter feeding on the common castor-oil plant and on the umbrella tree of North Queensland. The cocoons of the Eri are worth 3s. per lb. dried, and, what is of great importance, no exception is taken by buyers to pierced cocoons—*i.e.*, those from which the moth has emerged, so that there is no need to sun dry or boil the cocoons as in the case of the mulberry silk worm. One acre of castor-oil plants will support 600,000 Eri silk worms during the year—that is, six broods of 100,000 each. These, allowing for deaths, will produce 450,000 cocoons, and, as 1,600 Eri cocoons go to the lb., 1 acre of land will produce 300 lb., which, at 3s. per lb., amounts to £45. Roughly speaking, to put 1 acre under castor-oil and to rear the worms (out of doors on the trees) should not cost more than £15, leaving a net profit of £30 per acre.

FEEDING.

There are no definite rules as to feeding, but whenever leaves become dry they should be removed, and this may be easily accomplished without disturbing the worms. They should never be handled. When it is

necessary to move them from the tray of dry leaves, all that is needed is to place a transfer tray of wire netting full of fresh leaves over the tray containing the worms, which will soon rise through the openings

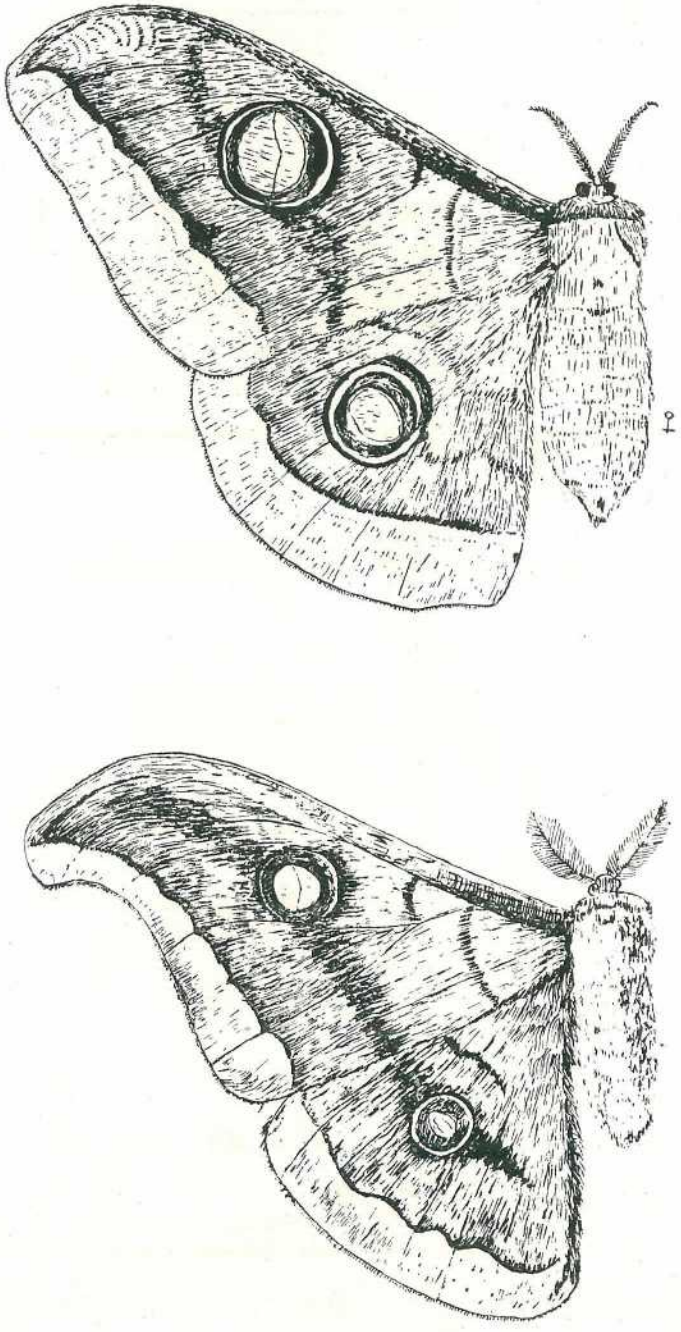


PLATE 31.—TUSSER MALE AND FEMALE MOTHS.

and abandon the old tray. For very young worms, shortly after their birth, the first transfer is made by the aid of mosquito netting, which is laid over the hatching eggs. On this netting leaves cut small are placed, and the tiny worms soon rise through the meshes, and may then be removed to a tray.

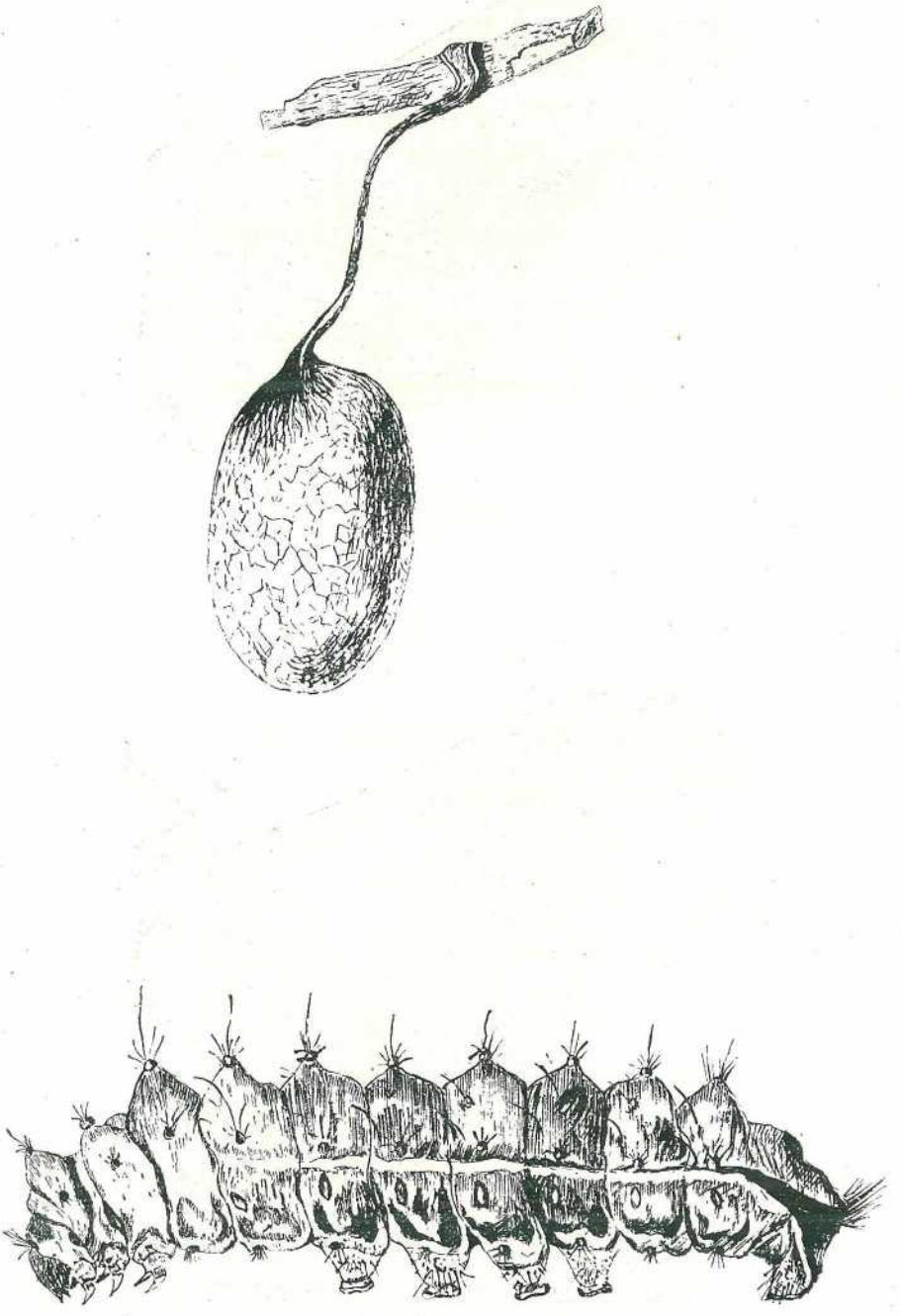


PLATE 32.—TUSSER COCOON AND WORM.

REPRODUCTION.

Before killing the chrysalides in the cocoons, a certain number of the best—the firmist and best coloured—are put aside. In about three weeks the moths will emerge, and they are placed on a tray to lay their eggs as they please.

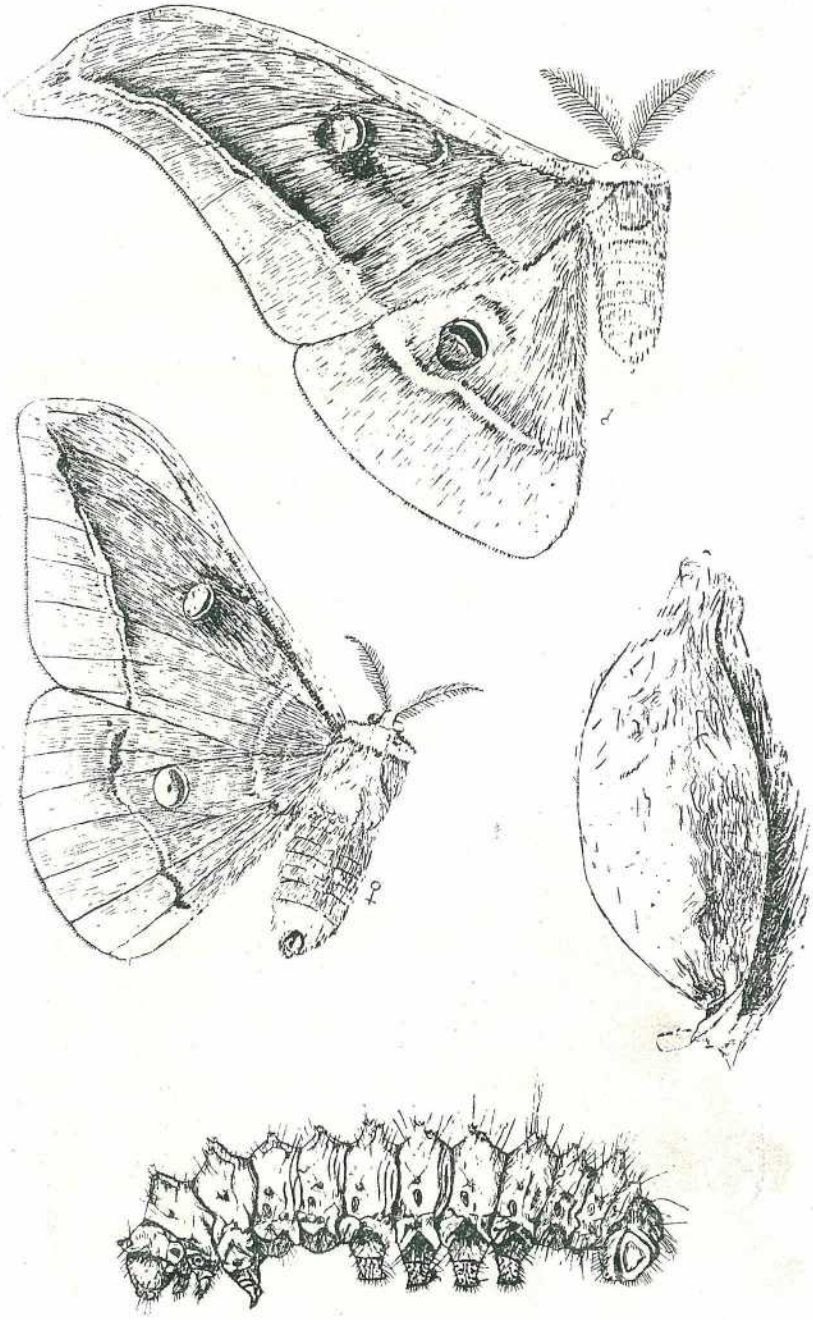


PLATE 33.—MUGA MALE AND FEMALE MOTHS, COCOON, AND WORM.

FOOD.

Besides the mulberry, the silk worm will feed and thrive on the Osage orange, and, better still, on the Ramie plants, which will grow like a weed in Queensland all the year round. The result of feeding on Ramie leaves is larger cocoons and finer silk. The Ramie plant

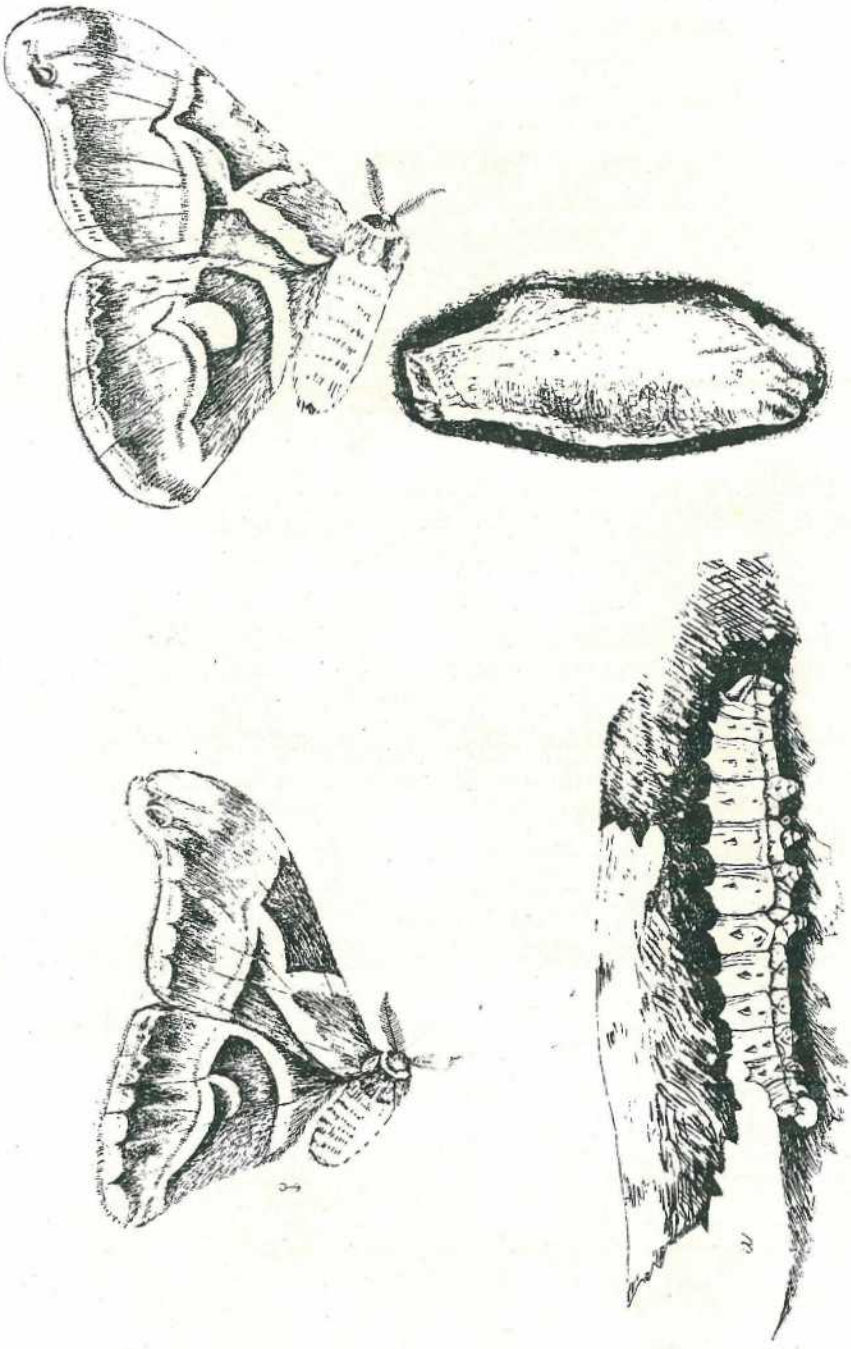


PLATE 34.—ERI MALE AND FEMALE MOTHS, COCOON, AND WORM.

(*Bœhmeria nivea*) belongs to the same natural order as the mulberry—namely Utricaceæ.

SILK REELING.

From the cocoon, the silk is, by different processes, transformed into spun or reeled silk. We will describe this process briefly, but, as silk-reeling is a delicate operation, we think it better to advise silk-growers

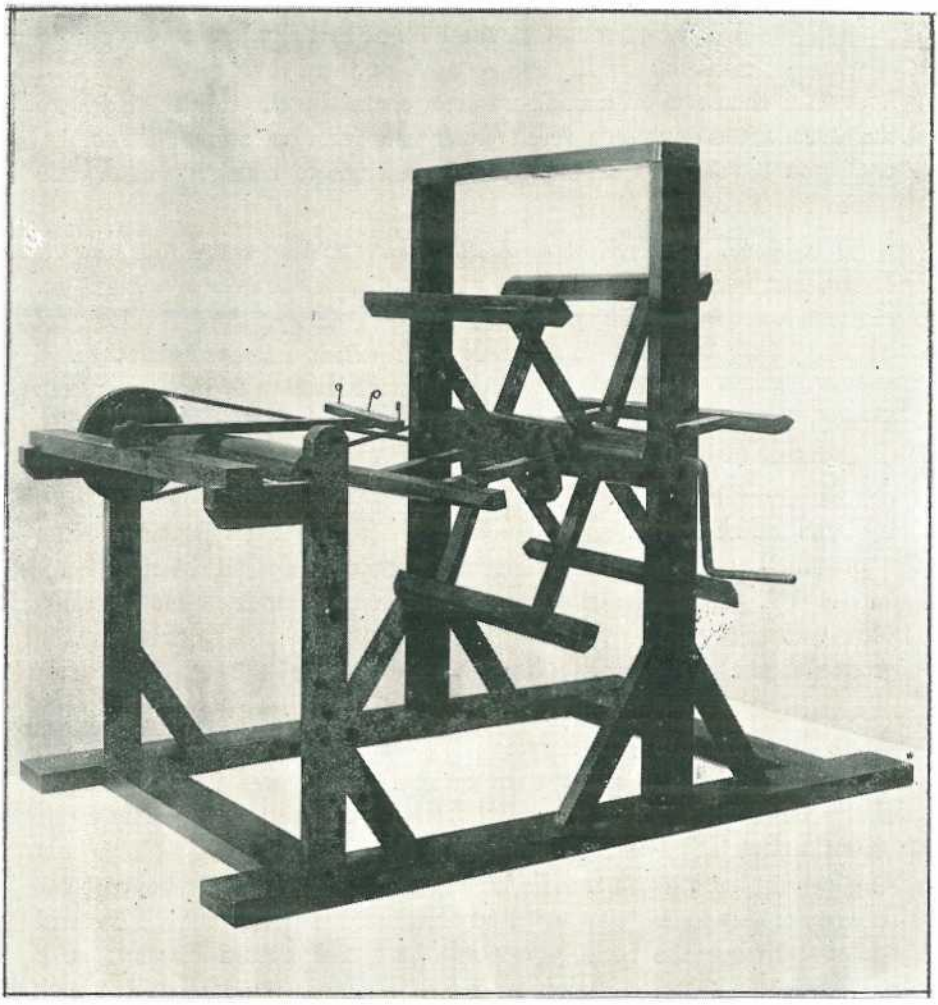


PLATE 35.—SILK-REELING APPARATUS.

to sell their cocoons rather than go to the trouble of reeling. Cottage-reeling appliances are procurable at a cost of about £10, but it is very questionable whether silk so reeled in small quantities would be marketable, because silk-reeling requires skill, and with small parcels of raw silk it would be impossible to get a uniform quality. The value of raw silk depends greatly on the uniformity of the threads, its cleanliness, tenacity, &c.; so that, of the four branches of sericulture—raising seed, feeding

the worms, producing cocoons, and reeling—producing cocoons seems to us to be the only one left which gives promise of being a profitable undertaking.

For those, however, who wish to reel their silk, we give the following short directions:—

To begin with, it is an utter waste of time and cocoons to attempt to reel off a few dozen. "Remember," says Mrs. South, "that it takes from 3½ to 4 lb. of cocoons to make 1 lb. of raw silk, and as about 600 cocoons go to the lb.; it will require 2,400 of them to make 1 lb. of silk. So, rather than reel off a small number, choke the chrysalides, and keep the cocoons in a dry place, free from insects from one season to another, until you have a further supply large enough to make it worth your while to reel them off."

Mr. M. M. De, Sericulture Assistant to the Imperial Entomologist, Japan, has just published in Calcutta (Agricultural Research Institute, Pusa) a very interesting pamphlet entitled "Instructions for Rearing Mulberry Silk Worms" (Bulletin No. 39). In it he says that 80 lb. of green (raw) cocoons, if dried well, would be reduced to 27 lb., from which about 5½ lb. of raw silk and 2 lb. of waste may be obtained. The price in India of 80 lb. of green cocoons is about £1 10s.; 2 lb. of raw silk will be sold for £1; and 2 lb. of ribbon waste for 2s. 6d.

The apparatus here depicted scarcely needs description. The "spreader" on the small front shaft is intended to spread the silk evenly on the reel. By means of a spiral groove on the shaft, it moves transversely to right and left, working a skein 6 in. wide. The centre of the groove should be exactly in a line with the centre of the reel.

Three discs, as shown in the illustration, are used for twisting the single filaments into two threads. Besides the reeling apparatus, a tin or delft basin and a brush are required. Under the basin, which is partly filled with water, a spirit lamp is placed; and when the water boils the first lot of cocoons is put into it, but it must not be kept continuously at boiling point. The boiling is necessary to cook the cocoons, so as to soften their "glutin," and thus allow of their being unwound easily. During the reeling process, the water should be kept at a temperature of about 180 degrees Fahr. In India the cocoons are kept at the boiling point from 8 to 10 minutes. Under or over boiled cocoons yield inferior silk. The proper amount of boiling may be known by the cocoons feeling silky to the touch; and when one continuous thread comes from most of them, they may be considered as properly boiled. The cocoons should not lie over each other, but just cover the surface of the water.

Now with the brush (merely a small bundle of fibres from a millet broom) dab the cocoons under the water until the threads of each are

attached to the twigs. Take these in the left hand, and, with the right hand, keep drawing up, and putting into the left, all the floss silk till all the cocoons are attached by one clean thread.

Now take the threads of five cocoons and twist them between the finger and thumb, and pass this through the hole C in the upright as shown in the figure, then through an eyelet in the twisting appliance, next through the eyelet of the spreader, and thence on to the reel. Now take five other cocoons and do the same. There will then be two threads

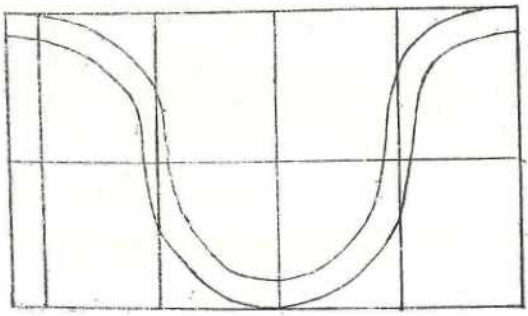


Fig. 6.

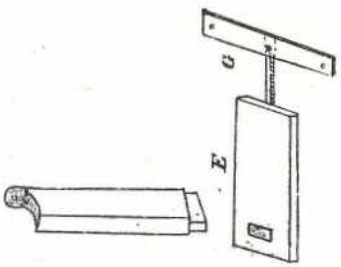


Fig. 8.

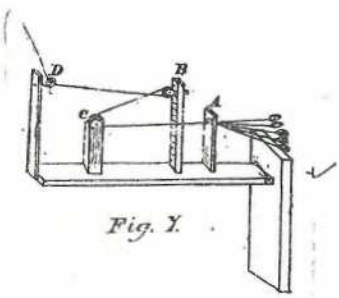


Fig. 7.

on the reel, and a twist must be given by turning the inner disc round from left to right six or eight times. This twisting of the threads is only done once at the start and after each break of the thread. Now start the reel. This requires two people—one to turn the reel, the other to attend to the cocoons. The reel must be turned in the direction away from the basin. The five cocoons forming each thread will now begin to unwind readily. As the reeling proceeds, the filament comprising each cocoon becomes so very fine that it would not bear the strain of reeling; therefore the threads, made up of five cocoons, will, by the time they are half unwound, require an additional cocoon. Then, if a break occurs, the two ends have to be brought together and tied with a very small neat knot.

After reeling, it is necessary to unwind the thread into skeins of standard length. This is called re-reeling, and it makes the raw silk soft and lustrous. The weavers prefer re-reeled to reeled thread. Imperfect, unreelable, and pierced cocoons can be spun on a special continuous spinning machine (the Pusa). Ribbon waste and waste cocoons are exported to Europe, and are also spun at Cawnpore and Bombay.

The spinning apparatus here shown may be seen in the museum of the Department of Agriculture and Stock, William street.

Apiculture.

BEES SENT BY PARCEL POST.

Mr. R. S. Nevill, late Tobacco Expert to the Department of Agriculture in this State, sends us the following clipping from the "Erie Daily Sentinel," Erie, Kansas, U.S.A., showing the extent of the bee-keeping industry in parts of the United States:—

"Parkertown, O., 17th April.—Uncle Sam's parcel post will carry about 6,000,000 queen bees from this place the coming summer in small packages destined to all parts of the civilised world. H. G. Quirin, who operates perhaps the largest bee farm in the United States, estimates his orders will call for that number of queens. Last year Quirin shipped queen bees with their 'escorts' of working bees in little parcel post packages to all parts of America, Europe, Japan, Cuba, China and the West Indies.

"Quirin has raised queens he valued at 300 dollars. These, however, were extraordinary stock. The regular stock are worth from 1 dollar to 3 dollars. In addition to his queens, the bee magnate expects to have employed about 50,000,000 workers the coming season making many tons of honey."

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND AND BRITISH NEW GUINEA.

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

Order MELIACEÆ.

DYSOXYLON, Blume.

D. cerebriforme, *Bail.* (Plate 36). To the description in Queensland Botany Bulletin, XIV., p. 7 (Plates 1 and 2), and in the "Queensland Flora," page 232, add:—

Flowers in dense short panicles in the upper axils of the branchlets, branches pubescent. Calyx pubescent, 3 lines long, with 5 broadly triangular teeth. Petals silky pubescent outside, about ½ in. long, adhering to the staminal tube for about one-third of their length.

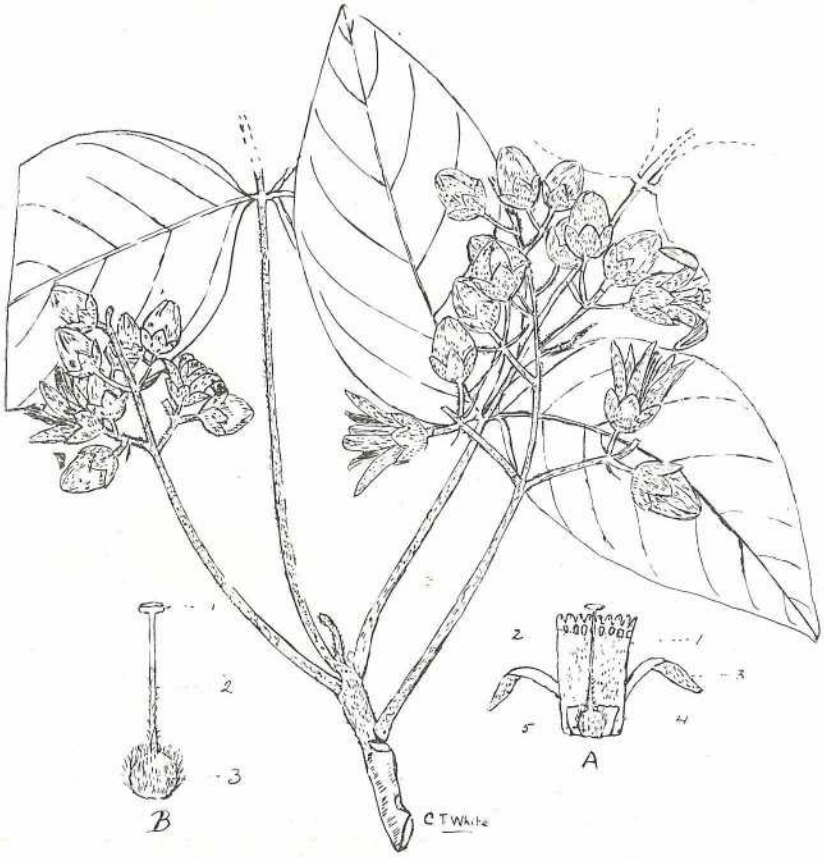


PLATE 36.—DYSOXYLON CEREBRIFORME, *Bail.*

A—Part of flower laid open. 1—Staminal tube. 2—Stamens. 3—A petal. 4—Disk. 5—Ovary (natural size).

B—Pistil. 1—Stigma. 2—Style. 3—Ovary (enlarged).

Staminal tube truncate with 10 short teeth. Disk broadly tubular, glabrous, ovary very hirsute. Style pubescent in the lower half. Stigma flat and broad.

Hab.: Atherton, *H. W. Mocatta*, May, 1914.

I have been enabled to complete the description of this valuable timber tree from some specimens lately received from the Director of Forests (Mr. N. W. Jolly), collected at Atherton by the District Forest Inspector.

Order LEGUMINOSÆ.

INDIGOFERA, Linn.

I. subulata, Vahl. in *Poir.* Encyl. Meth, Supp. iii. 150 (1813). Perennial, with very long, slender, sub-scandent stems, branches numerous, ascending or spreading, striate, nearly glabrous, when young with white appressed hairs. Leaves imparipinnate; rhachis 1 to 2 in. long, slender, hoary; stipules filiform; leaflets 5 (2 pairs and end one), stalked, readily disarticulating, oval, obtuse, apiculate, hairy on both sides, paler beneath. Flowers small, on short, strongly curved pedicels, numerous in very long-stalked, slender, spicate racemes, exceeding the leaves, Calyx segments setaceous. Pod 1½ to 1¾ in., linear, slender, deflexed at base, curved outwards, and divaricate, sharp-pointed sub-quadrangular, nearly glabrous, not torulose. Seeds 8 to 12—Hook., Fl. Br. Ind., vol. ii., 96; Trimen, Handbook. Fl. Ceylon, ii., 25; *I. flaccida,* Koen.; Wight, Ic., tab. 387.

Hab.: A native of South India, Tropical Africa, and America; now naturalised if not truly indigenous to Queensland at Hughenden. Specimens received from *Mr. Wm. Price.*

Order MYRTACEÆ.

EUCALYPTUS, Lher.

E. amygdalina, *Labill.* Pl. Nov. Holl. ii., 14 t. 154. A tall straight tree; bark of trunk persistent, of the branches deciduous; branchlets slender. Leaves thin, mostly straight and under 1 in. broad and from 3 to 4 in. long; acuminate when long, the short ones usually broad and often blunt and apiculate; venation faint. Lateral nerves usually very oblique and irregular and at times almost inconspicuous like the reticulate ones. Intra-marginal nerve distant from the edge. Base of leaf tapering into a slender petiole from ½ to 1 in. long. Peduncles axillary and lateral, appearing at times paniculate, terete or nearly so, with about 4 to 8 rather small flowers. Buds ovate, glandular. Calyx tube turbinate, about 1 line diameter, the pedicel of equal length. Operculum slightly pointed. Stamens under 2 lines long, all perfect. Anthers small with diverging confluent cells. Ovary flat-topped. Fruit subglobose-truncate, and under 2 lines diameter; the capsule not at all or only slightly sunk; valves flat.—Benth. Fl. Austr., iii., 202.

Hab.: Chinchilla, *R. C. Beasley,* who says "Growing on gravelly hill near brigalow scrub. Trees mostly tall and straight. Local names 'Malle Box' and 'Silver-leaf Box.'"

From the above description it will be seen that the Queensland plant differs but slightly (mainly in the size of flower and fruit) from the more southern forms.

Order CUCURBITACÆ.

CUCUMIS, Linn.

* **C. metuliferus,** *E. Meyer.* Habit resembling that of the cucumber. Leaves alternate; petiole 1 to 4 in. long, blade 3 to 5-lobed, 2-5 in. long and as much broad. Tendrils simple. Flowers 1-sexual; males in clusters, females solitary; the ovary with spinulous tubercles; male peduncles 2 to 10 lines long, females ¾ to 1¼ in. long. Calyx with an obconic-campanulate tube, 2 to 2½ lines long; teeth subulate, half as long as the tube. Corolla 5-lobed, 1¼ to 1½ in. wide, yellow; lobes obvate, obtuse. Stamens 3 very short, anthers oblong, 1 to 1½ line long, finely citiate, with crenulate apical crests. Style 2 lines long; stigma large, 3-lobed. Fruit 2½ to 5 in. long, 1½ to 2½ in. thick, oblong or ellipsoid, bluntly 3-gonous, beset with thick narrowly conical spines ¼ to ½ in. long, rich scarlet when ripe. Seeds ¼ in. long, ovate, smooth, faintly margined.—Harvey and Sond., Fl. Cap. ii. 495; N. E. Brown, Bot. Mag., Tab. 8385.

Hab.: A native of South Africa, now naturalised about the Barron River and Russell River road, Tropical Queensland, *E. W. Bick.*

Order RUBIACEÆ.

GARDENIA, Linn.

G. Kershawii, *Bail, Sp. nov.* (Plate 37.) Young branchlets resinous, stipules particularly so. Leaves lanceolate 3¾ in. long, 1 in. broad, pubescent, especially on the under surface; lateral nerves numerous, parallel; petioles ¼ in. long, pubescent like the lateral nerves and branchlets. With regard to the inflorescence, that of the only specimen available for description seemed to be somewhat abnormal, the flowers were four in number, and seemed to be three and an odd one. Calyx ½ in. long, densely hirsute; calyx lobes 6 or perhaps 7, subulate, hispid, of about 2 lines. Corolla tube 1 in. long, hairy, scarcely dilated upwards; the lobes 7 as long as the tube 2 lines broad; margins ciliate. Anthers ½ in. long; style slightly exceeding the carolla tube; stigmatic lobes short.

Hab.: Claudie River, *Jas. A. Kershaw.*

Order ORCHIDEÆ.

EULOPHIA, R.B.

E. papuana, *Bail.* Ql. Agric. Jl., xix. (1907), p. 273 (Plate 38). A plant received some time ago by the Director of the Brisbane Botanic Gardens, collected in British New Guinea by Mr. T. H. Wells, has recently flowered; and the opportunity has been taken of giving a figure of the plant.

PLATE 37.—GARDENIA KERSHAWII, *Bail.*

A—Flowering shoot. B—Corolla laid open. b^1—Style. b^2—Stigma.

PLATE 38.—EULOPHIA PAPUANA, *Bail.*

A—Sepals and petals. B—Side view of labellum. C—Front view of labellum.
D—Column. A, B, and C—Natural size. D—Enlarged.

Order LEMNACEÆ.

LEMNA, Linn.

L. polyrrhiza, Linn. (Plate 39). The large Duck-Weed. Fronds very broadly ovate or most frequently orbicular, mostly about 3 lines diameter, rather thin, but more herbaceous than most species, and often darker coloured, emitting from the underside a cluster of several, often many, rootlets. Bract of the flower saccate. Anthers and the apex of the ovary spotted.—*Spirodela polyrrhiza,* Hegelm.

Hab.: Eidsvold, *Dr. T. L. Bancroft.* This is a very widely spread species, but not previously met with in Queensland, although it has been found in Victoria and New South Wales.

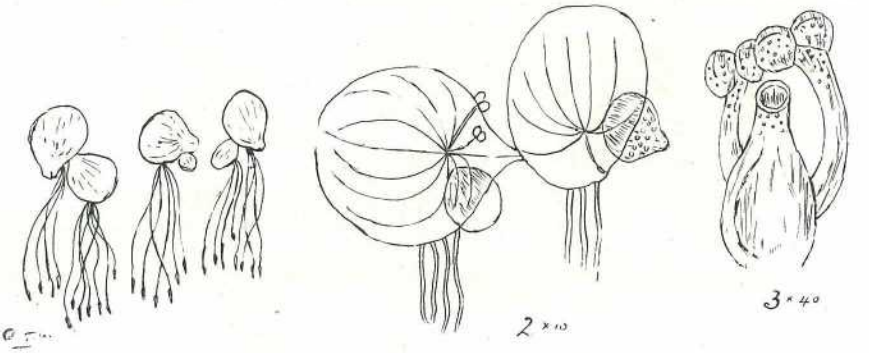


PLATE 39.—LEMNA POLYRRHIZA, *Linn.*
1—Plants (natural size). 2—Flowering and fruiting plants (enlarged).
3—Ovary and stamens (enlarged). 2 and 3—After Hegelmaier.

Order CHARACEÆ.

CHARA, Linn.

C. contraria, *Kuetz.*

Hab.: Currumbin Creek, *C. T. White,* November, 1911.

The above addition to our Characeæ has been determined for me by Mr. James Groves, London.

Order FUNGI.

The following additions to our Fungi and Algæ have been determined at the Royal Botanic Gardens, Kew, England:—

GASTEROMYCETEÆ.

Geaster tenuipes, *Berk.* (*G. plicatus,* Berk.).

Hab.: Eidsvold, *Dr. T. L. Bancroft.*

PYRENOMYCETEÆ.

Phyllachora maculata, *Cooke.*

Hab.: On leaves of *Eucalyptus,* Darra, *C. T. White.*

Scirrhia cyperi, *Wakefield* (in letter).

Hab.: On stems of *Cyperus polystachyus,* Nudgee, *C. T. White.*

Parodiella perisporioides, (B. et C.) *Speg.*

Hab.: On leaves of *Crotalaria sp.,* Gilbert River, *E. W. Bick.*

Ceratostoma australe, *Speg.*

Hab.: On dead rhachis of a palm, Brisbane, *J. H. Simmonds.*

HYPHOMYCETEÆ.

Aspergillus candidus, *Link.*

Hab.: On pods of garden pea (*Pisum sativum*), Brisbane, *F. M. Bailey.*

Order ALGÆ.

Caulerpa anceps, *Harvey.*

Hab.: Moreton Bay, *J. H. Simmonds.*

Entomology.

THE QUEENSLAND FRUIT FLY, AND HOW TO DESTROY IT.

By A. A. SMITH, Wellington Point.

In dealing with this subject it is necessary to mention its life history. Whether the fly is a native of Queensland, I am not prepared to say; but that it attacks a large number of our fruit is beyond question, and also that there are a few it is very partial to, such as the common yellow guava, some varieties of plums, eating pears, and peaches. The fly deposits her eggs well under the skin of the fruit, and, according to Mr. Tryon, if the fruit is in a favourable degree of ripeness, the eggs hatch out very quickly, and in three weeks develop into flies. Now, I will proceed to deal with some ideas and statements that have been made for years. Some people think the fly breeds very much in our wild fruits, but I beg to differ from that view, unless such fruits are very much isolated from cultivated fruits. My reasons are that I have noticed that practically all insects, animals, and birds, in nine cases out of ten, will seek out the best fruit they can find. Having grown strawberries for a number of years, I have noticed that, wherever there was a nice large berry and two or three smaller ones on a plant, the large one would be attacked; and, to bear out my views, I quote the statements of two gentlemen at a meeting held at Redland Bay some time ago. One of them said he knew of a case where cultivated orange trees had proved more subject to the pest than those allowed to go under grass. Another that their cultivated trees had been attacked worse than those not so thoroughly cultivated. In dealing with some ideas which have been suggested for its destruction, it appears that the idea most favoured is one by means of trapping; but the trouble appears to be the difficulty in destroying it without a great amount of time and trouble. In the "Queensland Agricultural Journal" for July, 1906, appears an article by Mr. S. C. Voller, of Enoggera, in which he states that in one season he saved nearly the whole of his orange srop by catching the fly by hand, and in another part of his article he deals with the matter of destruction by the use of certain forward or early maturing trees as trap-trees, as the fly will always be found on such trees in force before it spreads to give its attention to the rest of the orchard. The process here is to go and catch the fly by hand and kill it on the spot. I think it was Mr. Benson who advocated hanging up ripe fruits in trees throughout the orchard to attract the fly, and when infested to destroy them. Again, it has been recommended to plant a number of guava trees in a selected place, fence it in, and when the fruit is ripening to place one to two pigs in it to eat the fallen fruit. Now, as a fruit-grower I have taken a great deal of interest in this subject for some time, and, in carefully studying numerous ideas and statements and with experiments lately conducted by me, I have arrived at the conclusion that this pest can be very simply controlled by a method I have adopted (and which will

eventually be placed on the market); but to do so, I agree with others that it will have to be done by concerted action by all growers and by the Government. An Act must be put in force prohibiting, under penalty of a fine, people from allowing infested fruits about the premises (unless for the distinct purpose of a trap for destruction of the pest). To all those who are not conversant with the life habits of the fruit fly, I wish to say that larvæ or maggots always leave the fruit when fully developed and fall to the ground, where they hide and turn into a little brown chrysalis, and then into a fly in a very short space of time. I am satisfied there need not be any breeding of the fly in commercial orchards, for the reason that a great deal of the fruit is gathered before the maggot develops, and whatever fruits are infested can easily be destroyed, as can any fallen fruits. Now, coming to my method of destruction, which is by creating a permanent trap or traps, according to the size of the orchard, by planting at convenient spots, an early, middle, and late ripening fruit, dwarfing the trees, and making them as attractive as possible; and other ripe fruits, which are more attractive to the fly than those partly ripe can be placed there as well, and the fly is allowed to deposit all the eggs there, after which, by my method, when placed in position, every maggot is destroyed as it emerges from the fruit. In my experiment, in a small way, seventy fully developed maggots, besides a number of undeveloped ones, were destroyed from three guavas. I am preparing a trap myself with a peach and Red Heart Plum to catch the first broods of fly, and the guava for a later brood of any that escape the first.

SNAILS IN THE GARDEN AND BUSH-HOUSE.

Snails (says the "Journal d'Agriculture Tropicale") are a veritable plague in some hot countries, and are particularly numerous during the months of December and January. They live from 4 to 6 months, and in the daytime remain hidden in damp, dark places, coming out at nights to carry on their depredations on whatever vegetable life is within their reach. They lay about 80 eggs in heaps of dead leaves, and these hatch out in from 25 to 30 days—according to the species. In the State of San Paolo they are captured by hand, and the high-growing plants most subject to their attack are surrounded by a rope of tarred piassava. Low-growing plants are sprayed with a 4 per cent. solution of sulphate of copper, and pasture lands with a 1 per cent. solution of bay salt. Ducks and crows readily devour them. The Glandinas, or carnivorous snails, will devour from 15 to 30 of the pests a day. These Glandinas (*Gl. nana, stigmatica, liquaria, fusiformis, guttala, vanuxenensis, aurata, miradorensis*) live in open, damp places, and are perfectly harmless to plant life. Hence they have been successfully introduced into the South of France and into Tunis, where they are found very useful in vegetable and flower gardens, and in bush-houses, in destroying the numerous snails.

[Once the snails in a garden or elsewhere have been thus destroyed, one is apt to wonder whence these carnivorous molluscs obtain a supply of food, unless they devour one another.—Ed. "Q.A.J."]

Animal Pathology.

FACTORS INFLUENCING EFFICACY AND DETERIORATION OF CATTLE-DIPPING FLUIDS.

BY J. C. BRÜNNICH, F.I.C., AND F. SMITH, B.Sc., F.I.C.

A study of factors influencing efficacy of dipping fluids requires, in the first place, a knowledge of the manner in which cattle ticks are killed by the application of the chemical. Practical work in this direction has been carried out by Messrs. William Cooper and Nephews in South Africa, and the conclusions drawn from the results are given in a pamphlet issued by that firm (1).

Three theories are mentioned as generally advanced by different workers—

"HOW TICKS ARE KILLED."

1. That the tick absorbs the poison through its own skin while the animal is in the dipping bath.
2. That the absorption of the poison through the skin of the tick takes place after dipping.
3. That the poison is absorbed by the skin of the animal, and that the tick sucks in the poison with the fluids extracted while feeding on the animal.

The authors regard the third theory as correct, as supported by practical field experiments, and give as chief contention the theory that the living cells, forming the deeper layers of the skin, have an actual affinity for arsenic; that the poison is arrested and fixed in them, and thus prevented from reaching to circulating blood; and that the ticks take in the poison with the blood and lymph passing through these layers of the skin, which are saturated with arsenic.

Our own experiences, however, force us to the conclusion that only a combination of 2 and 3, when using a dipping fluid, with *a minimum* amount of arsenic, kills all ticks on an animal in a few days. A number of experiments were carried out to prove this theory.

In the first place, we proved that the arsenic of the dipping fluid is rapidly absorbed through the skin of the animal, and goes into circulation within a few hours. The steers experimented with, at the Stock Experiment Station, Yeerongpilly, were not dipped, but the dipping fluid (the Queensland Government formula) was applied by spraying, so as to avoid any possible intake of arsenic by accidental swallowing of the dipping fluid. Blood drawn from the animal before dipping showed no or only the faintest traces of arsenic. Two hours after dipping, the blood already gave distinct reaction for arsenic, the amount had increased rapidly at the four hours' interval, and diminished again up to twenty-four hours after dipping. The repetition of this experiment gave exactly the same results.

For further experiments two young heifers, fairly well infested with ticks, of various stages of development, were selected, and kept under observation in a stable.

On small areas of the skin the following trials were made:—

1. Ticks painted carefully with dipping fluid, with the aid of a camel-hair brush, without wetting skin of the host;
2. Skin of host wetted with dipping fluid without wetting ticks (neglecting, of course, small larval ticks);
3. Small quantities of dipping fluid (5cc.) were injected subcutaneously; and, lastly,
4. Larger areas of skin with ticks were thoroughly wetted with dipping fluid.

No ticks were killed in either experiments 1, 2, or 3, although in 1 and 3 some of the ticks appeared to sicken, whereas in experiment 2 ticks showed hardly any effect of the poison, and all increased rapidly in size. Even in experiment 4 some ticks were still alive after five days, although the majority, from 80 to 90 per cent., were killed.

It is a very well known fact that when dipping animals small areas of skin, as, for instance, on the top of the head, escape immersion and are left unwetted, the ticks on these areas will not be killed, showing that the poison absorbed by the ticks from the blood of the animal is as a rule not sufficient to kill. Dipping fluids of greater concentration may kill such ticks, but the fluid would be dangerous to the host. Again, partial wetting of the animal, as in experiment 4, cannot be absolutely effective, because the total amount of arsenic going into circulation is too small to have any additional effect on the ticks of the sprayed areas.

The efficacy of any dipping fluid depends largely on its power to thoroughly wet the skin of host and of tick, leaving a uniform thin film of liquid adhering to the skin. Solutions which contain no emulsifying agent, pure sodium arsenite solutions, recommended by many for dipping purposes, do not form a continuous uniform film of liquid on the surface of the hide of the animal and body of the tick, but the liquid will run together and collect in form of drops. It is quite self-evident that such solutions cannot be as effective as others which contain emulsifying agents. This has been proved by practical experiments carried out in Queensland, South Africa, and elsewhere. Furthermore, sodium arsenite, or solutions of arsenious acid and caustic soda, in these conditions appear to have a severe local scalding action, perhaps largely due to the fact of running together and forming larger drops which act more severely on the skin of the animal than a uniform fine film of liquid.

Watkins Pitchford's bath (schedule II.) contains 20 lb. of arsenite to 400 gallons of water, his laboratory dip 8½ lb. to 400 gallons; the latter because it contains an emulsion was as effective as the former, without having its irritant qualities (2).

The Queensland Government formula, as originally prepared, contained tar and tallow, dissolved by the aid of caustic soda, as emulsifying agent, and these ingredients may be effectually replaced by other substances, oils, resins, &c. It has also been found that the quantity of such

agents can be very much reduced and still give good results. The amount of Stockholm tar, which was originally 2½ gallons per 400 gallons of fluid, has now been reduced to half a gallon without interfering with the efficacy of the fluid. The formula may also be prepared in the form of a concentrate, as it readily mixes with the necessary amount of cold water to make a fluid of standard strength.

There is but little to choose between the different proprietary mixtures of dipping concentrates now on the market, as long as they contain the right amount of arsenic and the necessary amount of emulsifying agent.

One firm of manufacturers has claimed superiority of their preparation over the Government formula dip, based on greater wetting power, due to a lower surface tension of the fluid. The wetting power of any liquid, or the property to form a uniform film upon a greasy surface, depends primarily on its surface tension. The size of drops formed by liquids running out of a small orifice may be taken as a measure of their surface tension, liquids with low surface tension forming proportionately smaller drops. Even a rough preliminary test showed that the Government formula dip had a much smaller surface tension than the proprietary mixture in question, and even when diluted with two parts of water the surface tension was still smaller, and the wetting property therefore higher than that of the proprietary liquid in undiluted form.

In order to bring this matter to a finality, a series of experiments were carried out, in which the surface tensions of solutions of different recognised or supposed emulsifacients were determined, by observing the number of drops formed, when a measured quantity of liquid was allowed to run through a fine opening.

TABLE I.

Liquid.	Number of Drops from 2 cc.
Water	34
·2 Per cent. arsenite solution	34
·2 Per cent. oleic acid soap	83
·2 Per cent. stearic acid soap	42
·2 Per cent. resin soap	55
·2 Per cent. Stockholm tar soap	51
·15 Per cent. tar soap	48
·2 Per cent. sodium cresylate) (phenolic bodies)	36
·2 Per cent. sodium phenylate) (phenolic bodies)	34

The amounts of soap used are approximate to the proportions of the Queensland Government formula. The higher amount of tar with sufficient soda to render a homogenous solution was used in order to make its concentration comparable. The points brought out are—

1. The superiority of oleic acid soap, such as is obtained from saponification of oils, over the stearate soaps of tallow.

This is accounted for by the partial insolubility of the latter at ordinary temperatures, the solutions appearing cloudy from precipitation of stearate or acid-stearate. (See the work of Hillyer (3), who finds palmitic acid soap solutions to behave similarly.)

We are led to recommend, therefore, the preference of saponifiable oils in place of tallow in the preparation of dipping solutions and concentrates.

2. The fair efficacy of resin soaps.
3. The considerable efficacy of Stockholm tar as an emulsifying agent.
4. The inoperativeness of phenolic bodies as emulsifying agent.

A further series of experiments was conducted to test the influence of the acid arsenite of the Departmental formula upon the soap emulsifying agents above, as it was expected that their efficiency would be effected through diminution of the effective neutral soaps by liberation of their constituent acids. Two arsenite solutions were employed:—(A) As_2O_3 and NaOH in proportion to give the total alkaline content approximating to that of the Government formula, which contains insufficient alkali above that of the neutral soap, to completely satisfy the arsenious acid radicle, and in which acid arsenite (or free arsenious acid) must be considered to exist. (B) A solution containing As_2O_3 in combination with additional NaOH to give trisodium arsenite Na_3AsO_3. These are distinguished in the following table as "Acid" and "Neutral arsenite."

TABLE 2.—WETTING POWER OF DIPPING FLUID WITH NORMAL AND INCREASED ALKALI.

Liquid.	Number of Drops from 2 cc.
Acid arsenite + ·2 per cent. oleic acid soap ..	82
Neutral arsenite + ·2 per cent. oleic acid soap ..	72
Acid arsenite + ·04 per cent. stearic soap + ·16 per cent. oleic soap	76
Neutral arsenite + ·04 per cent. stearic soap + ·16 per cent. oleic soap	63
Acid arsenite + ·2 per cent. resin soap	56
Neutral arsenite + ·2 per cent. resin soap ..	63
Acid arsenite + ·1 per cent. tar soap	46
Neutral arsenite + ·1 per cent. tar soap ..	48
Acid arsenite + ·2 per cent. bone oil soap ..	55
Neutral arsenite + ·2 per cent. bone oil soap ..	54

In the case of the oleic and the mixed oleic and stearic acid soaps, the opposite result to that expected is shown, the solution containing acid arsenite possessing appreciable higher emulsifying power. Hillyer (3), however, states that neutral soap solutions do not show increased emulsifying power with excess of alkali. Our results show that there is a definite depression which we would attribute to the formation of basic soap compounds. In the case of resin marked cloudiness was noticed on admixture with the "acid arsenite," the weaker resin acid evidently being liberated, excess alkali in the case of the neutral arsenite by preventing this destruction of soap giving a fluid a markedly higher emulsifying power. Tar soap solutions seem little affected by excess of alkali.

In view of these findings we do not consider an increase of the proportion of alkali in the compounding of the Government dip formula necessary. In case of use of resin soap probably an excess of alkali would be advisable.

An extension of the observation to bone-oil, an ingredient in a new formula under consideration, shows that this substance also possesses considerable emulsifying power.

A further study was made upon the influence of hard water upon the wetting power of dipping solutions, the effect being tested upon solutions containing "acid" and "neutral arsenites."

The arsenite-soap-tar solution of double the standard strength was diluted with an equal quantity of water, showing a hardness of 100 on Clark's scale, an effect equal to the compounding of fluids from commercial concentrates by dilution with water of hardness 50, a much softer water than many that are undoubtedly employed in practice.

TABLE 3.—WETTING POWER OF DIPPING SOLUTIONS MODIFIED BY HARD WATER.

Liquid.	Number of Drops from 2 cc.
Acid arsenite (·2 per cent. As_2O_3)	33
Neutral arsenite (·2 per cent. As_2O_3)	33
Acid arsenite + ·2 per cent. oleic soap	42
Neutral arsenite + ·2 per cent. oleic soap ..	39
Acid arsenite + ·2 per cent. resin soap ..	52
Neutral arsenite + ·2 per cent. resin soap ..	54
Acid arsenite + ·2 per cent. bone-oil soap ..	48
Neutral arsenite + ·1 per cent. tar soap ..	49
Acid arsenite + ·2 per cent. bone-oil soap ..	46
Neutral arsenite + ·2 per cent. bone-oil soap ..	48

Comparison of the figures obtained with those in Table 2 show, as would be expected, marked diminution of wetting power in compounding dip solutions containing fatty acid soaps with hard water. Nor does the increased alkali in the proportion employed serve to protect the soaps against the precipitating effect of calcium and magnesium salts. The effect on resin soaps and bone-oil soaps is less pronounced. On the other hand Stockholm tar solution would seem to retain the emulsifying power unaffected by hard water, and Stockholm tar is on this account a valuable ingredient in dipping fluids in preserving their wetting power when hard water is used.

A further important function of such substances as tar and bone-oil is the imparting of a distinct disagreeable odour and taste to dipping fluids, in order to minimise the risk of cattle drinking the fluid during immersion, as the salty taste of pure arsenite solution is often an inducement to cattle to drink such fluid.

It is also probable that certain materials added to the fluid may prevent reinfestation, and for this reason experiments with bone-oil, as stated, as a substitute for both Stockholm tar and tallow, are being carried out.

THE OXIDATION OF ARSENITES.

One of the factors influencing the efficacy of a dipping fluid is the possible deterioration by an oxidation of the arsenious acid into arsenic acid, or rather from arsenite into arsenate.

That alkaline solutions of arsenious acid tend to undergo oxidation in the atmosphere is generally recognised, and is a familiar fact to all whose experience it has been to keep solutions of ascertained strength over a period of time under laboratory conditions.

The importance of this phenomenon in dipping practice is evident from the fact that solutions of arsenates (the oxidised form) are considerably less effective in tick destruction as now generally recognised by all engaged in the work of tick eradication. The actual tick-killing property of sodium arsenate may be considered as a little less than one-half that of sodium arsenite, whereas the constitutional effect on cattle is practically the same or only slightly less. Numerous experiments carried out by Cooper and Laws have proved these facts (4 and 6.)

Brünnich first attributed inefficacy of certain arsenical dipping fluids to such deterioration (5) caused by the oxidation of arsenious acid, and also found that such oxidation was markedly increased in presence of tar and phenolic bodies.

A similar observation was made by Cooper and Freak (2), who further ascribe a promoting influence to action of light or increased temperature.

The extent to which such deterioration takes place in dips, in continuous use, has been remarkably constant, as we found 76·8 per cent., 71·0 per cent., 76·6 per cent. of all the fluids analysed in the years 1913-14, 1912-13, and 1911-12 respectively free from oxidation, and only 9·3 per cent., 9·2 per cent., and 12·2 per cent. respectively with 3 lb. and more of arsenic in the form of arsenate.

Our experiences further show that there is no marked difference in the rate of oxidation in the various recognised dipping mixtures, so that at present no manufacturer of concentrates could claim a superiority of his preparation over others in this respect. Furthermore, the claim made by Laws (6) that frequent use of a dip prevents oxidation is not borne out by our practical experience, as we found cases of rapid deterioration both in dips in constant heavy use and in others lying idle. Any deterioration in dips frequently refilled, or rather kept filled to a constant level, is largely obscured by the continual introduction of fresh dipping fluid.

Only chemical tests will be a safe guide to ensure proper concentration of a dipping fluid, as practical observation of the effects of fluids on ticks are only of value when made by trained observers, as the layman is quite satisfied with the efficacy of his dip if the majority of ticks are killed, and in many cases such practical tests would be of no value as being too late, particularly when cattle has to be travelled into clean country.

That organisms may play a part in the oxidation of arsenious acid was first indicated by Fuller (7), and recent publications in South

Africa (6 and 8) would seem to attribute the oxidation entirely to this cause.

The present work was undertaken with the view of ascertaining the relative effect of what we regard as a catalytic influence of tar and of bacterial action, and for the purpose of more closely studying each. The observations were made upon two series of solutions:—(1) Practically pure arsenite; (2) an arsenite solution containing tar and soap, and approximating to the Queensland Government formula of dipping fluids in general use.

The solutions to which a small amount of nutritive material was added were submitted to autoclave sterilisation in bottles plugged with cotton wool, and were left sterile or were inoculated with various media, allowed to stand for some weeks under varying conditions of illumination, when the extent of change of arsenite into arsenate was investigated.

The inhibitive effect of bactericides, mercuric cyanide, and formalin, upon activity of organisms was also investigated.

SERIES 1.—PURE ARSENITE SOLUTIONS.

No.	Time.	Light.	Treatment.	Per cent. of As_2O_3 Oxidised.
1	6 weeks	Direct sun ..	Sterile	11·0
2	6 weeks	Direct sun ..	Sterile	8·7
3	6 weeks	Diffused light	Sterile	Nil
4	6 weeks	Dark ..	Sterile	Nil
5	6 weeks	Dark ..	Sterile	Nil
6	6 weeks	Dark ..	Sterile	2·7
7	12 weeks	Diffused light	Sterile	Nil
8	6 weeks	Direct sun ..	Inoculated with oxidised dipping fluid (A)	61·4
9	6 weeks	Direct sun ..	Inoculated with oxidised dipping fluid (A)	64·7
10	6 weeks	Dark ..	Inoculated with oxidised dipping fluid (A)	67·0
11	6 weeks	Dark ..	Inoculated with oxidised dipping fluid (A)	66·0
12	6 weeks	Diffused ..	Inoculated with oxidised dipping fluid (B)	100·0
13	6 weeks	Dark ..	Inoculated with oxidised dipping fluid (B)	100·0
14	12 weeks	Diffused ..	Inoculated with oxidised dipping fluid (B)	99·7
15	12 weeks	Diffused ..	Inoculated with oxidised dipping fluid (C)	33·0
16	6 weeks	Direct sun ..	Inoculated with dipping fluid (A) 1:1000 mercuric cyanide	16·1
17	6 weeks	Direct sun ..	Inoculated with dipping fluid (A) 1:10000 mercuric cyanide	15·5
18	6 weeks	Dark ..	Inoculated with dipping fluid (A) 1:1000 mercuric cyanide	1·0
19	6 weeks	Dark ..	Inoculated with dipping fluid (A) 1:10000 mercuric cyanide	·9
20	6 weeks	Direct sun ..	Inoculated with dipping fluid (A) 1:1000 formalin	9·5
21	6 weeks	Direct sun ..	Inoculated with dipping fluid (A) 1:2000 formalin	9·6
22	6 weeks	Dark ..	Inoculated with dipping fluid (A) 1:1000 formalin	Nil
23	6 weeks	Dark ..	Inoculated with dipping fluid (A) 1:2000 formalin	Nil
24	12 weeks	Diffused ..	Inoculated with dipping fluid (C) without nutritive material	2·1
25	12 weeks	Diffused ..	Inoculated with dipping fluid (C) without nutritive material	1·7
*26	12 weeks	Diffused ..	Without nutritive material, 1:1000 hycol.	16·1
*26A	12 weeks	Diffused ..	Without nutritive material, 1:2000 hycol.	11·1

* The effect of presence of phenolic body in inducing oxidation is here again demonstrated.

SERIES 2.—SOLUTIONS OF ARSENITE: TAR AND SOAP.

No.	Time.	Light.	Treatment.	Per cent. of As_2O_3 Oxidized.
27	6 weeks	Direct sun	Sterile	29·4
28	6 weeks	Direct sun	Sterile	25·8
29	6 weeks	Dark	Sterile	15·3
29A	6 weeks	Dark	Sterile	5·8
30	6 weeks	Diffused	Sterile	33·4
31	6 weeks	Diffused	Sterile	20·9
32	6 weeks	Diffused	Sterile	34·9
33	6 weeks	Direct sun	Inoculated with fluid (A)	28·1
34	6 weeks	Direct sun	Inoculated with fluid (A)	29·1
35	6 weeks	Dark	Inoculated with fluid (A)	21·7
36	6 weeks	Dark	Inoculated with fluid (A)	20·7
37	6 weeks	Dark	Inoculated with fluid (B)	66·2
38	6 weeks	Direct sun	Inoculated with fluid (A) 1:1000 mercuric cyanide	31·8
39	6 weeks	Direct sun	Inoculated with fluid (A) 1:10000 mercuric cyanide	29·4
40	6 weeks	Direct sun	Inoculated with fluid (A) 1:1000 formalin	29 7
41	6 weeks	Direct sun	Inoculated with fluid (A) 1:2000 formalin	29·7
42	6 weeks	Dark	Inoculated with fluid (A) 1:1000 mercuric cyanide	10·2
43	6 weeks	Dark	Inoculated with fluid (A) 1:10000 mercuric cyanide	11·3
44	6 weeks	Dark	Inoculated with fluid (A) 1:1000 formalin	4·7
45	6 weeks	Dark	Inoculated with fluid (A) 1:2000 formalin	3·3

A series of experiments in which bacteria were introduced but no nutritive material, and in which oxidation was found to proceed to an equal extent to sterile solutions, indicated the dependence of the active organisms upon a liberal organic food supply; such however, must be always present in dipping solutions in actual use.

From the results summarised in the foregoing table it is possible to deduce the following facts:—

1. Pure arsenite solutions in darkness, or diffused light, under sterile conditions remain unoxidised (see Nos. 3, 4, 5, 6, and 7).

2. Pure sterile arsenite solutions exposed to direct sunlight undergo marked oxidation (see Nos. 1 and 2).

3. Sterile arsenite solutions undergo marked oxidation in the presence of tar in darkness; exposed to direct sunlight or diffused light the effect of tar is still more marked in inducing oxidation.

4. The oxidation of arsenious to arsenic acid can be effected by bacterial agency, the oxidising bacteria seeming to be equally active both in light and in darkness (see Nos. 8, 9, 10, 12, and 13).

5. There, however, appears to be a marked difference in the activity of strains of organisms introduced with various oxidised dipping fluids A, B, and C (see Nos. 10, 13, and 15).

6. Tar, apart from its effect in itself inducing oxidation, appears to exert an inhibitive effect on the activity of oxidising bacteria (compare Nos. 10 and 11 with 35 and 36, 13 and 37), and this inhibitive effect seems to be exerted to greater extent in sunlight, direct sunlight in tar solution almost completely preventing the activity of certain strains of organisms in Nos. 33 and 34 (compare with 27 and 28).

7. Bactericides as mercuric cyanide and formalin are effective in preventing growth of oxidising organisms, and bacterial activity is necessarily not evident except in presence of nutritive material (see Nos. 26 and 26A).

It would appear that the catalytic acceleration of tar and phenolic bodies is measurably greater under the higher temperatures of summer than during the winter months, though this point has not been thoroughly tested. We should also expect an optimum temperature for bacterial activity. The influence of tar, *per se*, and of organisms in bringing about the oxidation of arsenious acid is established, the former influence in promoting the oxidation being preponderant under solar influence, bacterial agency in exclusion of light. Which factor is predominant in dipping fluids under field conditions, it is impossible to say, as it must be borne in mind that fluids prepared for commercial concentrates contain generally considerably less tar than the Departmental fluid, and are likely to exhibit less bacterial inhibition due to that substance.

As already observed, it is a remarkable fact, however, that a large percentage of dipping fluids examined show no oxidation, or oxidation only to a small extent. It is evident, therefore, that there are agencies at work inhibiting the oxidation that occurs normally in arsenite solutions.

THE BACTERIAL REDUCTION OF ARSENATES.

It has been suggested (6) that such apparent inhibition is due to the agency of organisms capable of reducing arsenic to arsenious acid. In order to test this point, sterile arsenate solutions, provided with nutritive material, and equivalent to ·2 per cent. strengths arsenic As_2O_3 were inoculated with various media likely to gain access to dipping fluids in dipping practice, and maintained under conditions of light and complete darkness, during periods of two and four weeks, when they were examined for arsenic in the reduced form of arsenite. The amounts found under the condition of the experiments are given below:—

SERIES 1.—PURE ARSENITE SOLUTION.

No.	Time.	Light.	Treatment.	Per cent. As_2O_3 Reduced.
1	4 weeks	Direct sun	Sterile	Nil
2	2 weeks	Direct sun	Sterile	Nil
3	4 weeks	Direct sun	Cowdung and urine	Nil
4	2 weeks	Direct sun	Cowdung and urine	9·5
5	4 weeks	Direct sun	Grass and hay	3·4
6	2 weeks	Direct sun	Grass and hay	Nil
7	4 weeks	Direct sun	Soil	Nil
8	4 weeks	Direct sun	Washings from hide	Nil
9	2 weeks	Direct sun	Washings from hide	Nil
10	4 weeks	Direct sun	Excrements, soil, and hide washings	Nil
11	4 weeks	Dark	Sterile	Nil
12	2 weeks	Dark	Sterile	Nil
13	4 weeks	Dark	Cowdung and urine	18·2
14	2 weeks	Dark	Cowdung and urine	55·5
15	4 weeks	Dark	Soil and grass	Nil
16	4 weeks	Dark	Washings from hide	6·1
17	2 weeks	Dark	Washings from hide	40·6
18	4 weeks	Dark	Unoxidised dipping fluid	Nil
19	2 weeks	Dark	Unoxidised dipping fluid	Nil

SERIES 2.—ARSENITE SOLUTION WITH TAR AND SOAP.

No.	Time.	Light.	Treatment.	Per cent. As_2O_3 Reduced.
20	4 weeks	Direct sun	Sterile	1·0
21	4 weeks	Direct sun	Sterile	1·3
22	4 weeks	Direct sun	Cowdung and urine	6·6
23	4 weeks	Direct sun	Cowdung and urine	22·6
24	4 weeks	Direct sun	Soil and grass	10·9
25	4 weeks	Direct sun	Soil and grass	17·2
26	4 weeks	Direct sun	Washings from hide	9·1
27	4 weeks	Direct sun	Washings from hide	2·5
28	4 weeks	Direct sun	Unoxidised dipping fluid	7·6
29	4 weeks	Direct sun	Unoxidised dipping fluid	5·1
30	4 weeks	Dark	Sterile	1·5
31	4 weeks	Dark	Sterile	2·5
32	4 weeks	Dark	Cowdung and urine	35·6
33	4 weeks	Dark	Cowdung and urine	40·5
34	4 weeks	Dark	Soil and grass	16·8
35	4 weeks	Dark	Soil and grass	10·1
36	4 weeks	Dark	Washings from hide	2·5
37	4 weeks	Dark	Washings from hide	9·1
38	4 weeks	Dark	Unoxidised dipping fluid	7·6
39	4 weeks	Dark	Unoxidised dipping fluid	5·1

The figures are sufficient to prove the bacterial reduction of arsenate solutions. The inconsistency of duplicate experiments with the same inoculating medium would be accounted for by the difficulty of insuring uniform inoculation, but the general significance of the results is not thereby invalidated, and is all the more evident in view of the fact that the introduced media may also contain organisms capable of affecting the oxidation of arsenite.

It is observed that in pure solutions in the majority of cases reduction does not occur—here it is assumed that oxidising bacteria are in

the ascendency—but in tar solutions, especially in those removed from light, marked reduction has taken place.

We are able to tentatively suggest that the presence of tar has not the inhibitive effect upon reducing bacteria that the previous experiments indicate it exerts upon oxidising organisms, and that the exclusion of light is specially conducive to their activity, a condition the oxidising bacteria are independent of.

Absolute uniformity in the results of experiments such as described, however, cannot be expected in view of the fact that in each inoculation different strains or classes of organisms are introduced, that may show varying preference with regard to environment.

The maintenance of the arsenite concentration of dipping fluids would seem to rest mainly on the growth and activity of organisms capable of preserving it in opposition to the oxidising influence of tar, light, and the opposing oxidising organisms, and the determination of the environmental conditions most conducive to their multiplication presents the most promising field for further investigation.

With regard to future work along these lines the advisability of dealing with pure cultures is urged.

The probable intolerance of the reducing organisms to concentrations of mercuric cyanide and formalin found efficacious in inhibiting the activity of oxidising bacteria renders their recommendation for use at this stage doubtful.

At present our recommendations for the cleaning out of dips, which show persistent rapid oxidation of their fluid content, before recharging them with fresh fluid, are the following:—

Empty out all fluid, clean out thoroughly, spray walls, woodwork, and also dripping yards with formalin solution, whitewash dip and timber, and allow at least a week interval before recharging.

This treatment was suggested by the probability of destroying local unfavourable strains of bacteria, and permitting the establishment of more favourable conditions, and such treatment has already been found successful in a few cases.

In concluding, we must express our thanks to the officers of the Stock Experiment Station, the Government Veterinary Officers (Messrs. Cory and O'Gorman), and Stock Inspector Carmody, in aiding in some of the observations and carrying out of experiments.

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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	5·16	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	„

General Notes.

TO SOFTEN A HARD SPONGE.

"Town and Country" gives three receipes for softening a sponge:—1. Soak it in cold buttermilk for a few hours, then wash it in clean water. 2. Take one quart of rainwater, make it quite hot, then add a teaspoonful of soda and a little soap. Lay in the sponge for ten minutes, then it will be ready for use. 3. Place the sponge in a saucepan with cold water and a spoonful of borax. Let it come to the boil, then take out, and rub with a little borax.

BANANA MANURING AT BUDERIM STATE SCHOOL.

The head teacher of the above school (Mr. R. G. Bartlett) points out that an error crept into his report on banana manuring at the school as published in the June issue of this Journal. The report should have been headed "Return of Results from 1st March, 1913," [not 1912] "to 28th February, 1914." As the returns are only for twelve months, this error detracts from the value of the report as published. We willingly make the correction, merely remarking that we published the report exactly as we received it from the Department of Public Instruction.

PARTICULARS OF WHERE AGRICULTURAL LIME CAN BE OBTAINED IN QUEENSLAND.

From time to time application is made to the Department of Agriculture as to the sources whence lime for agricultural purposes can be procured. There are several vendors of this article in various parts of the State, as, for instance, at Bundaberg, Townsville, Cairns, Mackay, Hinchinbrook Island, Chillagoe, Sweer's Island, Rockhampton Cawarral, Marmor in the North, and Mount Larcom district in the Burnett district.

Prices vary according to the class of lime required, and the mode of preparation for transport, whether in bags, tanks, or in bulk, from 9s. per ton for crude ore, 10s. per ton for screenings, 15s. for carbonate, 30s. for coral sand (Cairns), 40s. for coarsely ground lime shells (Hinchinbrook) to 60s. per ton (Rockhampton). The prices quoted are on the rails at the station of departure or at the port.

The whole subject of the use of lime in Agriculture was dealt with by Mr. J. C. Brünnich, Agricultural Chemist, in an article in the May (1914) issue of the "Queensland Agricultural Journal," to which was appended a table of analyses of the limestones, shells, sand, and corals of the districts above mentioned.

The names of the firms dealing with this material can, of course, always be ascertained by application to the various Shire Councils, local merchants, or the local Press.

Particulars may also be obtained from Messrs. F. R. Brand, Bundaberg; Douglas Pitt, Cairns; H. A. Ryan, Calcium Siding, Townsville; David Donald, Townsville; E. Garner, Clump Point, Innisfail; G. W. Tremble, Mackay; A. Diehm, Hinchinbrook Island; Chillagoe, Limited; Mount Morgan G.M. Co.; W. Breckels and Co., Rockhampton; H. Tooker and Sons, Cawarral; J. de Raeve, Mount Etna Caves, Rockhampton.

RAILWAY RATES FOR THE CONVEYANCE OF LIMESTONE SCREENINGS FOR MANURING PURPOSES.

The following rates are in existence from Marmor:—

—	Miles.	Special Rate per Ton.	Classification Rate, "M" Class, per Ton.
		s. d.	s. d.
Bingera	162	10 6	12 8
Bullyard	172	10 6	13 3
Maroondan	176	11 0	13 6
Childers	191	11 0	14 6
Huxley	193	11 0	14 7
Gillen's Siding	196	11 0	14 9
48-Mile	200	11 0	15 0
Boolboonda	208	11 6	15 4
Mt. Perry	218	11 6	15 9
North Arm	298	15 0	19 1
Yandna	301	15 0	19 3
Woodford	357	16 0	21 7
Kuraby	388	20 0	22 10
Stapylton	403	20 0	23 6

NEW HYBRID ORANGE.

We have received from Mr. James Collins, of Redland Bay, some very fine samples of a Mandarin Orange which is a hybrid produced by crossing the Beauty of Glen Retreat with the Washington Navel Orange. Judging by the fruit, the experiment has proved eminently successful. Mr. Collins also sent us specimens of a choice, chance seedling orange which originated on the Kolan River. Both varieties, he said, are extremely prolific, the trees very robust, and the specimens are a really fine sample of fruit. Both were photographed by Mr. Mobsby, of this Department, but too late for illustration in this issue of the Journal.

AN EFFICIENT METHOD OF POISONING FLYING FOXES.

The "Agricultural Gazette" of New South Wales (June) publishes the following method of getting rid of flying foxes, supplied to the Department of Agriculture of that State by Mr. John H. Greensell, of Mulwaree Gardens, Goulburn. He says:—

"I may say that the flying foxes have been worse this season than ever I have known before, dating back over thirty years.

"As the nights were so dark it was impossible to shoot them, so I had to resort to the poisoning. My crops of apples and pears were very heavy, and the foxes were doing an immense amount of damage.

"The method I adopted was to run a thin wire through the core of an apple, then slice off one side and sprinkle it with strychnine. It was then fastened to the highest branch of a tree.

"The first night I placed 12 poisoned apples in 8 pear-trees and 4 apple-trees, and destroyed 66 foxes. The second night 16 baits were

hung out, and 74 foxes secured. The third night's total was 64, the fourth 36, and the fifth 30, making a total for the five nights of 270. Since the fifth night of poisoning I have only seen an odd fox. There were as many as 8 foxes hanging round one bait.

"I am more than satisfied with the results, and recommend any growers who are plagued with the pests to try the method for themselves."

TO ESTIMATE STANDING CROPS.

The following table (taken from the "Farm Bulletin" for May) gives a formula for measuring roughly the amount of wheat to the acre should it be desired to ascertain before harvesting.

To use the table, make a square frame of wood or iron measuring 1 yard each way. Let it down carefully over an average patch of standing grain, and then shell and weigh the grain carried by the straws enclosed:—

2	oz.	grain	per square yard	10	bushels	per	acre.
2½	oz.	"	"	12½	"	"	
3	oz.	"	"	15	"	"	
3½	oz.	"	"	17½	"	"	
4	oz.	"	"	20	"	"	
5	oz.	"	"	25	"	"	
6	oz.	"	"	30	"	"	
7	oz.	"	"	35	"	"	
8	oz.	"	"	40	"	"	

Answers to Correspondents.

DESTROYING TREE SUCKERS.

"COO-EE," Cooyar—

See Journals for May and April, 1914; also see Notice to Correspondents on page VIII. of the current issue.

MUSTARD AND CRESS.

"SALADS," North Queensland.

The above two excellent salad vegetables are, as you say, never seen in the greengrocers' shops, nor have we seen it either in market gardens or in private gardens, yet there is no nicer small salad cut fresh from the garden for breakfast or for sandwiches. Both grow as easily as weeds, and are annuals. Any good garden loam suits them; but, to ensure rapid growth and the production of crisp, tender leaves, the soil should be very fertile. With favourable conditions the leaves will be large enough to use in four weeks from sowing. Sow in shallow drills about 6 in. apart thickly. The plants require abundant moisture and shade. If there is no shade in the garden, cover them over with boughs so as to draw the plants and make them crisp. Mustard can be sown with cress, but two weeks later. Preferably they should be sown separately. Gather the leaves as wanted, and allow another crop to develop. We have both kinds growing, and when cut several more crops have come on. Cut when 3 in. high. Cress is a spring and autumn crop, and does not thrive in midsummer.

The Markets.

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

Article.		JUNE. Prices.
Bacon	lb.	8d. to 10½d.
Bran	ton	£5 5s.
Butter	cwt.	102s. to 104s. (locally, 112s.)
Chaff, Mixed	ton	£4 to £4 15s.
Chaff, Oaten (Victorian)	,,	£4 to £4 15s.
Chaff, Lucerne	,,	£3 10s. to £6 6s.
Chaff, Wheaten	,,	£3 5s.
Cheese	lb.	8¾d.
Flour	ton	£9
Hams	lb.	1s. 2d.
Hay, Oaten (Victorian)	ton	£5 to £5 5s.
Hay, Lucerne (Prime)	,,	£3 to £3 15s.
Honey	lb.	2d. to 2½d.
Maize	bush.	3s. 3½d. to 3s. 5d.
Oats	,,	3s. 6d. to 3s. 8d.
Onions	ton	£8 to £9
Peanuts	lb.	2½d. to 2¾d.
Pollard	ton	£5 5s.
Potatoes	,,	£3 to £6
Potatoes (Sweet)	cwt.	1s. 6d. to 2s. 5d.
Pumpkins	ton	£1 15s. to £2
Wheat, Milling	bush.	3s. 4d. to 3s. 7d.
Eggs	doz.	1s. 8d. to 2s.
Fowls	pair	3s. to 3s. 6d.
Geese	,,	5s. 6d. to 5s. 9d.
Ducks, English	,,	3s. 9d. to 4s.
Ducks, Muscovy	,,	4s. to 6s. 6d.
Turkeys (Hens)	,,	8s. to 9s.
Turkeys (Gobblers)	,,	10s. to 14s. 9d.

SOUTHERN FRUIT MARKETS.

Article.	JUNE. Prices.
Bananas, G.M., per case	18s. 6d. to 19s.
Bananas, G.M., per bunch	4s. 6d. to 12s.
Bananas (Fiji), per case	15s. 6d. to 18s.
Bananas (Fiji), per bunch	3s. 6d. to 10s.
Custard Apples, per case	6s. to 9s.
Lemons, per case	6s. to 8s.
Mandarins (Queensland), per case	8s. to 10s.
Oranges (Navel), per case	12s.
Oranges (other), per case	6s. to 8s.
Papaw Apples, per quarter-case	4s. to 5s.
Passion Fruit, per half-case	2s. 6d. to 10s.
Pineapples (Queensland), (Queens), per case	7s. to 9s.
Pineapples (Ripleys), (cutting black), per case	...
Pineapples (commons), per case	5s. to 6s.
Strawberries	...
Tomatoes, per quarter-case	4s. to 5s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	JUNE Prices.
Apples, Eating (Tasmanian), per case	7s. to 10s.
Apples, Eating (Local), per case	...
Apples (Cooking), per case	7s. to 9s.
Bananas (Cavendish), per dozen	3d. to 3½d.
Bananas (Sugar), per dozen	1½d. to 2½d.
Cape Gooseberries, per quarter-case	7s. to 10s.
Cocoanuts, per sack	12s. to 14s.
Cumquats, per case	2s. 6d. to 3s.
Custard Apples, per quarter-case	2s. 6d. to 4s. 6d.
Lemons (Local), per case	4s. 6d. to 6s. 6d.
Mandarins, per case	5s. to 9s.
Oranges (Navel), per case	8s.
Oranges (other), per case	3s. 6d. to 6s. 6d.
Papaw Apples, per quarter-case	1s. 6d. to 2s. 6d.
Passion Fruit, per quarter-case	3s. 10d. to 4s. 6d.
Peanuts, per pound	2½d. to 2¾d.
Pineapples (Ripley), per dozen	1s. to 2s. 3d.
Pineapples (Rough), per dozen	1s. to 2s.
Pineapples (Smooth), per dozen	1s. 9d. to 3s. 6d.
Rosellas, per sugar bag	3s. 6d. to 5s. 1d.
Strawberries, per dozen pint boxes	7s. 6d. to 12s. 9d.
Strawberries, per tray	2s. 6d. to 3s.
Tomatoes, per quarter-case	2s. 6d. to 6s.

TOP PRICES, ENOGGERA YARDS, MAY, 1914.

Animal.	MAY. Prices.
Bullocks	£9 2s. 6d. to £11
Cows	£6 10s. to £8 15s.
Merino Wethers	29s.
Lincoln Wethers	28s. 9d.
Crossbred Wethers	26s. 6d.
Merino Ewes	22s. 6d.
Lincoln Ewes	21s. 9d.
Crossbred Ewes	25s. 3d.
Lambs	24s.
Pigs (Porkers)	39s.

THE SISAL HEMP MARKET.

Messrs. Landaner and Co., London, in their weekly report for 29th April, state that, admittedly, this commodity (sisal hemp) holds the key of the situation of the whole of the fibre markets. At the moment no offers or quotations can be obtained either from Yucatan or New York, and a total stoppage of supplies is threatened. A sharp rise in German East African sisal has taken place in sympathy with Manila and the uncertain outlook for Mexican sisal. Prices paid record an advance of £3 per ton, and sales have been made of No. 1 quality at £31 to £31 10s. per ton.

Mauritius hemp (Furcræa) has also risen to £25 per ton for good, fair, prime quality being unattainable.

Farm and Garden Notes for August.

This and the following two months are about the busiest periods of the year so far as work in the field is concerned; and the more activity now displayed in getting in the summer crops, the richer will be the reward at harvest time. Potatoes should be planted, taking care to select only good sound seed that has sprouted. This will ensure an even crop. Yams, arrowroot, ginger, sisal hemp, cotton, and sugar-cane may now be planted. Sow maize for an early crop. If the seed of prolific varieties is regularly saved, in the end it will not be surprising to find from four to six cobs on each stalk. This has been the experience in America, where the selecting of seeds has been reduced to a fine art.

In choosing maize for seed, select the large, well-filled, flat grains. It has been shown that, by constantly selecting seed from prolific plants, as many as five and six cobs of maize can be produced on each stalk all over a field. A change of seed from another district is also beneficial. Sow pumpkins, either amongst the maize or separately, if you have the ground to spare. Swede turnips, clover, and lucerne may be sown, but they will have to contend with weeds, which will begin to vigorously assert themselves as the weather gets warmer; therefore keep the hoe and cultivator constantly going in fine weather. Tobacco may be sown during this month. If vines are available, sweet potatoes may be planted towards the end of the month. In this case also it is advisable to avoid too frequent planting of cuttings from the old vines, and to obtain cuttings from other districts. If grasses have not yet been sown, there is still time to do so, if the work be taken in hand at once. Sugar-cane crushing will now be in full swing, and all frosted cane in the Southern district should be put through the rollers first. Plough out old canes, and get the land in order for replanting. Worn out sugar lands in the Central and Northern districts if not intended to be manured and replanted will bear excellent crops of sisal hemp. Rice and coffee should already have been harvested in the North. The picking of Liberian coffee, however, only begins this month. Collect divi-divi pods. Orange-trees will be in blossom, and coffee-trees in bloom for the second time. As this is generally a dry month in the North, little can be done in the way of planting.

KITCHEN GARDEN.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown which will keep the market gardeners busy for some time: Carrots, parsnip, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in

the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

FLOWER GARDEN.—All the roses should have been pruned some time ago, but do not forget to look over them occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragon), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall 2·63 in., and for September 2·07 in., increasing gradually to a rainfall of 7·69 in. in February.

Orchard Notes for August.

THE SOUTHERN COAST DISTRICTS.

The remarks that have appeared in these notes during the last few months respecting the handling and marketing of Citrus Fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible, so that the orchards can be got into thorough order for the Spring growth. All heavy pruning should be completed previous to the rise in the sap; and where Winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with the lime and sulphur wash.

Where there are inferior sorts of seedling citrus trees growing, it is advisable to head same hard back, leaving only the main trunk and four or five well balanced main branches cut off at about 2 ft. from the trunk. When cut back give a good dressing with the lime and sulphur wash. Trees so treated may either be grafted with good varieties towards the end of the month or early in September; or, if wished, they may be allowed to throw out a number of shoots, which should be thinned out to form a well balanced head, and when large enough should be budded with the desired variety.

Grafting of young stock in nursery, not only citrus but most kinds of deciduous fruits, can be done this month. It comes in useful in the case of stocks that have missed in budding, but for good clean grown stocks I prefer budding.

In the case of working our Seville orange stocks to sweet oranges, grafting is, however, preferable to budding, as the latter method of propagation is frequently a failure. The Seville stock should be cut off at or a little below the surface of the ground. If of small size, a single tongue graft will be sufficient, but if of large size, then the best method is the side graft—two or more grafts being placed in each stock, so as to be certain of one taking. In either case the grafts are tied firmly in place, and the soil should be brought round the graft as high as the top bud. If this is done, there will be few missed, and undesirable Seville stocks can be converted into sweet oranges.

In selecting wood for grafting, take that of the last season's growth that has good full buds and that is well-matured—avoid extra strong, or any poor growths.

Seville oranges make good stocks for lemons. In case it is desirable to work them on to lemons, it is not necessary to graft below ground, as in the case of the sweet orange, but the stock can be treated in the same manner as that recommended in the case of inferior oranges—viz., to head hard back, and bud on the young shoots.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the trees' use during Spring. This is a very important matter, as Spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop, to a greater or lesser extent.

Where necessary, quickly-acting manures can be applied now. In the case of orchards, they should be distributed broadcast over the land, and be harrowed or cultivated in; but, in the case of pines, they should be placed on each side of the row, and be worked well into the soil.

The marketing of pines, especially smooths, will occupy growers' attention, and where it is proposed to extend the plantations the ground should be got ready, so as to have it in the best possible condition for planting, as I am satisfied that the thorough preparation of the land prior to planting pines is money very well spent.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and plant them in well and deeply worked land, leaving the top bud level with the surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is often done. You only want one strong shoot from your cutting, and from this one shoot you can make any shaped vine you want. Just as the buds of the vines

begin to swell, but before they burst, all varieties that are subject to black spot should be dressed with the sulphuric acid solution—viz., three-quarters of a pint of commercial sulphuric acid to one gallon of water; or, if preferred, this mixture can be used instead—viz., dissolve 5 lb. of sulphate of iron (pure copperas) in one gallon of water, and when dissolved add to it half a pint of sulphuric acid.

THE TROPICAL COAST DISTRICTS.

Bananas should be increasing in quality and quantity during the month, and though, as a rule, the fruit fly is not very bad at this time of the year, still it is advisable to take every care to keep it in check. No over-ripe fruit should be allowed to lie about in the gardens, and every care should be taken to keep the pest in check when there are only a few to deal with, as, if this is done, it will reduce the numbers of the pest materially later on in the season. The Spring crop of oranges and mandarins will be now ready for marketing in the Cardwell, Tully, Cairns, and Port Douglas districts. For shipping South see that the fruit is thoroughly sweated, as unless the moisture is got rid of out of the skins the fruit will not carry. Should the skins be very full of moisture, then it will be advisable to lay the fruit on boards or slabs in the sun to dry; or, if this is not possible, then the skin of the fruit should be artificially dried by placing same in a hot chamber, as the moisture that is in the skin of our Northern-grown citrus fruits must be got rid of before they will carry properly.

Papaws and granadillas should be shipped South, and the markets tested. If carefully packed in cases holding only one layer of fruit, and sent by cold storage, these fruits should reach their destination in good order. Cucumber and tomato shipments will be in full swing from Bowen. Take care to send nothing but the best fruit, and don't pack the tomatoes in too big cases, as tomatoes always sell on their appearance and quality.

SOUTHERN AND CENTRAL TABLELANDS.

All fruit-tree pruning should be finished during the month, and all trees should receive their winter spraying of the lime and sulphur wash.

All new planting should be completed, orchards should be ploughed and worked down fine, and everything got ready for Spring.

In the warmer parts, grape-pruning should be completed, and the vines should receive the Winter dressing for black spot. In the Stanthorpe district grape-pruning should be delayed as late as possible; so as to keep the vines back, as it is not early but late grapes that are wanted, and the later you can keep your vines back the better chance they have of escaping Spring frosts.

Towards the end of the month inferior varieties of apples, pears, plums, &c., should be worked out with more desirable kinds; side, tongue, or cleft grafting being used. In the case of peaches, almonds, or nectarines, I prefer to head back and work out by budding on the young growth.