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QUEENSLAND AGRICULTURAL JOURNAL

VOL. VII. JANUARY, 1917. PART 1.

Agriculture.

HINTS TO COTTON-GROWERS.

When Queensland was a cotton-exporting country, the American Civil War was raging, and small supplies of American cotton were only obtainable by English buyers through the medium of blockade-runners, and the demand was so great that the mixed condition of much of the Queensland cotton shipped to England was not too closely scrutinised; hence, a bale of cotton, consisting of several varieties—long and short stapled—mixed together, brought almost, if not quite, as much as a bale of only one variety. It is even on record that a ginowner at Oxley, at the close of the picking season, ginned a large quantity of damaged cotton, which was brought in by farmers when delivering their seed cotton at the gin-house, and used for engine-cleaning. This cotton consisted of immature and weather-beaten stuff, discoloured—red, blue,

yellow, and brown. Two bales of this cotton were shipped with other bales. When the account sales arrived, this rubbish fetched the same price as the best, 1s. 0½d. per lb. The only remark of the Liverpool agent was that "a couple of bales appeared to be slightly damaged by salt water"!

Such a case could not well recur, even during the present scarcity of cotton, owing to the war and to the serious decline in the American crop, due mainly to the ravages of the boll weevil, which have resulted in abnormally high prices for all classes of cotton. The production of Sea Island cotton seems to be in a precarious condition, judging by the following article published in "Cotton and Cotton Oil News," of 30th October, 1916, reprinted from "Cotton Record," under the caption "A Crisis in Sea Island Culture"*:—

Three or four years ago there was a crisis in the Sea Island industry. The demand almost entirely ceased, and although the production was not at all excessive, prices fell to a discouragingly low level. Nobody seemed to want Sea Island cotton any more, and it looked as if the cultivation would have to be abandoned.

"Another crisis has developed; and, although the cause is entirely different, the ultimate tendency is the same—namely, the abandonment of the industry. On the former occasion, the industry was menaced through lack of support, consumers appearing to prefer the cheaper imported article. This time it is menaced through impossibility of production.

"Already the boll weevil has reached the Sea Island section, and Sea Island cotton is more seriously endangered than Upland is. The Sea Island is of slower development; it has to be planted about a certain season, and is not so susceptible to forcing. With Sea Island, there is no way of sneaking in a fair crop before the weevil gets to actual work. And, besides, the Sea Island territory does not usually have those extremes of temperature which to some extent restrict the development of the weevil. It appears that by the time the weevil has spread to the whole Sea Island section, the chances for a crop will be almost nil. The weevil will not be starved out by the abandonment of Sea Island culture for a season or two; efforts will be made to grow Upland cotton, and the insect will be perpetuated.

"Even this year's crop is quite disappointing; for, while the acreage was possibly the largest ever planted, the production is hardly an average one. The moderate crop and the increased obstacles in the way of obtaining the foreign cotton have combined to bring about an acute situation in the market, and prices are higher than for many years.

* Sea Island cotton derives its name from the Sea Islands—James, Edisto, Wadmalaw, and John's—off the coast of South Carolina, U.S.A., which are under the influence of the warm Gulf Stream, its warmth giving rise to considerable condensation, resulting in a dampness of the atmosphere and heavy dews, which contribute to the perfect maturing of the fibre. Uplands cotton can thrive even with long spells of dry weather, whereas any long absence of moisture is injurious to the Sea Island plant.

"The demand for cotton of a long and strong staple is constantly increasing. It furnishes the best fibre for making the web of automobile tires, and the call for this purpose is expanding by leaps and bounds. With a tire costing up to $40 or more, and the web an indispensable part of it, what difference would an advance of 5 to 10 cents in the price of Sea Island cotton make to the tire manufacturer? By adding a dollar or two to the price of the tire, he would get back the added cost of the cotton ten or twenty times over.

" Amid the Latin notes to an old Greek text were just two anglicized lines. The Greek author was depicting the scene of a recent savage battle, and the particular incident was a mother, wounded unto death, with her infant at her breast. The two lines in English were these:—

"Suck, little wretch, while yet thy mother lives;
Suck the last drop her fainting bosom gives!"

"For grim pathos it would be difficult to surpass these two ruggedly eloquent lines. Unforgettable, they come back to mind after the lapse of half a lifetime, and seem to suggest an analogy to the present situation in Sea Island cotton.

"Now that the very life of the culture of the staple is menaced, is the trade beginning to realise how very valuable the commodity is? Perhaps, in the course of a comparatively short time, the bosom of mother earth will cease to yield any more. Is it an intuitive apprehension of this peril which makes the formerly indifferent trade so eager to obtain a supply while there is still a little to be had?

"We are not writing an obituary notice or a funeral oration for the Sea Island industry by any means. The industry is threatened by a crisis, but threats are not always fulfilled, and one crisis can be successfully passed through as well as another. Moreover, we have strong faith that the boll weevil problem will eventually be solved."

Queensland farmers who are growing Sea Island or Caravonica this season would doubtless realise very high prices if their crop could be placed on the British or the American market at a reasonable rate. In ordinary times Sea Island cotton was generally quoted at from 1s. 3d. to 1s. 8d. per lb. It is impossible to say what the market price will be in view of the probable total failure and possible cessation of the cultivation of this valuable variety of cotton—probably over 2s. per lb; and Caravonica, being an equally valuable long-stapled cotton, would also participate in a rise in price. Already Upland cotton is bringing 10d. to 1s.; and, were it not for the freight difficulty, growers who send their cotton to the ginned by the Department of Agriculture would find that their cotton crop would be the most valuable of all field crops.

To get on, however, to the main object of this article. What we wish to warn cotton-growers of is that two or three different varieties should not be planted, as we might say colloquially, within "coo-ee" of each other. It should be remembered that bees and other insects are the principal agents in pollinating the flowers, and many of these insects—bees especially—range over a large extent of country. Hence arises the variation in the character of many of our originally choicest fruits.

vegetables, and other plants, including cotton. In proof of this degeneration we may instance a boll of cotton we recently received, supposed to be Russell's Big Boll. It contained twenty-nine seeds, of which thirteen were of Sea Island and sixteen Russell's. Singular to say, these were absolutely distinct, each variety occupying a different section of the boll, and each having its own distinctive characteristics of long and short staple. From a field thus hybridised, only mixed fibre could result, and the price obtained for the ginned cotton would be reduced to the value of shorter staple.

COTTON NOTES.

We have frequently expressed the opinion that the revival of cotton-growing in Queensland is not to be brought about by establishing large plantations, but rather by adopting the American plan of small areas grown by farmers in conjunction with other crops. Under the heading "Don't be a Chump," a Texas journal—"Cotton and Cotton Oil News"—gives the following sensible advice:—

"If our farmers had to buy their corn, meat, hay, and other indispensable supplies they would not be benefited much by 15 or 16 cents cotton.

"The lesson this crop teaches is what the Press, the Government demonstrators, the agricultural schools, and colleges, and a hundred other agencies have tried to teach for many years.

"Let not our farmers forget the teachings of past years. Let them not be tempted next spring to plant all cotton, for no farmer can afford to grow 14 or 15 cent. cotton and go in debt to his merchant for farm and family supplies. Don't be a chump.

"This cotton crop is undoubtedly small, yet it will put more money in our farmers' pockets than any other cotton crop ever grown. What is the reason? There are several. In the first place, our farmers produced the crop at less expense than usual. There are fewer debts to be paid out of the proceeds of the cotton crop.

"Again, farmers practised diversification more generally than ever before; and hence they have more corn, more forage and small grain, more vegetables, poultry, hogs, &c., than they have had since the Civil War.

"The prosperity that now blesses the land is not due to the high price of cotton so much as to the diversification which was practised.

"The boll weevil has very nearly made a clean picking of the cotton-fields of Alabama, yet he is not an unmixed evil, since diversification always follows in his wake.

"Even with cotton at 16 cents, farmers should not rely on buying everything they need with cotton money, but they should hold fast to diversification as the path of safety and the highway of prosperity.

The Southern cotton-grower who plants all cotton next year because it is high this year is a short-sighted chump.

"The world demands at least a 15,000,000-bale crop. The production promises to fall short of this demand by 3,000,000 bales or more. Here is a big demand with a small supply, and the result must be high values for the staple."

[The ten to fifteen million 500-lb. bales of cotton produced in the United States are the result of small areas planted by thousands of farmers, who also produce various other crops, raise millions of pigs, and billions of eggs and fowls. The same thing could easily be done in Queensland.]

MORE COTTON FROM THE COTTON PLANTS.

It is hoped to get a greatly increased cotton crop from the same acreage by means of a method devised by John B. Hall, of Philadelphia, Pa., who has been recently awarded a patent on his system. There is a great deal of loss in the cotton-fields in the shape of cotton-bolls which, for one reason or other, never mature, says "The Scientific American." Mr. Hall contemplates turning the pickers into the fields a little earlier than is usual and picking all the bolls before they are open. They are then treated to a bath of a solution in which starch and talcum enter largely, and in a moderately warm temperature the bolls are artificially opened and the burden of fibre is removed in the usual manner. The cotton recovered in this manner is said to be superior to that allowed to remain longer on the plant, in that it has a beautiful lustre. Another interesting feature of this process is that it is said to bring about the downfall of the boll weevil, which requires to be matured in the boll.

CASTOR OIL PLANT.

Of late there has been considerable inquiry as to the cultivation of oil-yielding plants, particularly of the castor oil, as a payable farm crop. There is ample evidence that the plant will thrive almost anywhere on the coast lands of Queensland. In and around Brisbane it may be seen growing and bearing heavy crops of seed in all sorts of out-of-the-way places—on the river banks, in quarries, on unoccupied allotments, &c.: and this applies as well to other coastal localities in Central and North Queensland. No attention has, however, been given to it with a view to turning a plant, which is looked upon almost as a noxious weed, to profitable account. Most people, especially children, know to their sorrow that castor oil is a most valuable medicine; but not many are aware of the large quantities which are used for lubricating machinery and for illuminating purposes. In India it is used on all the railways in the signal and carriage lamps, owing to the brilliancy and safety of the light. It burns very slowly, and thus is more economic than other oils.

The plant is exceedingly hardy and will stand a wide range of climate. The seeds have extraordinary vitality. Oil seeds, as a rule, quickly lose their germinating power; but the castor seed seems to be an exception. Seeds known to have been kept for fifteen years in a bottle have been sown in Queensland, and have produced healthy plants.

In a tropical or even sub-tropical climate the plant becomes a perennial tree instead of an annual, attaining a height of from 20 to 30 ft. The plant should thrive well in the Kilkivan and Nanango districts. The best soil for castor is much the same as that required for the cotton plant —a rich, well-drained, sandy loam. It will not thrive on heavy, wet soils. As the roots penetrate very deeply, the land must be deeply ploughed and well worked. The seed is planted in rows 6 to 8 ft. apart each way, three or four seeds being planted in a hole. Before planting, they should be softened by having hot water poured over them, and then being left to soak for twenty-four hours. In ten days after sowing the seeds will germinate; and when the plants are 8 or 10 in. high, the three weakest must be taken up where four seeds have been put in. They grow very rapidly, and begin to bear in four months. Like the coffee and cotton plants, the castor plant would grow to an inconvenient height if left to itself. It should, therefore, be kept low by pinching back the main stem. This will have the further effect of causing the plant to throw out many more fruit spikes than it otherwise would do. When the tree gets old, the usual scale insect (the *Coccus*) attacks the bark. They have to be dealt with, as in the case of citrus and other fruit trees, by spraying with kerosene emulsion.

When the capsules turn brown, it is time to begin the harvest. This is done by cutting off the spikes and removing them as soon as possible to the barn. The work of harvesting must be done rapidly, for if the seeds are allowed to ripen on the tree the pods burst open and the liberated seeds fly in all directions. This "popping" of the capsules makes the matter of freeing the seeds a very simple one. All that has to be done is to prepare a drying-ground either in a shed or in the open. The ground should either be boarded or swept quite clean. When the spikes are brought in, they should be spread out on the drying-ground to the depth of from 6 in. to 1 ft., according to the heat of the weather. Should rain occur when out-of-door drying is being carried on, draw the spikes into heaps and cover with a tarpaulin. Turn the spikes over frequently to let all get the benefit of the sun. The capsules will soon begin to burst, and in four or five days they will have shed all their seed. All that remains to be done is to sift or winnow out the husks. When drying in the open it is well to surround the drying spikes with a low rampart of galvanised iron or bagging, for the reason that many seeds fly out very violently, and without some such precaution they would be lost.

The return from an acre is about 20 bushels, a bushel of seed weighing 46 lb.

In an article by Mr. W. Soutter on the castor oil plant, published in this Journal in November, 1901, the matter of extracting the oil is discussed. "Those," he wrote, "who would venture to embark in the production of oil-seeds have to face the fact that the market is too far distant to leave a margin of profit after deducting the freight and other charges. The only remedy, therefore, is to endeavour to bring the market nearer, and this can only be done by bringing the oil-miller alongside

the raw material. The actual outlay in erecting an up-to-date oil mill is not large, as will be seen by the following estimate:—

A mill to deal with 30 to 45 cwt. of castor per day would cost £750.
A mill to deal with 40 to 70 cwt. of castor per day would cost £1,050.
A mill to deal with 100 to 150 cwt. of castor per day would cost £2,400.
A mill to deal with 160 to 200 cwt. of castor per day would cost £3,000.

Skilled labour would be required to make the oil''; and Mr. Soutter's idea was to induce ''men with the necessary capital to take the matter in hand, and thus find another string for the farmer's bow.''*

A comparatively simple process can be tried by anyone interested, and a good oil should result. It is as follows:—

First cleanse the seeds from fragments of the husks and from dust, and submit them to a gentle heat, not greater than can be borne by the hand, which process makes the oil more fluid and more easily expressed. A whitish, oily fluid is thus obtained, which is boiled with a large quantity of water, and all impurities are skimmed off as they rise to the surface. The water dissolves the mucilage and starch, and the albumen is coagulated by the heat, thus forming a layer between the oil and the water. The clear oil is then removed, and boiled with a small quantity of water until aqueous vapour ceases to rise and a small quantity taken out in a phial remains perfectly transparent and cool. The effect of this is to clarify the oil and rid it of volatile acid matter. Care is necessary not to carry the heat too far, as the oil would acquire a brownish colour and an acid taste.

In India the seed is crushed between rollers, placed in hempen cloths, and pressed, and then the oil is heated with water in a tin boiler until the water boils. This separates the mucilage and albumen, the product being finally strained through flannel.

Cheap wooden rollers would serve the purpose, and these could be driven by a horse gear.

WEAK POINTS OF SOYA BEANS.

As we have often pointed out, soya beans have their weak points. These are chiefly two. The seed rapidly deteriorates in germination. It is generally unwise to use seed over one season old, and it should not be covered to a depth of over 1½ in. The greatest weakness of the crop is the difficulty in getting good stands. The other serious weakness is that unless it is cut at the right time and handled properly, the beans ''pop'' out or shatter badly in harvesting. They must not be allowed to get too ripe.

The only safe plan is for each farmer to grow a small acreage until he learns how to handle the crop.—''The Progressive Farmer.''

* The cost of such mills to-day would be far higher.—[ED. "Q.A.J."]

The Horse.

CAVALRY HORSES.

A correspondent of the "Live Stock Journal," London, writes on this subject as follows:—

"I should like to refer to what various other countries are using as mounts for their cavalry, all of which goes to point to the fact that horses with a percentage of Arabian blood in their veins are used very largely by our Allies, and also recently by the United States expeditionary force sent into Mexico. The small horse of 15 hands has proved himself always the best for campaigns and long-distance rides.

"Many of the horses ridden by the United States cavalry in the recent Mexican rising were Arabs and half-bred Arab-Morgan horses, some being bred by Colonel Spencer Borden at his stud farm at Falls River. It was a long time before the United States Government would consider their use, but Colonel Borden was so sure of what they could do that he persuaded some of the younger cavalry officers to ride some of his Arabs in an endurance test, which they did, beating all comers; the only other one that came anywhere near was a three-quarter bred Arab-Morgan mare, 15 hands. They carried, in most cases, over 12 stone, and had to travel over very bad roads, some of which were covered with snow and ice, as the test took place in winter time.

" The Russians use high-caste Arab stallions for breeding remounts, they having purchased in England among others some years ago the Arab stallion Mesaoud for the figure of 800 guineas from the Crabbett Arabian Stud. The ponies ridden by the Cossacks all have a percentage of Eastern blood in them, and it is well known how easily they endure fatigue and hardship of all kinds. Only a few months ago it was reported that Cossack officers had come through Persia and joined our officers in Mesopotamia after a long ride.

" High-caste Arab stallions are used in the following countries for breeding remounts:—Italy, Portugal, Spain, Java, Sumatra, India, Hungary, Turkey, Egypt, and France. We are about the only cavalry nation that have never tried Arab stallions as sires for our cavalry remounts, although all through the Boer campaign the Arab and the Basuto ponies (half Arab) proved their value on all occasions. One cavalry colonel, who took out five picked Irish hunters and one Arab stallion, had to give the hunters up, as they went to pieces during the first six months, and rode his Arab for the rest of the war, and he never went sick or lame. Hunters, when they came in from a forced march, very often being led by the troopers on account of leg trouble, were unsaddled and turned loose. Instead of having a roll in the sand or dust as the Arab did, they stood about and would not eat, and whinnied for their

grooms to come and rub them down and rug them up and give them their feed of corn, whereas the Arab went off and picked up any herbage he could find, and was content.

"During the Omdurman campaign the cavalry had to leave their horses behind and use Arab and Syrian ponies. Out in the Western States of America no one ever thinks of using a big horse on a cattle round-up or on a long-distance journey. If they did they would soon go to pieces, as they could not thrive on the coarse herbage. The Mexican ponies are full of Eastern blood brought over when the Spaniards conquered Mexico. Some years ago, when there was a race across the desert in Egypt between an English T.B. and an Arab, the former broke down about half way, and the latter finished alone not in the least distressed.

"The reason why Arabs are not popular in this country is: Firstly, on account of their size, which is from 14 hands 1 in. to 15 hands, and people, especially officers, state they are not up to weight, which is not correct, as it is well known they will carry 16 stone all day. Secondly, on account of there being brought to this country at intervals Barbs, Gulf Arabs, Dongola Arabs, and Syrians, and sold here as high caste. They are bought and found to stumble; they will not jump, and have, as a rule, not much of a shoulder; and at once the Arab is condemned, although the people who have had inferior ones probably have never ridden a high-caste one. The writer of this article has one which he has ridden from London to Brighton and back twice.

"I might add, in conclusion, that whatever the high-caste Arab is crossed with—*i.e.*, Cleveland Bay, T.B., Hunter, Trotting, Morgan, or Suffolk—he will stamp his likeness, docility, and hardiness on his young stock; and what would make a finer charger than a high-caste Arab crossed with a T.B. or Cleveland Bay mare?"

MOST VALUABLE TREE IN THE WORLD.

Everyone who makes a living from the soil might appreciate such a tree as the *Gantor avocado* in Whittier, near Los Angeles, Cal. In no year since it began bearing has it brought its owner (H. A. Woodworth) an income of less than 2,000 dollars (£400), and the annual average is 3,000 dollars (£600). Ordinarily the proceeds from avocado growing range from 400 dollars to 2,000 dollars (£80 to £400) per tree.

The Avocado is more generally known as the Alligator Pear. It is about the size of the Bartlett fruit, and very dark green in colour. The flesh is about the consistency of a banana, and is prized highly for salads. —"Cotton and Cotton Oil News."

[The Avocado or Alligator Pear thrives and bears well in Queensland, but we have never seen them offered for sale, nor do we think they would bring as much in our markets as prime navel oranges. Tastes differ.—Ed. "Q.A.J."]

The Orchard.

BANANA CULTURE IN THE TWEED DISTRICT.

By G. E. B. WELSH, Mirambeck Farm, Tweed Heads.

For many years sugar-cane has been the main crop grown in the Tweed district, but since black labour ceased to be available sugar-cane growing has gradually declined, and now, on the rough and hilly country, only small areas are to be seen growing because of the heavy cost of white labour, which has absorbed the profits, the grower finding that, after waiting two years for his crop to mature, very little was left over after paying expenses. Some growers sowed down their land with grass and embarked on the dairying industry; others allowed the lantana to grow up, then brushed the lantana, burnt it, and planted bananas. Some of the plantations in this district look extremely well, and it is fortunate that the banana seems a crop which can be successfully grown in very rough country, because some of the sites selected for banana plantations are so steep and rocky that it is an impossibility to cultivate by means of horse labour. In this district can be seen bananas growing most luxuriantly amongst masses of rock and huge boulders.

Some of the essentials for success in banana-growing are a good rainfall, a well-drained and warm soil rich in potash, and a sheltered position; the rain should fall chiefly in the summer when the soil temperature is high, the chief growing period of the banana, also in the spring to give them a start after the winter. Shelter from rough and cold winds is necessary, because of the immense weight of the bunches causing the stems to sway about when the huge leaves catch the wind, and in consequence the sucker is either broken off or uprooted. The leaves become torn in strips by the wind, but their efficiency is not much impaired by the tearing, because the vascular bundles run parallel to each other and are not broken across; thus their functions are not interfered with.

From reliable reports issued from Queensland's Chief Agricultural Chemist we learn that bananas—plants and bunches—remove from soil the following in lb. per acre:—Pure potash, 271·48; phosphoric acid, 22·52; lime, 102·15; nitrogen, 84·54; these figures convey to our minds the immense importance of potash and lime for bananas. Just as the speed of a locomotive is governed by the amount of fuel and water to supply the steam, so the development and quality of the banana depend on the available supply of plant food. The banana plant is naturally a very rapid grower, and the enormous quantity of potash must be readily available. An inefficient supply is known to adversely affect the formation of carbo-hydrates.

As before mentioned, the bananas in this district are being chiefly grown on old sugar-cane land which has been permitted to become over-

PLATE 1.—BANANAS PACKED FOR MARKET.

grown with lantana, and, when burnt, the lantana has furnished a supply of potash in its most available form. This, I believe, explains why, where there has been a heavy growth of lantana followed by a good burn off, the bananas during the first four years thrive so well, the enormous growth of foliage with that dark green, healthy colour, denoting abundance of available plant-food; also, the bunches are large and well-filled. But under this heavy strain of cropping the requisite plant-food becomes exhausted quicker than nature can supply it, the plants assume a yellow-green colour, the bunches are smaller, and eventually the plantation becomes neglected because the crops no longer pay for the labour required. Disease then soon asserts itself, and the grower blames the soil, the weather, the supplier of the stools, or anything but himself.

We must remember bananas are surface rooters, and in comparison to their size their roots do not extend a very long way, whereas the majority of fruit trees establish a system of roots extending in all directions, growing to a great depth as well as covering a large area; they also take several years to establish themselves before the heavy demands of fruit-bearing are made. Trees have been known to send out roots long distances to procure food or water not found close at hand. Bananas are not adapted for this, and if the necessary food is not within easy reach they soon assume an unhealthy and stunted appearance.

We also learn that lime is very necessary for the banana. Having tested samples of soil in this district with dilute hydrochloric acid, I have found it very deficient in lime. Owing to the continued growth of sugar-cane in this district for many years, the soil has become acid in reaction; and it is a well-known fact that microfungi are favoured by an acid reaction, and the action of bacteria which fix nitrogen is hindered. Not only does lime prevent fungoid diseases but it obviates it on soils where they already prevail; dressings of lime also render available both potash and phosphoric acid, which are brought into a more soluble form; and just at this time, when the world's largest store of potash salts is locked up in Germany by the war, it is well to bear in mind that a liberal application of lime to soils deficient in such is a good investment.

It is erroneous to conclude that if superphosphate of lime or bones, which are phosphate of lime, be supplied to the soil, these fertilisers will supply the lime required. Lime or its carbonate is required in the soil to supply a free base. Superphosphate is saturated with sulphuric acid in the process of its manufacture so that there is an excess of acid, and the use of this fertiliser reduces the amount of the carbonate of lime in the soil; in fact, used on land deficient in lime, superphosphate has a favourable influence on the spreading of some fungoid diseases by reason of its increasing the acidity of the soil.

Basic slag is a phosphatic fertiliser which supplies both phosphates and lime to the soil; it is a cheap manure, can be safely stored in bulk, and where land is deficient in lime basic slag will give much better results than superphosphate. Basic slag requires a good rainfall to assist in bringing it into action, and it is a very slow-acting manure, requiring eight to twelve months before its action is seen.

On light porous soils lime exerts a good effect in causing the cohesion of the fine particles; thus the soil becomes more retentive of moisture, enabling crops to better withstand spells of dry weather.

A simple method for testing the acidity of the soil is to procure some blue litmus paper from the chemist and wrap it round a ball of moist soil; should the litmus paper gradually turn red, it denotes an acid soil; if some soil which has received a dressing of lime be wrapped up in the red litmus paper, it will change it back to blue. It is advisable not to handle the litmus paper previous to the test, as such will turn it red and spoil the test. A better and more effective method is to use a flat-bottomed glass, in the bottom of which is placed a round piece of litmus paper, and on top a round piece of white blotting-paper the same size, both resting on bottom of glass; next, place some soil which it is desired to test in the glass, and moisten with clean rain water and stand for an hour or more. Should the colour of the litmus paper be changed to red, it indicates an acid soil; a quick change of colour shows a very acid soil.

As previously mentioned, disease soon asserts itself in a neglected plantation because starvation of an essential food constituent may act as a specific cause of predisposition; the whole matter of immunity from disease is very closely related to the nutrition of the plant and its environment. Queensland fruitgrowers are fortunate in having the advice of a thoroughly qualified staff of experts, but much of their valuable assistance is rendered void to the State simply because some growers are not alive to their own interests. When reports are tendered of diseases and pests, how frequently is the remark made: "It will not pay," or "It is too much trouble." In the case of the merchant with large premises carrying a valuable stock and who neglects to insure such stock, if fire breaks out and consumes his goods, what farmer would not condemn that merchant for taking the risk? Yet, when methods are carefully described and advocated for the prevention and curtailment of diseases and pests, how often the farmer ignores them instead of adopting them, thereby increasing the production of the best crops, free from disease, and thus assisting to meet the demands of home consumption, and in this way preventing the profitable importation of foreign-grown fruit and products and helping to grow an exportable surplus, so that capital may be sent into the country, instead of *vice versâ* to purchase abroad produce inferior to that which can be grown here.

Bananas have many advantages over other crops; they bring in quick returns, their cropping period is more under control and is spread over the whole year, affording a regular income, and they are not so subject to market gluts as fruits which reach maturity only at one season of the year, entailing a great rush of work. Bananas do not suffer to so much extent from insect pests, and are more easily protected from the raids of flying-foxes, as they are cut and marketed when in an unripe state. It is utterly useless to plant bananas within the frost zone or in cold exposed situations, so the grower does not run the risk of losing his whole crop and having to wait another year for returns, as is often the case with peach, plum, and apple growers. Frequently, windfalls

cause a serious depletion in the returns of the latter crop. Pilfering in transit has also to be considered. The large consignments of bananas which reach Sydney every fortnight from Fiji indicate the immense demand and popularity of the banana, and there is no reason why the bulk of this demand cannot be met by the banana districts of Queensland and the Tweed if only growers would plant larger areas, organise, and place the whole trade from the production to the marketing on a thorough business footing. What has been done by the Fiji and Jamaica banana-growers can just as easily be done in Queensland when rational labour conditions are again resumed.

THE ALGAROBA BEAN.

(*PROSOPIS JULIFLORA.*)

In the May number of the Journal, 1916, we gave an illustration of this valuable tree, and explained to a correspondent that the seeds he had in his possession were those of the Algaroba or Mezquit Bean, and that another kind is known as the Carob, the Locust, and St. John's Bread. We are still receiving inquiries about the tree; and a perusal of the following paper on "The Carob, by C. W. Beers, County Horticultural Commissioner, Santa Barbara, California" (published in the Monthly Bulletin (Vol. V., No. 8) of the State Commission of Horticulture, Sacramento, Cal.), will be of interest to our correspondents, affording, as it does, the fullest information on the subject:—

THE CAROB—*CERATONIA SILIQUA.*

For several years the writer has been attempting to interest the farmers of California in the above forage tree, and the demand for some available literature on the matter has led to the preparation of this paper.

WHAT IT IS.

The carob is an evergreen tree, growing from 25 to 30 ft. in height, and old trees are reported as 40 in. in diameter. The tree is long-lived, comes readily from seed, and grows with little care after it is once established. In Santa Barbara there are a number of trees, planted eighteen years ago, that are from 15 to 18 ft. high. They are 15 ft. apart in the row, and the branches are interlocking. One tree from the same lot of seedlings has a spread of over 20 ft., and is 30 ft. in height. The carob belongs to the Leguminosæ, and, besides yielding a large amount of highly nutritious forage it enriches the soil by storing up nitrogen through the roots.

ADAPTABILITY.

The carob will grow where other plants make a very poor showing. On high, dry, rocky points, by roadsides, along drives, bordering water-courses, anywhere where vacant spots are to be found, there this beautiful glossy foliage tree may be grown, adding to the landscape attractions and every year bearing an abundance of high-grade forage.

It will endure neglect after once established, and can be planted 60 to 100 to the acre where soil conditions are moderately favourable. A recent visitor to Algeria tells me he saw the carob everywhere. In the lower fertile lands were found fruit trees and crops; on the next higher lands grapes were carefully tended; but on the high dry places the carobs were planted, and make a splendid growth.

G. P. Rixford has a record of a carob that grew in a rock crevice at Campo Seco, Calaveras County. He says:—"It had bid defiance for many years to the sulphur fumes from the neighbouring copper smelter which had killed every vestige of vegetation in the vicinity, except the poison oak—*Rhus diversiloba*. It finally succumbed, not to the acid fumes, but from lack of moisture after the little soil in the crevice had been washed out by rains, leaving the roots bare."

Thousands of acres of our own pasture lands, now averaging less than 1 ton of indifferent forage, can be made to produce upwards to 5 tons of carob pods.

PRODUCTIVITY.

Dr. Aaronshon, of Palestine, who attended the Fresno Convention in 1912, said that seedling trees will produce an average of 350 to 500 lb. per tree. Twenty trees to the acre will thus produce 3½ to 5 tons each year. He reports grafted trees, eighteen years old, bearing 900 to 1,100 lb. each. When one reflects that the carob is easily grafted, the possibilities of a pasture of carobs makes the industry quite worth trying out.

NUTRITIVE CONTENT.

Pods from six seedling trees now growing in Santa Barbara were sent to the United States Department of Agriculture, Washington, and the following analyses were reported:—

	A	B	C
Gillespie	27.14	13.78	91.94
Gould, No. 38	24.82	15.02	89.98
Gould, No. 27	23.39	15.65	92.28
Gould, No. 24	30.20	13.16	91.84
Gould, No. 18	32.58	12.57	90.24
Gould, No. 9	30.34	14.31	92.00

A—Sucrose per cent. B—Reducing sugars per cent. C—Dry substance per cent.

In this report, No. 18 shows a sugar content of 45·15 per cent.; No. 9, 44·65 per cent. sugar; No. 24, 43·36 per cent.; and the Gillespie tree gave 40·92 per cent. The poorest of them is a very rich forage product. Dr. Aaronshon says the pods carry, in addition to the sugar content, a protein supply of 7 to 8 per cent.; and in the Experiment Station Record No. 10, for June, 1905, will be found the analysis of a carob pod that yielded 43·57 per cent. sugar and 15·22 per cent. protein; but allowing only an 8 per cent. of protein and 45 per cent. sugar, and we have the following most interesting and remarkable series of comparisons:—

COMPARISONS.

Wheat is a rich ration, running higher than the carob, pound for pound; but, to equal 5 tons per acre of carob pods, wheat must yield 3 tons of grain to the acre, which is out of the question.

Alfalfa is a splendid feeding product, and stores up nitrogen in the soil while producing the hay. Compared with the carob at 45 per cent. sugar and 8 per cent. protein, the ground must produce 5 tons per acre, and that on rocky, hilly places, without irrigation and without cultivation. Besides, the carob is one of those trees whose rootlets store up nitrogen in the soil.

We Californians feed quantities of barley, both as a grain ration and as hay, and to make a crop we require good soil, good seasonal conditions; and, when threshed, to equal 5 tons of carob pods, each acre must yield 3½ tons of sweet, dry, first-class barley.

Bean straw is carefully husbanded, baled, and housed, and sold at a price that brings good returns; but, to equal 5 tons of carob pods, each acre must yield 6 tons of bean straw.

It requires 30 tons of carrots to provide the same elements found in 5 tons of carob pods. Corn and cob ground requires 3 tons to the acre to equal the product of 1 acre of carobs. Corn meal must weigh 2½ tons to equal in food product 5 tons of carobs.

Oats are found to be a great ration for milch cows; but, if the crop is to keep pace with carobs, there must be delivered at the sacking shoot 3 tons of grain per acre, or of good clean oat hay the land must yield 4 tons.

Men pay good prices for beet tops to sugar factory people, but, to equal the acreage of the carob, each acre of beets must furnish 38 tons of tops. It is difficult to realise the economic importance of such a product. It requires 3½ tons of cotton-seed meal to equal the acre product of carobs. For human food, it is richer than cow's milk, pound for pound.

FEEDING.

Horses, cattle, sheep, and hogs take readily to the pods; and turkeys soon learn to fly into the tree, tear off the pods, break them, and eat them. Chickens will readily feed on the pods when broken up. The Arabs feed the pods to their fine horses. The carob is the main forage for the English cavalry horses in Malta and for the tram horses in Naples, while it is a common sight to see the London cabby give his horse a feed of the brown pods while waiting for a customer. The island of Cyprus grows large quantities of this forage, and it constitutes its largest export.

The carob is a splendid avenue tree, and hundreds of California farmers could add very materially to their forage supply by planting these trees where shade and ornamental trees are desired.

FEEDING VALUE.

Dr. F. W. Woll, Professor of Animal Nutrition, University of California, at the Davis Farm, carried on a feeding test with calves. One bunch of calves received, as their grain portion, ground milo and ground barley, half and half; the other bunch receiving an equal amount of crushed carob pods and ground milo, half and half. This experiment extended over a period of thirteen weeks; and at the close of the period

those fed on milo and barley had averaged a gain of 1·70 lb. per day, while those fed on the carob pods and milo averaged 1·81 lb. Those fed carobs required more hay than the others, so, taking it altogether, the carob showed values equal to ground barley. This test was made with pods from seedling trees, the sugar test being no higher than those mentioned above, and probably much below that average.

PROPAGATION.

The seeds come readily. By planting the seed pods on edge, close together, in a sprouting-box, with a slight covering of soil, there will be a succession of seedlings, covering two or three years. This method seems to protect the young seedling from the damping-off fungus, that otherwise causes great loss of the young plants. There seems to be a ferment in the pod that protects the early growth. Seeds stripped from the pod and treated with hot water come quickly, but these young plants are very susceptible to the damping-off fungi.

I. L. Knudson, in the Journal of Biological Chemistry, shows that tannic acid is toxic to a large number of fungi. In the early ripening period of the carob, tannic acid is present in large proportions, making the pod very bitter and astringent, and this suggests to my mind that this tannin may remain in the pod to an extent sufficient to inhibit the deadly action of the damping-off fungi on the young seedlings, when the pod itself is planted. In the Journal American Chemical Society, F. M. McClenahan has shown that in the young walnut a very thin seed coat separates the tannic acid, so abundant in the walnut shell, from the fatty substance of the walnut meat; doubtless placed there to protect the fats from the action of the fungi that would destroy them. It has been shown that the tannic acid of the date, persimmon, banana, and olive is not removed by the ripening process, but is sealed up in some manner that renders it insoluble during the process of mastication, so that, although the fruits are delicious to the taste, the tannin remains in the fruits. While the rôle that fats and tannin play with reference to each other may not be known, is there not a suggestion in the findings of Knudson and McClenahan that, possibly, one relation between them is the inhibition of fungus action of fats and sugars during the formative periods? and then, later, the destruction of damping-off fungi at the period of germination?

Possibly this may account for the fact that seedlings grown from planting the entire seed pod are immune from damping-off fungi, while those from cleaned seeds are very apt to be destroyed by them.

GRAFTING AND BUDDING.

The tree is easily budded or grafted, and the union appears very intimate. Grafted and budded trees bear earlier than seedlings, and produce heavier crops. Only by this method can the nutritive content be determined beforehand, as seedlings do not come true to product; also, the carob is dioecious,* and in seedling trees there is an excess of

* Dioecious—a term used when the flowers are unisexual, and the male and female flowers occur on different plants.—[ED. "Q.A.J."]

staminate trees, and by budding or grafting this can be controlled. It has been found that, by budding a single branch of a pistillate tree to a staminate bud, there will result an abundance of pollen to fertilise all the balance of the tree, thus making every tree a fruit-bearer.

TEMPERATURE RANGE.

Eighteen degrees of frost does not injure the carob to any extent. Frost conditions that did marked damage to citrus trees made no impression on carobs growing within a few feet of them.

CONCLUSION.

And what more shall be said? Do we advocate planting carobs instead of grains? Shall we plough up our alfalfa and put out this thrifty tree? Are we proposing to revolutionise present good systems of farm procedure? Not at all. But we do urge and expect that the good sense of those who may read this will induce some of them to make a respectable planting of this tree in places where now there is small return, and watch the development.

THE AMERICAN PAPAW AND THE TROPICAL PAPAYA.

According to the "Journal of Heredity" for July, 1916, the American papaw is known botanically under the name of *Asimina triloba*, belonging to the family Anonaceæ, which includes the custard apple. It is stated that so little is the papaw known that its very name has been stolen from it and applied, through a confusion in sound, to the tropical papaya (*Carica Papaya*). While this double use of the term is unfortunate, we fear that, as its employment in connection with *Carica Papaya* is world-wide, there is little chance of even the United States ever gaining a monopoly of its use in connection with their northern species of fruit.

The article in question gives an interesting account of the papaw tree, which, in appearance, resembles very much a cacao tree. But the papaw thrives under temperate conditions, and is not in any sense a tropical plant, though many of its near relatives are. One of the promising fields for plant breeding, in connection with the papaw, appears to be in hybridising it with its close relatives, the tropical Anonas—the soursop and the custard apple, for instance. These fruits are larger and finer than the papaw, but too tender to grow in the United States, except in Southern California and Southern Florida. There would appear to be a good chance that they could be crossed with the papaw, and the fruit produced which would be hardy in a large part of the United States, while superior in quality to the papaw itself. So far as is recorded, this cross has never been made.

The above idea of extending the range of a tropical plant by crossing it with its near relatives in a cold country is new and interesting; and there would seem to be no reason why the reverse could not be effected, and some of the more attractive fruit of temperate countries acclimatised by hybridisation to grow in the tropics.—"Agricultural News," Barbados.

Horticulture.

THE GERMINATION OF SEEDS.

At a meeting of the Horticultural Society of Charters Towers, Mr. E. Mann read the following interesting paper in October last:—

"In this paper I will try to explain the observation and experiments I have made in my endeavour to grow and acclimatise plants in our tropical climate. I am going to tell you of things that I know, also of those that I don't know, in the hope of picking up a little information when you discuss this paper. In this meeting I have several times stated you must make the soil firm when you plant your seeds to be sure of good germination. I will tell you for why. It is a well-known fact that the more you cultivate the soil amongst growing crops the less water they require; this is because by stirring the top 2 or 3 in. of soil you dry the moisture out of it and create a loose mulch that prevents the moisture in the soil lower down from rising to the surface by capillary attraction and being lost by evaporation, thus leaving more available for the plants; but in planting seeds you have to reverse the process to some extent, as most seeds germinate best when only just covered with soil; and many flower seeds are so small that planted this way they would be no more than ⅛ in. underground, and in our hot climate the sun will dry the surface of loose soil over 1 in. deep in a day, but by pressing the soil firm you set in motion capillary attraction, which draws the moisture from a lower depth to the surface, as the sun dries it out and so in a great measure protects the seed from being burnt up just as it starts to germinate under the soil. A little light horse manure spread on top of the soil after planting takes the place of cultivation in growing crops, as it protects the soil from the direct rays of the sun, and so retains the moisture at the surface of the soil, where it is most needed; even then our climate is so severe that with small seeds it is better to water twice a day till the plants show through the ground, either morning and midday or midday and evening; never let them go from morning till evening, or you will lose most of them.

"We will now take a few plants in detail. I have no doubt many of you have noticed that while some seeds nearly all germinate at the same time others again come up very irregularly. Phlox is a noticeable example of this, coming up at three or four different times, and it is possible to have plants nearly ready to plant out while others are only just showing through the ground. This is owing to the seed ripening very irregularly on the plant; if you will look at your plants, you will notice the little bunches of seeds are in all stages of ripeness—some have burst and scattered, others are brown and just ready to burst, while others on the same bunch are quite green.

"Well, you know commercially it is impossible to harvest each little pod as it gets ripe, and they are all cut together, so the seed when saved

is not all of the same ripeness, and, so far as my observation goes, the ripe seeds germinate first; the others seem to finish their ripening in some way underground before they germinate; hence the various times of coming up. Another point about phlox. I have often imported from Europe, and never averaged more than 10 per cent. of germination; some years it would fail altogether. After writing several letters and making experiments, I found that, owing to their climate being so much cooler and more moist than ours, the seed did not ripen so hard as with us, and was more affected by the sea voyage. If they had a dry summer, the seed might average 15 to 20 per cent. of germination, but in a wet season hardly a seed would grow. I sent seed of my own growing (in our hot climate) to England for a test, and it averaged 85 per cent. of germination. Imported aster seed is worse than phlox in this respect, as in various years I must have spent about £5 on different kinds and bought enough seed to raise 20,000 plants, but all I have raised so far are three plants. A curious check test that came under my notice was the lupin. I got an imported packet containing six seeds; five germinated in about six days after planting. I saved my own seed from one of them, and the following season planted twelve seeds; they did not come up in a fortnight, so I put more in the same box; as they are large seeds I just pressed them in with my thumb without disturbing the soil in case some of the others might make a late start, but none came up. At the end of another fortnight I planted Dianthus on top of them and covered with new soil without disturbing the old; these came up thick, and when large enough to plant out I started to dig them out of the box. I came across two or three of the lupin seeds just as sound as when I planted them. I chipped one with my knife, and it was all right inside; so I raked out five seeds, chipped them all, and planted them again. Four came up in six days; so you see this was just the reverse of the phlox. Our climate ripened the lupin seed too hard to germinate till I cut through the shell of the seed. To prove this, the following season I did not let the seed ripen on the plant, but picked the pods while they were yellow and dried them indoors, and these seeds germinated six days after planting. In a short paper like this I cannot go into details of many of my experiments. I can only mention a few most prominent examples in each class. I now come to the section that so far has puzzled me, and I hope to obtain some information about, as, if these problems were elucidated, I believe they would enable us to acclimatise many more plants in this country that are now beyond us. The sweet pea is a popular flower, and if planted in April it seems to grow along without any check, and flowers just about right for the show in August, but if you want early flowers and plant in March they very often come up all right but die off again when about 2 in. high, only an odd one here and there pulling through.

"The earlier you plant the more pronounced this dying off becomes. I also notice imported seed is more liable to go than my own, but they all fail when planted too early. I have read of some being killed by mildew, but I could not find any trace of it on mine, and, as they always seem to go off just at the same height, I hardly think it is caused by this disease. I am inclined to think, when planted too early and the weather is too hot, they just grow till the nourishment in the seed is exhausted, and then from some cause not yet known to me they fail to draw nourishment from the soil and so die off; those that do pull through invariably come to a standstill at the 2 in., sometimes for as much as fourteen days; then all at once they rush along, sending out new shoots from the ground level, and come into flower well ahead of those planted later, although these receive no check. Another curious example of germination is the petunia. These I have grown for summer flowers and pulled up in February; from that time onward after the borders were planted with winter flowers the petunias would come up right on to September, and then, when the winter flowers were pulled out and summer flowers planted again, they would come up in thousands week after week. The mystery to me is, Why do these seeds germinate at so many different times when practically under the same treatment, and how can this seed remain sound so long in soil that is constantly watered? Lettuce and celery, if planted in hot weather, will act in a somewhat similar manner. A marked contrast to this is the *Linaria marsuana*. If this seed is planted in March, it will flower from July to November; but I pulled mine out in September. This plant seeds freely, but you rarely see a plant come up during summer; and if you pull out your summer flowers in February or early March, you can plant the borders again and water them without seeing any young plants, but as soon as April arrives they will come up in thousands all over the borders. Now, why do these seeds lie dormant so long, and then all answer the call at about one and the same time? and what protects them from decomposition in the constantly watered soil? The last flower I will mention is perhaps not so well known to you, but as regards germination is the most remarkable plant I know. It is called *Ruellia tuberosa*. The flowers resemble the *Mimulus* in shape, but are a slate blue in colour. I got a packet of seed to try, and raised three plants in March. I planted them out in the border with other flowers, but they made no progress till August; then they started to grow, and, as I thought at the time, sent out flower buds; every day, when watering, I noticed the buds, but they seemed to get no farther forward. At last I dropped the hose and had a close look at them and they were seed pods, formed without any sign of a flower—either petal, pistil, or stamen; and yet when I pulled out the borders at the end of September, there were dozens of young plants all round the old one.

"I was disgusted at getting no flowers, so destroyed two plants, but left one for further trial; and as soon as the borders were clear and the sun could get direct to the soil, this plant started to grow strong and blossomed right through the summer, bearing seed pods exactly like the first that were formed. As the plant is not showy enough for small gardens, I do not recommend it; but I tried it two or three seasons, to notice the results, and every year they acted the same—on the turn of spring the seed pods would come alone, and as the weather got warmer the flowers would come and the seed would germinate freely from either. One curious point was brought to my notice during the last few weeks. When importing phlox and aster seed from Europe with such poor results, I noticed petunia seed in the same collections germinated freely. Now where I am growing my flowers the water is very salt, and in a bed I planted part phlox and part petunias; both germinated, but the phlox died away again, while the petunias grew along and are now coming into flower; so evidently the petunia is a good sailor and likes a little salt. When we consider that most of our seeds are imported from Europe, mostly to seedsmen down South, and then shipped up here under very trying conditions on our coastal boats, it is always a wonder to me we get such a good percentage of germination as we do; and only one word can be used to describe the vitality contained in these small seeds—that is, marvellous."

FIGHTING IN THE JUNGLE.

DIFFICULTIES IN THE EAST AFRICAN CAMPAIGN.

In the course of its pursuit of the German forces in East Africa, General Beve's infantry has had some unusually exciting experiences, including encounters with lions and other natives of the jungle. The route lay over indescribably precipitous mountain paths, through dense jungle, and over elephant tracks. General Beve's infantry, abandoning all wheeled transport, without blankets or greatcoats, and subsisting on nothing more than half rations, undertook the pursuit, and was able to join up with General Enslin's mounted brigade on the Moeba River.

The whole force then set out and overtook the enemy, who was again defeated. After the engagement, the correspondent states, the Germans, in the politest possible manner, sent several of our wounded back with a doctor, warning our officers of the danger to wounded men at night from lions, three of which were "put up" in Colonel Nussey's firing line.

A huge python invaded General Beve's quarters, and was despatched with difficulty. Bees also attacked the column, scattering the ammunition mules and horses, and for a time completely checked the infantry advance. The scene of operations was the densest jungle.

Operations have resulted in the complete dislodgment of the enemy from his mountain retreat in East Africa, and the scattering of his remnants. Lindi and Mikindani, the last remaining ports in the German colony, are now occupied by naval forces.—"Exchange."

Tropical Industries.

NOTES ON SISAL CULTURE.

1. For the cultivation of the sisal plant, the most suitable lands are poor, rocky, gravelly soils rich in lime (the latter is absolutely necessary), worn-out sugar lands and arrowroot fields, and lands which no longer yield satisfactory wheat crops. Swampy land must especially be avoided. A very suitable soil is one composed mainly of coral rock. On rich soils, the plant will go larger, but the fibre is less in quantity and quality. Another objection is that the plant rapidly comes to maturity, throwing up its flower pole after three or four years, which is the end of the plant's life, and only one crop is harvested. On the poorer lime soils the life of the plant runs to from ten to fifteen years, yielding as many and more crops.

2. The failure of a crop on suitable land and in a warm climate has never been heard of.

3. The land to be planted should be fenced to keep off stock—for the reason that, in feeding round the plants, these are trampled down or kicked out. The plants to form a plantation should not be higher than 10 or 12 in., or even less. Older plants take a much longer time to start growing. When planting all dry leaves at the base of the young plant should be taken off as in the case of pineapples, and the main roots cut off and pared as closely to the trunk as possible. They must be planted perpendicularly, and only the lower portion of the trunk must be covered. The distance apart in the field is a question of soil. In rich soil the rows may be 10 ft. apart, and the plants at intervals of 6 or 7 ft. In poor ground 8 ft. by 6 ft. is as close as the plants should be set. Roadways should be left at intervals of 5 chains.

4. Once a field is planted, it may be practically left to itself, as there is probably no crop, except the castor-oil plant, which requires less care to bring it to perfection than sisal. At the same time, a little care is needed at the outset until the plants are robust. No weeds should be allowed to grow, nor any to overtop the sisal plants, as they require all possible light, air, and sun. Tall weeds may be mown down.

5. In about twelve months suckers will begin to appear, and in twenty-four months these will be produced at the rate of 100 per plant. These must all be removed for two reasons. One is that they deprive the mother plant of the nutriment it requires to produce large leaves and plentiful fibre. The other is that the suckers are valuable either for extending the area under sisal or for sale to intending planters. To plant up 100 acres 60,000 to 100,000 suckers are needed.

6. The life of the sisal plant is intimately connected with the production of the flower-stalk, technically called the "pole." The life of the agave (sisal plant) is a comparatively long one, but the long life may be

materially shortened by injudicious management. The sign of the termination of its existence is the sending up of the pole. This happens when the plant arrives at the cutting stage and the leaves are left uncut. It may also be the result of over-cutting. Much judgment is required, therefore, to ensure that no pole shall appear for ten, twelve, or fifteen years. When the pole has appeared, it should be notched and bent over as soon as it appears, in order that all the leaves on the plant should be ripened before it dies. In this way the plant is kept available for yielding fibre a year later than it otherwise would be. Immature leaves should not be cut. As a general rule, the ripening leaves gradually fall from the erect to the horizontal position on the plant. Then are the leaves to be cut. It should not be lost sight of that when a mature plant sends up its pole all its suckers at once follow suit and send up slender poles. Hence suckers from a poled plant should never be used in forming a plantation, as it will probably not be six months before the pole appears.

7. According to conditions of climate, soil, and the kind of plant, the first leaves will mature in from three to four years. For harvesting the leaves, account must be taken of their length and state of ripeness. The length of the fibre is one important factor in its fitness for the market. The least length admissable is 2 ft. 6 in., and every additional length increases its value. It is not advisable, however, to cut leaves until they have attained a length of 3 ft. These leaves will average about 3 lb. in weight, but they frequently attain a weight in the Brisbane district of from 5 to 7 lb. If left long after the leaf has reached the horizontal position—*i.e.*, at right angles to the trunk—the leaf droops to the ground, acquires yellow spots, and, when machined, much of the fibre is broken off short at these spots, and is only saleable as tow. The unripe leaves produce a brilliantly white fibre, but these, as stated, must not be cut. The number of ripe leaves per plant when from three to four years old will vary from ten to twenty, according to conditions of planting, rising in subsequent years to forty or fifty. This does not mean that forty r fifty leaves are at once cut from each plant, but it refers to the aggregate of the year's operations. The leaves are cut with a curved knife. Proper cutting consists in cutting the leaves as close as possible to the trunk. Loose cutting results in a considerable loss of the strongest part of the fibre. If 3 in. of each of forty leaves are left on the plant, there is a loss of 10 ft. on each plant or 10,000 ft. on an acre. This is a matter well worthy of attention by sisal planters. One man should cut and tie up an average of 1,200 leaves a day.

8. As to yield of fibre, on average poor soils, plants 7 ft. by 8 ft. (799 to the acre), 7 lb. of fibre per plant, or 5,630 lb. per acre, is obtainable; but it is well to reckon on only 15 cwt. or 1 ton of marketable fibre per acre. At this time (October, 1916), 1 ton of sisal fibre is worth, in England, from £55 to £60 per ton. Once the plants have arrived at the cutting stage, no other labour is required in the field except the cutters and carters.

9. Machining is performed as soon as possible after the leaves are cut, as, if two or three days elapse, the fibre will be spotted and consequently of reduced value. The fibre is extracted by various machines

cheap and expensive, but all work by means of drums and beaters, which, as the leaves are passed in, beat off in one action the whole of the fleshy part of the leaves, leaving the fibre, except for drying, practically ready for market. The cheapest machines cost about £40, and require a two-horse power oil engine. They are made by J. Wilson, engineer, Elizabeth street, Brisbane. Other machines are made in Manchester, costing before the war about £75. The American automatic machines, in which the leaves are laid on a carrier side by side, and pass continuously into the machine, coming out as pure fibre as fast as the leaves can be fed, cost from £400 up to £1,000, and will clean from 70,000 to 150,000 leaves daily. These require from 20 to 45-horse power engines. The capacity of the Wilson machine is about 160 lb. of fibre per day. One of these is working near Gladstone, and a Manchester machine (£250) is to be seen at work at Bajool, near Rockhampton. The smallest machine has long been at work at St. Helena Penal Establishment. This one requires a 4 or 6 horse power oil engine.

Finally, there is no particular time for harvesting sisal leaves. The work may go on all the year round. One thing should be attended to—When the plants have been cut once, a sucker should be allowed to grow up near the parent plant, so that when the latter dies the new plant will have arrived at the cutting stage, thus avoiding the replanting of the field.

BEES AND COCOANUTS.

A. H. RITCHIE.

A very interesting point is brought out by Mr. Frank P. Jepson, the Government Entomologist of Fiji, in a recent circular giving an account of a tour of the cocoanut sections of that colony. As is well known, the cocoanut bears two kinds of flowers: male flowers, which give the dusty pollen, and female flowers, which look like tiny nuts at first, not complete flowers, having both male and female organs present, as is the commoner state of affairs. On further examination, too, we will notice that the male flowers and female flowers on the same stalk or, as botanists would call it, "spadix," never mature at the same time. The males open soon after the spathe or covering bursts, and the females not till later. Generally, too, we find only one set of flowers open, or ready to fertilise or be fertilised, on a cocoanut at one time. This is one of nature's devices which are calculated to guard against in-breeding or self-fertilisation. It insures that fertilisation from another cocoanut palm must take place. Darwin's experiments along this line are well known. The pollen must then be conveyed from the male flowers of one tree to the female flowers of another by one or two agencies—wind or insects. We notice that on certain trees—indeed, on most trees—that a high percentage of the small nuts fall to the ground, using the term "nuts" as the growers use it, meaning the undeveloped female flowers at this stage.

While there may be other causes, Jepson puts forth the idea—and rightly, I think—that this is due to their escaping pollination. We all know that, with melon and pumpkin, fruit will not set unless pollen is transferred from the male to the female flower by insects or hand; the usual plan by market gardeners being to nip off and place a male flower shedding pollen against the female flower. When this is done correctly, almost every female sets and a fruit is produced.

Jepson noticed on those cocoanut estates where bees are kept that the bees swarmed around the open inflorescences in great numbers, and, further, that the yield on these plantations was phenomenally high. Palms of five and six years bore heavy crops, and bunches were well filled. He concludes that the general introduction of bees on to cocoanut plantations is well worth a trial in Fiji. It would be interesting to have the observations of the growers in Jamaica on this subject.—"Journal Jamaica Agricultural Society."

FOR RUBBER PLANTERS.

METROLAC.

For the information of rubber planters, the Rubber Growers' Association (London) has published the following concerning an instrument for recording the amount of dry rubber in latex, in pounds and ounces:—

The following are some of the uses to which the "Metrolac" may be put. The value of the instrument, however, will depend to some extent on local conditions:—

To Check the Addition of Water to Latex.

1. Results have shown, and it is believed it is now generally admitted, that it is advantageous from all points of view to use little or no water in the collection of latex. The "Metrolac," by giving the amount of dry rubber in the latex, also indicates whether or not water has been added. The amount of dry rubber in latex to which water has not been added will vary with local conditions, methods of tapping, &c., but is usually from 3 to 5 lb. per gallon. The latex of any coolie suspected of having added water can be tested with the "Metrolac" and compared with the latex of other coolies.

2. Where the addition of some water to the latex is allowed, the "Metrolac" will enable a check to be kept on the amount of water added. The addition of small quantities of water has relatively little effect on quality, but where water is allowed some check is necessary to prevent the use of excessive quantities.

Bulking.

3. Where latex is bulked (and this procedure is strongly recommended), tests with the "Metrolac" enable the latex afterwards to be watered down to a standard rubber content, so that, for instance, in sheet-making all sheets are of uniform size and thickness, are smoked equally, and are generally uniform.

4. Closely connected with bulking is the correct apportionment of acid for coagulation, sodium bisulphite, &c. The proportions of these reagents necessarily depend on the dry rubber content of the latex. The "Metrolac" enables this to be rapidly ascertained; and so leads to economy and uniformity in the use of coagents, sodium bisulphite, &c.

PAYMENT BY RESULTS.

5. This mostly applies to Ceylon. The amount of rubber brought in by any coolie can be determined by testing with the "Metrolac," and then weighing or measuring the volume of the latex. This has the advantage that, if desired, the latex can be bulked before coagulation, and, secondly, tapping coolies do not need to enter the factory and follow their rubber round in course of washing and creping. It also enables payment by results in the case of rubber for sheet manufacture.

The instrument is graduated in pounds and ounces per gallon; this serves well for testing latex in bulk. For paying coolies by results, it is necessary to measure the latex in units smaller than the gallon; and the unit suggested is the half-pint. The calculation is quite simple, for, as there are 16 oz. to the pound and 16 half-pints to the gallon, the figures on the instrument will correspond to ounces to the half-pint as well as to pounds to the gallon.

It is not always necessary to test each coolie's latex; for, provided that no water has been added, the quality of the latex brought in from the same part of the estate by different coolies will not, as a rule, vary appreciably. Hence it will be sufficient to test the latex of one or two coolies with the "Metrolac."

As a coolie will never know whether his latex will be chosen for testing, he will not run the risk of adding water, or, should be do so, will sooner or later be detected.

6. By means of the "Metrolac" it is also possible to forecast the daily output of dry rubber on the estate.

7. In the case of trees which are tapped too severely or where the resources of the trees are overstrained, the amount of rubber in the latex tends to fall. A check may easily be kept on the quality of the latex by means of the "Metrolac," and, if necessary, a field may be rested or the system of tapping modified at an earlier stage than would otherwise have been.

The "Metrolac is made of brass gilt, and measures about 10 in. long. It is supplied complete with measuring glass for testing, and packed in a box with full instructions for working.

The price of the instrument in Great Britain is 50s., and a discount of 25 per cent. is allowed to members of the Rubber Growers' Association; packing and freight extra.

The sole manufacturers are Messrs. Dring and Fage, 56 Stamford street, London. Orders should be placed with the firm direct.

Note.—The trade mark "Metrolac" is registered in Ceylon, Federated Malay States, Johore, Straits Settlements, India, Dutch East Indies, and British North Borneo.

Science.

EUCALYPTUS TREES AND MALARIA.

S. L. Bostin writes in the "Scientific American":—

"During the later decades of the nineteenth century it was a common practice to plant blue-gum or eucalyptus trees in the districts infected by malaria fever. It was held that the essential oil produced by the leaves combated the harmful vapours rising from the swamps, laden with the poison of the disease. The discovery that the malarial germ is introduced into the blood by a mosquito has settled once and for all the origin of the disease.

"Yet it is only within the last few months that a somewhat mysterious point has been fully settled. The theory that the eucalyptus trees neutralised the poison vapours is nonsense; yet the fact remains that where blue-gums were freely planted there was always a notable decline in the amount of malaria. For instance, in a certain district near Algiers the placing out of thousands of eucalyptus trees completely transformed the conditions. Malarial fever of a peculiarly virulent type had formerly been a constant feature, but within twelve months of the planting of the blue-gums the disease entirely disappeared, and is now unknown.

"What is the explanation of this circumstance? It has been demonstrated that, of nearly all trees, the eucalyptus absorbs the greatest amount of water. Seeing that blue-gums increase in height with great rapidity, often growing many inches a day in a hot position, the amount of moisture taken up increases on a greatly progressive scale. And this is just what brings about the downfall of the malarial mosquito. To complete its life cycle it is necessary that this insect should pass its larval stage in pools of water. With the coming of the eucalypti these pools and indeed all marshy places disappear; the breeding spots of the mosquitos are gone, and in time the insects vanish altogether. The district is then free from malarial trouble simply because the carriers of the disease are not able to keep going."

Chemistry.

"THE FERTILISERS ACT OF 1914" AND "THE FERTILISERS ACT AMENDMENT ACT OF 1916."

BY J. C. BRÜNNICH, Agricultural Chemist.

Slowly but surely the value of artificial fertilisers is becoming recognised by our farmers and fruitgrowers. Unfortunately many factors, like high cost of fertilisers, heavy freight charges, uncertainty of seasons, &c., restrict a more extensive use. Instead of applying fertilisers, including lime, and practising an intense cultivation to obtain the best results, heavy yields and crops of superior quality, the majority of both farmers and orchardists are trying to increase the production by the cultivation of larger areas.

We have numerous instances of the **excellent results** obtained by fertilising and liming of soils, and it is interesting to record that, in spite of highly fertile lands available and in use for pineapple culture in Queensland, record crops were grown on comparatively poor sandy soil by judicious application of **lime** and **artificial fertilisers.** On the same farm timely application of certain nitrogenous fertilisers, recommended by us, to crops, which due to adverse climatic conditions were very backward and promising failure, produced immediate recovery and excellent yield.

The demand for **cheap artificial fertilisers** is becoming acute, and, therefore, it is not surprising to find that for the past few years **crude fertilisers** were sold, without a guaranteed analysis, as such fertilisers did not come under the provisions of "*The Fertilisers Act of* 1914," and were of such a variable composition that in many cases such fertilisers were not worth the freight paid for them.

In many places deposits of such crude fertilisers, like **sheep manure, bat guano, ashes,** &c., exist and could be utilised, but, on account of exposure to all weathers, composition must vary, and only a sale based on the actual amounts of fertilising substances contained therein will be of justice to the farmer. Of equal importance to the agriculturist is **lime,** in its various forms, which acts both directly and indirectly as a fertiliser and also improves the physical condition of the soil. Not only the **purity** of the lime, but also the state of **fineness** in which it is applied, must be taken into account.

In order to include abovementioned cases, "*The Fertilisers Act of* 1914" had to be amended, and, in accordance with "*The Fertilisers Act Amendment Act of* 1916," the **definition** of **"Fertiliser"** now reads as follows :—

"Any substance or compound containing in appreciable quantity nitrogen, phosphoric acid, potash, or lime, manufactured, produced, or prepared in any manner for fertilising the soil or supplying nutriment to plants ; also any excrement of animals or any natural substance or

natural product which is used for fertilising the soil or supplying nutriment to plants: Provided that the term does not include farmyard manure, stable manure, seaweed, crude nightsoil."

It will be seen that now only such products as **stable** and **farmyard manure, crude nightsoil,** and **seaweed** may be sold as manures without guarantee of composition; any other crude product, or offal, if specially treated or not, will be classed as a fertiliser if sold for the purpose of fertilising the soil.

No person shall sell fertiliser unless he is **licensed** as a **dealer** under the Act.

Any person who desires to become licensed as a dealer shall apply in writing to the Minister for Agriculture and Stock, in the form of Schedule I. of the Act, and transmit the prescribed fee of one guinea. Such license has to be renewed annually.

As under the present amended Act lime and crude fertilisers are included, any person desiring to sell **lime, limestone screenings, coral sand, sheep manure, bat guano, ashes,** &c., to farmers for fertilising purposes must apply for a license.

On or before the 31st January in each year, every dealer shall deliver to the Under Secretary of the Department of Agriculture and Stock a **certificate,** in the form of Schedule III. of the Act, of the specified ingredients of each brand of fertiliser sold by him. Such statement may be amended at any time during the year.

Such **certificate** of **registration** shall set forth the full name and place of business of the dealer, the name of the fertiliser, and the figure, or trade mark, or sign under which such fertiliser is sold, and a chemical analysis certifying that such fertiliser contains certain amounts of specified ingredients, and, in the case of bonedust or bonemeal, basic slag or Thomas phosphate, air-slaked lime, agricultural lime, and gypsum, the percentage of fine and coarse material.

Upon the **sale** of any fertiliser, the dealer shall, at the time of sale or before delivery of the same, give to the buyer an **invoice certificate** signed by the seller or his agent, stating the full name and place of business of the dealer; the name, trade mark, brand, or sign used to mark packages containing such fertiliser and used to identify such fertiliser; the quantity or net weight of fertiliser comprised in the sale; the composition of the fertiliser, setting forth the proportion per centum in which such fertiliser contains the following ingredients:—Nitrogen, phosphoric acid, potash, and lime, and the respective forms in which they respectively occur; and, in the case of bonedust, basic slag, agricultural lime, &c., the percentage of coarse and fine material.

Furthermore, every dealer who sells fertiliser, which term includes offering or exposing for sale and having in possession for sale, shall securely **affix** to each package a printed **label,** clearly and truly certifying :—The number of net pounds of fertiliser in the package; the figure, trade mark, or sign under which the fertiliser is sold; the chemical composition of the fertiliser, in the same manner as stated on invoice certificate; and the state of fineness for certain fertilisers.

A certain amount of **latitude** in the composition is allowed under the Act, in order to allow for slight variations in manufacture; and the **deficiency,** between the amount of fertilising ingredient found and the amount guaranteed on the invoice and label, must, in the case of nitrogen and potash, be not more than 5 per cent. or 1/20 of the total amount of nitrogen or potash certified to be present, and in the case of phosphoric acid and lime not more than 7 per cent. of the total amount.

On all schedules and labels the amounts of fertilising ingredients have to be stated in a uniform manner, as the old expressions—like bone phosphate, tricalcic phosphate, ammonia, ammonium sulphate, potassium sulphate, &c.—are liable to mislead the farmer. The Act provides for the statement of the valuable fertilising ingredients in percentage amounts of **Nitrogen** (N), **Potash** (K_2O), **Phosphoric Acid** (P_2O_5), **Lime** (CaO).

Lime may be used in several forms, and the amended Act provides for four classes—

(a) **Caustic lime**, or burnt lime, or quick lime, containing the lime in form of calcium oxide (CaO);

(b) **Mild lime** or air-slaked lime, containing the lime chiefly in form of hydrate of lime ($Ca(OH)_2$), obtained by slaking of burnt lime with water;

(c) **Agricultural lime,** containing lime in the form of carbonate of lime ($CaCO_3$), and obtained by crushing or pulverising of lime stone, marble, coral, and shells;

(d) **Gypsum**, containing lime in the form of sulphate of lime ($CaSO_4$).

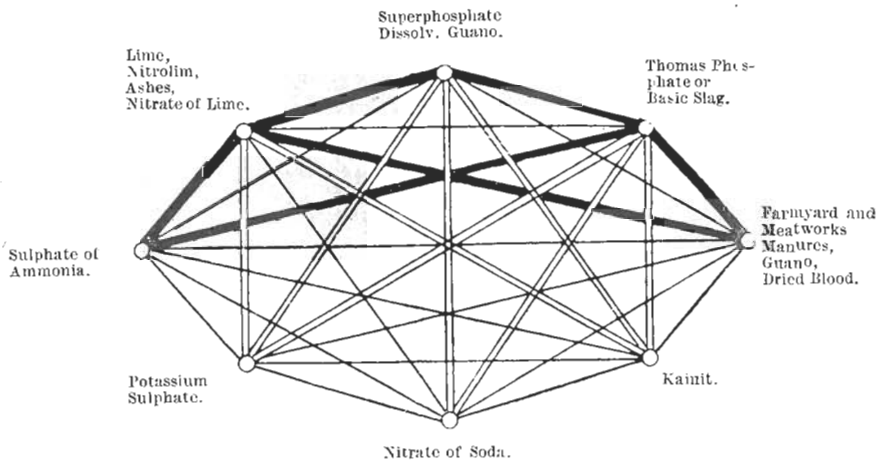
The action of lime in form of powdered quick lime or air-slaked lime is very rapid and powerful, and application is only recommended to very stiff clayey and very acid soils. The safest form is generally agricultural lime, but on account of its insolubility the limestone, in order to become gradually available, must be ground very finely, so that the largest percentage goes through a sieve with forty meshes to the linear inch or 1,600 meshes to the square inch.

The **conversion** of the amount of **fertilising compound** into another is very simple, and, as many old manuring formulae still give the old

denominations, I will herewith give a table which can be used for such calculation :—

Amount of—		Multiplied by—	Gives the Corresponding Amount of—
Ammonia	NH_3	0·824	Nitrogen, N
Ammonium sulphate	$(NH_4)_2SO_4$	0·212	Nitrogen, N
Sodium nitrate (Chili saltpetre)	$NaNO_3$	0·165	Nitrogen, N
Potassium nitrate (saltpetre)	KNO_3	0·139	Nitrogen, N
Nitrogen	N	1·214	Ammonia, NH_3
Nitrogen	N	4·714	Ammonia sulphate
Potassium sulphate	K_2SO_4	0·541	Potash, K_2O
Potassium chloride	KCl	0·631	Potash, K_2O
Potassium nitrate	KNO_3	0·466	Potash, K_2O
Potash	K_2O	1·850	Potassium sulphate
Tricalcic phosphate	$Ca_3P_2O_8$	0·458	Citrate insoluble Phosphoric acid, P_2O_5
Monocalcic phosphate	$CaH_4P_2O_8$	0·607	Water soluble Phosphoric acid, P_2O_5
Tetracalcic phosphate	$Ca_4P_2O_9$	0·391	Citrate soluble Phosphoric acid, P_2O_5
Limestone, marble	$CaCO_3$	0·560	Lime, CaO
Gypsum	$CaSO_4$	0·411	Lime, CaO

When **mixing fertilisers,** such mixtures must be avoided which would lead to decomposition, which, for instance, would take place if ammonium sulphate was mixed with lime (quick lime and air-slaked lime) or with Thomas phosphate, or if lime was mixed with superphosphate ; or, again, mixtures which would lead to caking. A very simple guide for the mixing of manures is given in the accompanying diagram, devised by Dr. Geekens, which I slightly modified, however, to apply to our local conditions :—



Manures joined by a *heavy black line* should *never be mixed* together ; those connected by a *double line* must only be *mixed immediately before use* ; and those joined by a *thin single line* may be safely *mixed* together *at any time*.

It must be clearly understood that the lime mentioned in the diagram refers to quick lime and air-slaked lime only. **Agricultural lime** may be **safely mixed** with any of the artificial fertilisers.

It is quite impossible to fix at the present day a **monetary manurial value** per ton, as potash manures are practically unprocurable. It is,

however, of interest to note that fertilisers in Victoria may be purchased at a very much lower rate than in Queensland; and from the Victorian official list published in January, 1916, I note the following quotations :—

Bonemeal and bonedust, from £6 to £7 per ton.
Superphosphate (18 % P_2O_5), from £4 7s. 6d. to £4 10s. per ton.
Concentrated superphosphate (44 % P_2O_5), £12 10s. per ton.
Nitrate of soda, £14 10s. per ton.
Sulphate of ammonia, £18 per ton.
Sulphate of potash, £25 per ton.

Our own local prices are very much higher, and this is largely due to the limited demand and want of competition. If only farmers and fruitgrowers would combine and order their fertilisers direct from the manufacturers, they would effect a considerable saving.

On account of the great **shortage** of **Potassic manures,** it is of importance to save any material rich in potash, and attention must be drawn to the analysis of **ashes of plants** and **woods** given at the end of this article. Such ashes could, in most cases, be directly utilised as fertiliser, although the low percentage would not allow the manufacture of a pure potash salt therefrom. The amount of ashes actually obtained on burning of timber is generally very small.

Several samples of such ashes have been received from time to time, and the Department will be always pleased to have such ashes analysed in order to get at the manurial value. In order to make such information of general value, the name of the plant or tree or specimen for botanical identification should be sent with the sample of ash.

Under the Fertilisers Act samples of the various fertilisers on the market were obtained and analysed. The results are given in the following table, and in the few cases where **deficiencies** in the fertilising ingredients were found the **values** are **printed in heavy type.**

The Acts are framed for the **protection** of the farmer, to ensure him to receive a fair value for his money, and this is only possible when he knows that the fertiliser he buys contains the guaranteed amounts of fertilising ingredients.

Any farmer in doubt about the quality of fertiliser purchased should at once apply to the nearest inspector under the Act, in order to let him draw a sample and submit same for analysis. All inspectors appointed under "*The Diseases in Stock Acts*, 1896 to 1898," "*The Diseases in Plants Act of* 1896," "*The Dairy Produce Acts*, 1904-1911," and the expert and inspector under the Pure Seeds Acts of 1913 and 1914, are officers under the Fertilisers Act.

ANALYSES OF FERTILISERS.

Lab. No.	Fertiliser.	Where Obtained.	Moisture.	PHOSPHORIC ACID, P_2O_5.						Potash. K_2O.		Nitrogen, N.		Remarks.
				Water Soluble.		Citrate Soluble.		Total.						
				Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	
			%	%	%	%	%	%	%	%	%	%	%	
Simple Fertilisers. Potash Manures.														
451	Sulphate of Potash	Webster and Co., Ltd., Brisbane ..	·40	..	..	..	..	..	..	53·52	50·0	..	..	
434	Ditto	Australian Co-op. Fertilisers, Ltd., Brisbane	·36	..	..	..	..	..	..	53·64	52·0	..	..	
536	Ditto	J. Croker, Mackay	·21	..	..	..	..	..	..	53·86	52·0	..	..	
Simple Fertilisers. Nitrogenous Manures.														
452	Sulphate of Ammonia	Webster and Co., Ltd., Brisbane ..	1·37	..	..	..	..	..	..	..	..	20·55	20·0	
540	Ditto	J. Croker, Mackay	1·78	..	..	..	..	..	..	..	..	20·52	20·0	
658	Ditto	Fearnley and Co., Ltd., Cairns ..	1·45	..	..	..	..	..	..	..	..	20·55	..	
433	Nitrolim	Aus. Co-op. Fertilisers, Ltd. Brisbane	,,	..	..	..	..	..	..	..	..	18·00	18·0	
440	Nitrate of Soda	ditto	3·45	..	..	..	..	..	..	..	..	15·24	15·8	
453	Ditto	Webster and Co., Ltd., Brisbane ..	1·08	..	..	..	..	..	..	..	..	16·00	15·0	
538	Ditto	J. Croker, Mackay	1·15	..	..	..	..	..	..	..	..	15·97	15·5	
Bone, Blood, Meatworks, Manures, &c.														Coarse. % / Fine. %
464	Bonedust, "Normanby"	E. A. Jordan, Aspley	6·96	,,	,,	,,	..	24·92	24·20	,,	,,	3·22	3·80	22·4
456	Ditto "Runcorn"	T. H. Wood, Brisbane	6·27	,,	,,	,,	..	24·06	24·20	,,	,,	3·60	4·00	43·9
501	Ditto	S. Francis, Ipswich	8·09	,,	,,	,,	..	22·74	25·80	,,	,,	2·91	2·72	40·6 / 50·4
443	Ditto "Runcorn"	Dalgety and Co., Ltd., Brisbane ..	8·09	,,	,,	,,	..	23·30	21·85	,,	,,	3·32	4·00	65·3 / 34·7
6	Ditto	H. Baxter and Co., Maryborough ..	8·51	,,	,,	,,	..	23·97	20·50	,,	,,	3·34	4·63	74·8 / 25·2
478	Boncmeal, "Wattle"	W. E. Hammond, Toowoomba ..	6·56	,,	,,	,,	..	27·12	19·00	,,	,,	2·73	2·80	47·4 / 52·6
644	Dried Blood, Q.M.E.	J. Tytherleigh, Woombye ..	9·41	,,	,,	,,	..	,,	..	,,	,,	12·08	12·00	,, / ..
435	Ditto	Aus. Co-op. Fertilisers, Ltd., Brisbane	8·49	,,	,,	,,	..	,,	..	,,	,,	12·15	12·52	,, / ..

462	Dried Blood, Q.M.E...	W. Hacker, Chermside	10·34	..	..	..	..	..	..	..	..	12·45	12·50
454	Ditto	Webster and Co., Ltd., Brisbane ..	9·00	..	..	..	..	..	..	..	..	11·77	12·0
436	Dried Blood, Birt and Co.	Aus. Co-op. Fertilisers, Ltd., Brisbane	10·12	..	..	..	..	..	..	..	..	12·61	12·83
628	Fertiliser, Baynes Bros.	E. Gleeson, Stanthorpe	8·45	..	..	..	..	19·31	19·75	..	..	4·32	4·27
477	Ditto	G. Searle and Sons, Toowoomba ..	13·94	..	..	..	..	**16·24**	19·75	..	..	5·64	4·27
449	Fertiliser, Redbank	C. Taylor and Co., Brisbane ..	9·47	..	..	..	..	13·78	8·19	..	..	7·28	7·35
461	Ditto	W. Hacker, Chermside	7·16	..	..	..	..	14·59	8·19	..	..	6·66	7·35
463	Ditto	G. Early, Chermside	8·34	..	..	..	..	13·11	8·19	..	..	7·66	7·35
466	Ditto	Farmer	8·18	..	..	..	..	13·10	..	..	..	7·63	..
437	Fertiliser, Redbank (mixed) ..	Aus. Co-op. Fertilisers, Ltd., Brisbane	14·55	..	..	..	..	14·59	8·15	..	..	6·23	7·53
448	Fertiliser, Q.M.E.	C. Taylor and Co., Brisbane ..	5·23	..	..	..	..	**13·46**	16·76	..	..	7·41	6·13
465	Fertiliser, Oxley	Farmer	1·86	..	..	..	..	13·81	..	..	..	6·12	..
535	Fertiliser, Fitzroy	Warry's, Ltd., Maryborough ..	6·48	..	..	..	..	16·45	16·94	..	..	5·52	5·15
643	Fertiliser, Hutton's Special	J. Tytherleigh, Woombye ..	7·10	..	..	..	..	15·50	14·10	..	..	5·06	6·17
659	Fertiliser, Burdekin	Headricks, Ltd., Cairns	4·57	..	..	..	..	19·75	..	..	..	4·11	..

Superphosphates, Basic Superphosphates.

439	Superphosphate, Paton, Burns, Ltd.	Aus. Co-op. Fertilisers, Ltd., Brisbane	5·22	17·07	16·5	..	..	18·32	..	..	..	..	..
450	Superphosphate, Crown	Webster and Co., Ltd., Brisbane ..	**4·93**	18·94	16·0	..	..	19·87	..	..	..	..	..
447	Superphosphate, Shirley's No. 1 ..	Paul and Gray, Ltd., Brisbane ..	**3·37**	16·90	17·0	..	..	18·76	..	..	..	..	..
460	Ditto	W. Hacker, Chermside	2·26	16·92	17·0	..	..	17·90	..	..	..	..	..
537	Ditto	J. Croker, Mackay	1·94	16·64	16·5	..	..	17·80	..	..	..	..	..
627	Ditto	E. Gleeson, Stanthorpe	9·23	16·55	16·5	..	..	20·45	..	..	..	..	..
4	Ditto	Corser and Co., Maryborough ..	4·68	17·43	..	..	..	18·04	..	..	..	..	..
476	Ditto	Walsh and Co., Toowoomba ..	7·13	20·07	..	..	..	21·87	..	..	..	..	..
442	Superphosphate, Hasell's	Dalgety and Co. Brisbane ..	5·05	21·08	16·5	..	..	21·58	17·50	..	..	..	..
441	Basic Superphosphate, Paton, Burns Ltd.	Aus. Co-op. Fertilisers Ltd., Brisbane	9·44	10·48	..	19·70	18·0	19·70	19·00	..	..	..	..

Mixed Fertilisers.

	Shirley's—												
458	No. 8	W. Hacker, Chermside	2·29	**10·10**	13·0	..	..	11·08	..	..	..	3·74	4·0
629	No. 8	R. B. Lawson, Stanthorpe ..	4·31	**11·95**	13·0	..	..	12·32	..	..	..	3·90	4·0
5	No. 8	Corser and Co., Maryborough ..	3·90	**11·31**	13·0	..	..	11·52	..	..	..	**3·62**	4·0
444	No. 8	Paul and Gray, Ltd., Brisbane ..	2·57	**11·34**	13·0	..	..	12·16	..	..	..	3·91	4·0
445	No. 10	ditto	5·93	13·62	13·0	..	..	14·69	..	..	..	1·95	2·0
455	No. 10	T. H. Wood, Brisbane	5·91	13·91	13·0	..	..	14·80	..	..	..	2·10	2·0
457	No. 10	W. Hacker, Chermside	4·98	12·78	13·0	..	..	12·90	..	..	..	2·28	2·0
446	No. 20	Paul and Gray, Brisbane	5·47	**8·47**	10·0	10·59	..	12·18	..	**2·13**	**4·0**	3·90	4·0
655	No. 20	J. Tytherleigh, Woombye ..	6·18	**7·36**	10·0	..	..	9·97	..	**2·18**	**4·0**	**3·58**	4·0
459	No. 20	W. Hacker, Chermside	5·02	**7·53**	10·0	9·90	..	10·36	..	**2·14**	**4·0**	3·88	4·0
539	Easterby's Mixture	J. Croker, Mackay	1·32	6·95	7·0	..	..	7·06	..	8·65	7·0	8·87	7·0

NOTE.—All figures in heavy type are below the deficiency allowed under the Act.

Wood and Plant Ashes.

——	——	Phosphoric Acid, P_2O_5.	Potash, K_2O.	Lime, CaO.	Per Cent. of Crude Ash in Wood or Plant.
		% In	% Crude	% Ash.	
Apple Tree		·34	4·45	29·85	..
Banana Plant		1·48	36·64	21·32	..
Belar		·02	4·95	49·10	..
Blackbutt		·04	2·02	7·27	..
Bloodwood		·27	5·25	8·47	..
Bottle Tree		·24	29·02	23·48	..
Boxwood		·87	1·85	(?)	..
Brigalow		..	·89	54·40	..
Cedar		·71	·71	48·50	1·00
Cotton Pods		2·18	29·93	8·28	5·3
Crow's Foot Elm	Atherton	6·24	5·75	46·91	..
Gidyea		·90	1·10	48·70	..
Hardwood (Sawmill)		·60	1·90	29·33	·31
Ironbark		·82	1·53	(?)	..
Lantana		3·57	13·96	16·95	..
Lantana (twigs and leaves)		3·50	11·78	11·52	..
Mangrove (leaves and twigs)	Russell Island	1·98	8·14	15·95	..
Ditto ditto	Sandgate	2·12	4·42	12·30	..
Mangrove, black	Cairns	·56	1·34	35·88	..
Mangrove, blue	Sandgate	2·52	2·14	16·72	..
Mangrove (*Ceriops Candollcana*)	Cairns	·76	3·28	36·80	..
Nettle Wood	Crow's Nest	4·14	6·46	28·65	3·36
Oregon Pine		·50	1·31	29·12	·77
Pine		·89	9·97	38 05	·82
Pineapple Plant		5·88	15·02	7·20	..
Prickly-pear	Dulacca	·48	9·48	19·92	1·2 to 2·6
Red Gum		·38	4·17	(?)	..
Sawmill Ashes (chiefly Pine)		1·11	8·72	34·14	..
Sisal Hemp		4·60	8·00	31·86	..
Spotted Gum		·10	·70	(?)	..
Stinking Roger		15·81	20·00	27·18	2·62
Sugar-cane Tops		4·90	6·49	4·78	..
Sugar-cane Trash		3·20	4·90	4·60	..
Tobacco		5·36	27·05	40·70	..

ANALYSES OF WOOL SCOUR LIQUID AND OVERFLOW LIQUID.

Samples of woolscour liquid and overflow liquid received by the Department of Agriculture and Stock from the Charleville Woolscour were sent to the Agricultural Chemist, Mr. J. C. Brünnich, for analysis, with a view to ascertaining the commercial potentialities of the content of lanoline and potash. Following is the result as far as the examination of the fluid has gone. The matter is now in the hands of the Government Bacteriologist for further investigation:—

The samples received from Messrs. Armstrong and Carter had the following composition:—

	Woolscour Liquid.	Overflow Liquid.
	Calculated in Pounds per 100 Gallons.	
Total Solids	70·7	15·9
(Of which Condi Lanoline)	11·1	trace
Ash	21·6	6·7
Potash (K_2O)	11·5	2·8
Nitrogen (N)	1·8	·7
Lime (CaO.)	·4	—

The woolscour liquid has the well-known composition of woolwash residues, and contains a fair amount of lanoline and potash.

There can be no doubt that such residue has a good commercial value, and should not be allowed to go to waste, but is quite an economic question if such saving can be effected in practice.

19th December, 1916.

(Sgd.) J. C. BRÜNNICH.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS OF COWS FROM 27TH NOVEMBER TO 26TH DECEMBER, 1916.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Bluebelle ...	Jersey	22 June, 1916	715	5·0	42·18	
Twylish's Maid	,, ...	2 Nov. ,,	666	5·1	39·91	
Nina ...	Shorthorn... ...	23 June ,,	859	3·8	38·26	
Sweet Meadows	Jersey	18 Aug. ,,	582	5·5	37·85	
Jeannie ...	Ayrshire	27 Oct. ,,	796	3·9	36·42	
Lady Dorset	,, ...	14 Sept. ,,	808	3·8	35·99	
Thornton's Fairetta	Jersey	26 May ,,	586	5·1	35·29	
Comedienne	,, ...	24 Nov. ,,	596	5·0	35·17	
Miss Bell ...	,, ...	1 Aug. ,,	534	5·4	34·08	
La Hurette Hope	,, ...	6 Oct. ,,	563	5·0	33·22	
Lady Annette	Ayrshire	11 Nov. ,,	838	3·3	32·29	
Queen Kate	,, ...	15 June ,,	765	3·5	31·32	
Lady Melba	Holstein	17 Dec., 1915	656	4·0	30·80	
Rosine ...	Ayrshire	6 July, 1916	668	3·8	29·75	
Lilia ...	,, ...	4 Sept. ,,	770	3·3	29·67	
Princess Kate	,, ...	20 June ,,	631	3·8	28·11	
Skylark ...	,, ...	21 March ,,	579	4·1	27·89	
Cocoatina ...	Jersey	17 March ,,	451	5·2	27·69	
Hedges Dutchmaid	Holstein	22 Aug. ,,	667	3·5	27·30	
Auntie's Lass	Ayrshire	4 April ,,	624	3·7	27·05	
Iron Plate ...	Jersey	9 Dec. ,,	407	5·5	26·47	
Charity ...	,, ...	28 May ,,	421	5·1	25·35	
Lady Loch II.	Ayrshire	17 March ,,	532	3·8	23·70	
Mistress Bee	Jersey	21 Jan. ,,	336	5·9	23·46	
Netherton Belle	Ayrshire	11 March ,,	469	4·2	23·14	
Belinda ...	,, ...	27 Feb. ,,	411	4·2	20·28	

The above cows were fed on natural pasture only.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, NOVEMBER 28 TO DECEMBER 27, 1916.

Nine thousand seven hundred and eight eggs were laid during the month, an average of 133 per pen. Broodies have again been numerous, while individual birds have started to moult, Mr. Pocock and Meneely divide the monthly prize with 157 eggs each. The following are the individual rceords :—

Competitors.	Breed.	Dec.	Total.
*J. Zahl	White Leghorns	148	1,183
*T. Fanning	Do.	131	1,162
*Miss M. Hinze	Do.	146	1,158
*J. M. Manson	Do.	148	1,142
*A. T. Coomber	Do.	146	1,142
G. H. Turner	Do.	142	1,124
W. Meneely	Do.	157	1,117
J. R. Wilson	Do.	153	1,111
A. Howe, N.S.W.	Do.	134	1,109
Geo. Tomlinson	Do.	152	1,093
Dr. E. C. Jennings	Do.	140	1,080
*E. A. Smith	Do.	146	1,060
J. M. Manson	Black Orpingtons	142	1,059
*A. E. Walters	White Leghorns	141	1,056
*E. F. Dennis	Do.	141	1,055
*Mrs. J. Jobling, N.S.W.	Black Orpingtons	85	1,040
Mrs. Munro	White Leghorns	142	1,038
*Dixie Egg Plant	Do.	129	1,037
Mrs. W. D. Bradburne, N.S.W.	Do.	140	1,034
Geo. Prince	Do.	136	1,023
A. W. Bailey	Do.	144	1,022
T. Taylor	Do.	133	1,019
Kelvin Poultry Farm	Do.	145	1,014
W. Lyell	Do.	126	1,012
T. B. Hawkins	Do.	119	1,009
*J. H. Gill, Victoria	Do.	151	1,007
*J. F. Dalrymple, N.S.W.	Rhode Island Reds	127	1,004
H. W. Broad	White Leghorns	135	1,004
T. E. Jarman, N.S.W.	Do.	136	1,002
*W. H. Knowles, junr.	Do.	144	998
W. Purvis, S.A.	Do.	150	986
P. Brodie	Do.	142	985
E. Pocock	Do.	157	985
F. Clayton, N.S.W.	Do.	145	979
A. H. Padman, S.A.	Do.	154	978
*C. Knoblauch	Do.	133	978
*E. West	Do.	128	974
R. Burns	S. L. Wyandottes	129	974
Mars Poultry Farm	White Leghorns	139	969
H. Jobling, N.S.W.	Black Orpingtons	125	966
Cowan Bros., N.S.W.	White Leghorns	152	963
A. F. Camkin, N.S.W.	Do.	130	963
Mrs. C. Davis	Do.	133	962
J. Anderson, Victoria	Do.	144	956

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Dec.	Total.
E. F. Dennis	Black Orpingtons ...	136	954
*Kelvin Poultry Farm	White Leghorns ...	121	953
Cowan Bros., N.S.W.	Black Orpingtons ...	108	951
T. Fanning	Do.	147	950
King and Watson, N.S.W.	White Leghorns ...	130	946
*W. L. Forrest, N.S.W....	Do.	115	938
W. Becker...	Do.	136	926
W. Hirst, N.S.W.	Do.	136	921
C. P. Buchanan	Do.	117	918
S. B. Tutin	Do.	94	917
J. G. Ritchie	Do.	138	910
G. W. Holland	Do.	151	908
Mars Poultry Farm	Black Orpingtons ...	140	898
F. Clayton, N.S.W.	Rhode Island Reds ...	127	893
*J. H. Madrers, N.S.W.	Do.	114	883
*J. W. Macrae	Black Orpingtons ...	122	877
P. Burns	Do.	113	877
J. Goslay	White Leghorns ...	108	854
*J. Anderson, Victoria	Red Sussex	101	844
Moritz Bros., S.A.	White Leghorns ...	150	837
Harveston Poultry Farm	Do.	135	831
H. Hammill, N.S.W.	Do.	144	824
F. W. Leney	Do.	124	819
W. Lindus, N.S.W.	Do.	144	812
W. H. Forsyth, N.S.W.	Black Orpingtons ...	91	795
L. K. Pettit, N.S.W.	White Leghorns ...	119	793
A. T. Coomber	Sicilian Buttercups ...	120	754
F. W Leney	Rhode Island Reds ...	113	719
E. F. Dennis	White Wyandottes ...	94	655
Totals	...	9,708	70,689

* Indicates that the pen is engaged in single hen test.

RESULTS OF SINGLE HEN TEST.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
J. Zahl	186	202	213	191	197	194	1,183
T. Fanning	206	204	202	197	181	172	1,162
Miss Hinze	200	179	221	176	198	184	1,158
J. M. Manson	180	217	177	180	206	182	1,142
A. T. Coomber	198	204	200	167	173	200	1,142
E. A. Smith	205	188	171	197	149	150	1,060
A. E. Walters	184	206	170	156	191	149	1,056
E. F. Dennis	165	199	150	199	184	158	1,055
Mrs. Jobling	179	217	152	167	152	173	1,040
Dixie Egg Plant	223	205	213	200	...	196	1,037
J. H. Gill	142	172	162	198	171	162	1,007
J. F. Dalrymple	155	162	187	137	192	171	1,004
W. H. Knowles, junr.	160	161	170	145	187	175	998
C. Knoblauch	151	175	156	150	173	173	978
E. West	199	182	149	149	134	161	974
Kelvin Poultry Farm	150	158	159	138	200	148	953
W. L. Forrest	181	183	52	173	184	155	938
J. H. Madrers	115	172	177	162	132	125	883
J. W. Macrae	117	188	164	152	124	132	877
J. Anderson	160	132	174	81	173	124	844

General Notes.

NATURE IN FARMING.

By JOHN W. PATERSON, B.Sc., Ph.D., Professor of Agriculture in the University of Western Australia.

We have received from Mr. Thomas C. Lothian (the Lothian Book Publishing Company, Melbourne) a copy of the above work, which, in our opinion, ranks high amongst agricultural text-books, not only for students proposing to enter on a farming career but also for those who have been engaged in agriculture all their lives. The past generation of farmers in this fertile land of Australia raised their crops with scanty appliances and little or no experience in farming, and the rich soil bountifully responded to the most barbarous methods of cultivation. But they left their successors, as an inheritance, the duty of restoring the land to its original fertility. How this is to be done is amply described in the book under notice, and, what is most important, the student is given therein the reason why; and this is really the principle on which the very valuable instruction given in every page of the work is based. Many agricultural text-books are so scientifically constructed that much of the instruction they are intended to impart is lost in a fog of scientific language, rendering them of little value to the student. Such cannot be said of this book. As the author says: "In Australia a book is wanted on agricultural science which shall take cognisance of local conditions and deal in a fair sense of proportion with the various problems which confront us." This is precisely the book which fulfils the conditions, and we confidently recommend it to all agricultural students, not alone for the explanation of how things are to be done but for the underlying principle why they are done.

The price of the book is 4s. 6d.

THE FARMERS HANDBOOK.

Five years ago the agricultural literature of the Commonwealth was enriched by the compilation and publication, by the Department of Agriculture of New South Wales, of the first edition of the Farmers' Handbook, which met with such appreciation of its value to the man on the land and to agricultural colleges and other educational establishments as a text-book that the edition was soon exhausted, and it was proposed to issue a reprint of it. Recognising, however, the advances made in practical and scientific agriculture, and the changes and improvements in agricultural practice, the Department of Agriculture of New South Wales very naturally and wisely came to the conclusion that a second edition of the book, even with modernised additions, would not entirely

meet the farmers' needs at the present day. To bring the book up to date, therefore, the principal articles—dealing with crop production, practical agriculture, and stock breeding and feeding—have been re-written by officers of the department, whilst good use has been made of various articles which have appeared in the "Agricultural Gazette" of New South Wales.

The book is divided into sections, the first dealing with the climate, soils, timber, grasses, &c., of New South Wales. Section 2 is devoted to manures of various kinds, whilst the subjects of clearing and fencing, water conservation, farm buildings, and shade trees are well treated in section 3. Sections 4 and 5 go fully into the cultivation of cereals; and root, leguminous, vegetable, and miscellaneous crops, together with native and introduced grasses, are discussed in the next six sections. Section 12 (fourteen pages) gives full information concerning silos, silage, and silage crops. The remaining sections treat of seed and seed testing, weeds, carpentry, blacksmithing, harness repairs, and farm bookkeeping. A copious index enables any subject to be at once found in these pages. The value of the book to the farmer cannot be overstated, and the Department is to be congratulated on the ability of the writers and compilers thereof.

PISÉ BUILDINGS FOR FARMERS.

Having taken up a selection either for farming or grazing, the settler in the old days of the "colony" of Queensland, forty or fifty years ago, either rigged up a tent for his first home, or, if in a locality where there was plenty of splitting timber or tea-tree, he rose to the dignity of a humpy of low log walls roofed with tea-tree bark, or stripped some sheets of stringy bark and built a bark hut; later on, perhaps, he split slabs and shingles, and dwelt in a fairly comfortable house. In the primeval scrub or forest, this question of housing himself, and perhaps his family, was easily solved. But it was otherwise when the farm happened to be situated on the plains. Then it meant either continuous tent life, or, as the alternative, a galvanised iron or a sawn timber structure, both very expensive in the pre-railway days. Yet, all the time on the treeless plain, all the materials were at hand for the construction of a comfortable weather-proof house, warm in winter, cool in summer, which could be erected by the farmer himself, the only tools needed being a pick, shovel, and rammer, and half a dozen planks.

The material for the construction of the walls, chimney, and flooring was the soil itself. All that the settler need do is to dig out the soil and shovel it into rough wooden moulds, ramming it down solid in layers of 4 or 6 in. When the mould or box is full and well rammed, it is taken to pieces and erected on another portion of the building, and the work proceeds until the walls and partitions are completed. Any inexperienced man can thus construct a comfortable dwelling, as the actual pisé work presents so little difficulty that it can be done by anyone who has sufficient strength to shovel earth and wield a rammer, and is careful

to see that the moulds or boxes into which the soil is shovelled are kept plumb and in straight lines. The services of a carpenter, unless the settler has some knowledge of that trade, will be found necessary to make doors and window-frames and construct the roof, and see that these are set correctly and in their proper places.

The whole process is well described in the "Agricultural Gazette of New South Wales" by Mr. G. L. Sutton, Cowra Experimental Farm, 2nd May, 1907.

In some of the South American States there are numbers of such buildings constructed either of rammed soil or of adobé or sun-dried bricks (for which material like clay can be used), which is unsitable for pisé work. For the latter, almost any soil containing a fair amount of loam is suitable; but a pipeclay loam, with which gravel is intermixed, is best. Soil which cakes after a heavy rain, or which, if ploughed or dug when dry, turns up in hard clods, is very suitable. Any vegetation growing on the surface of the earth selected must be removed, as also should any roots, bits of stick, or vegetable matter likely to decay. The earth is best used as it is dug, and, if too dry, should be brought to the correct moist condition by watering it about two days before it is to be used. The earth should be just moist enough to be crumbly, and yet adhesive enough to retain the impression of the fingers when pressed in the hand.

We have culled the above preliminary notes on pisé building from Mr. Sutton's exhaustive description in the abovenamed "Gazette." It is stated that pisé buildings are much cooler than buildings constructed with solid brick walls. Some idea may be formed of the durability of pisé by the fact that there is at present, at North Logan, a stable built of pisé which has been in constant use for over sixty years, and which is to-day in good order, notwithstanding the fact that the external walls are unprotected from the weather. Pisé buildings are said to have a life of 150 years.

It is, however, advisable to protect the walls from moisture, especially from rain, which should be guarded against by surrounding the building with verandas or by overhanging eaves. Pisé buildings not so protected are, however, very common.

SOCIETIES.

The title of the Mooloolah and Glenview Farmers' Progress Association has been altered to "The Mooloolah and Glenview Branch of the Queensland Farmers' Union," Mr. C. Ballard, secretary, *vice* Mr. W. Ellison.

Gayndah.—Gayndah P.I.A. and H. Society. Show dates: 5th and 6th June, 1917.

Warwick.—Eastern Downs H. and A. Association's Jubilee Patriotic Show, 13th 14th, and 15th February.

The annual show of the Pine River Agricultural, Horticultural, and Industrial Association will be held on 8th and 9th June, at Lawnton.

Nerada (*viâ* Innisfail).—Nerada Farmers and Settlers' Progress Association. A. Andrickson, secretary.

Mr. J. A. Hunter has been appointed secretary of the Dalby Pastoral and Agricultural Association, *vice* Mr. W. R. Hunter.

GINSENG.

By an oversight the illustrations of the Ginseng plant and root were omitted from our November issue, in which the cultivation of this valuable root was described. We ask our readers to accept the belated photograph.

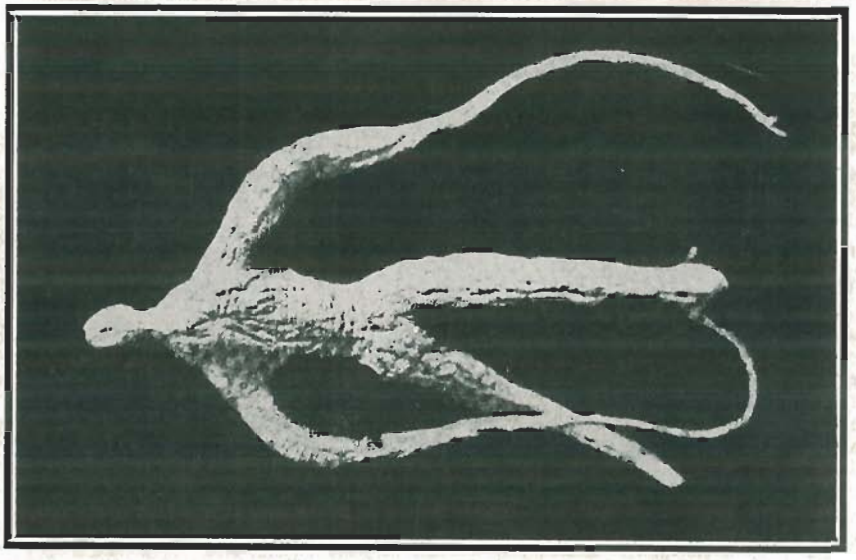


PLATE 3.—HUMAN FORM SPECIMEN OF THE GINSENG ROOT.

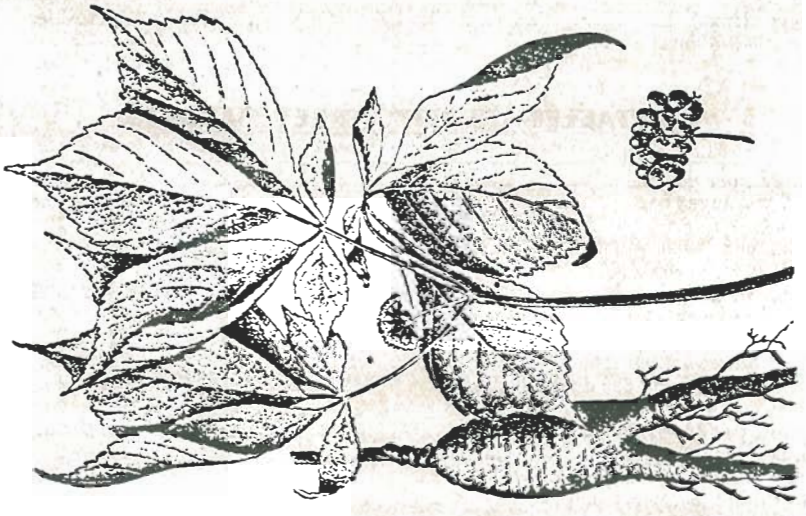


PLATE 2.—AMERICAN GINSENG.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR DECEMBER, 1916.

Article.		DECEMBER.
		Prices.
Bacon	lb.	9d. to 1s.
Barley	bush.	4s. 3d.
Bran	ton	£5 5s.
Broom Millet	„	£22 to £24
Butter	cwt.	149s. 4d.
Chaff, Mixed	ton	£1 5s.
Chaff, Oaten	„	£5 15s.
Chaff, Lucerne	„	£4 3s. to £4 5s.
Chaff, Wheaten	„	£3 5s.
Cheese	lb.	8d. to 8½d.
Flour	ton	£12 10s.
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten	ton	...
Hay, Lucerne	„	£2 10s. to £3
Honey	lb.	5d. to 5½d.
Maize	bush.	3s. to 3s. 3d.
Oats	„	2s. 6d. to 3s.
Onions	ton	£6 10s. to £7 10s.
Peanuts	lb.	3d. to 4d.
Pollard	ton	£5 5s.
Potatoes	„	£6 to £6 6s.
Potatoes (Sweet)	cwt.	3s. 6d.
Pumpkins (Cattle)	ton	£1 10s. to £1 15s.
Eggs	doz.	8d. to 10d.
Fowls	pair	5s. to 8s. 9d.
Ducks, English	„	4s. to 6s.
Ducks, Muscovy	„	6s. to 8s. 6d.
Geese	„	8s. 6d. to 9s. 6d.
Turkeys (Hens)	„	12s. to 14s.
Turkeys (Gobblers)	„	25s. to 28s. 6d.
Wheat	bush.	4s. 10d. to 5s. 2d.

VEGETABLES—TURBOT STREET MARKETS.

Asparagus, per bundle	8d.
Cabbages, per dozen	9d. to 1s. 6d.
Beans, per sugar bag	6d. to 1s. 6d.
Beetroot, per dozen bunches	9d. to 1s.
Carrots, per dozen bunches	4d. to 9d.
Cauliflowers, per dozen	...
Chocos, per quarter-case	1s. 6d. to 2s.
Celery, per bundle	1s. 3d. to 1s. 9d.
Cucumbers, per dozen	3d. to 6d.
Custard Marrows, per dozen	6d. to 1s.
Vegetable Marrows, per dozen	6d. to 1s.
Lettuce, per dozen	4d. to 9d.
Parsnips, per dozen bunches	6d. to 9d.
Peas, per sugar bag	1s. to 3s.
Sweet Potatoes, per sugar bag	1s. 3d. to 2s.
Table Pumpkins, per dozen	1s. 6d. to 2s.
Tomatoes, per quarter-case	6d. to 4s.
Turnips, per dozen bunches	1s. to 1s. 6d.
Rhubarb, per dozen bundles	6d. to 1s.

SOUTHERN FRUIT MARKETS.

Article.	DECEMBER. Prices.
Bananas (Queensland), per case	13s. to 16s.
Bananas (Fiji), per case	18s.
Bananas (G.M.), per case	19s. to 21s.
Custard Apples, per tray	...
Lemons (Local), per bushel-case	6s. to 10s.
Mandarins, per case	7s. to 10s.
Mangoes, per bushel-case	6s. to 10s.
Oranges (Navel), per case	12s. to 18s.
Oranges (other), per case	7s. to 10s.
Passion Fruit, per half-case	...
Pears, per case	5s. to 15s.
Papaw Apples, per double-case	5s. to 10s.
Persimmons, per half-case	...
Pineapples (Queens), per double-case	6s. 6d. to 7s. 6d.
Pineapples (Ripleys), per double-case	6s. to 7s. 6d.
Pineapples (Common), per double-case	6s. to 7s. 6d.
Tomatoes (Queensland), per half-bushel-case	10s.
Strawberries (Local), per dozen punnets*	10s. to 21s.

* 1 punnet = 1 quart.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	DECEMBER. Prices.
Apples, Eating, per case	10s. to 14s.
Apples, Cooking, per case	7s. 6d. to 8s. 6d.
Bananas (Cavendish), per dozen	3d. to 5½d.
Bananas (Sugar), per case	6s. to 8s.
Cape Gooseberries, per case	4s. 6d. to 9s.
Citrons, per cwt.	12s.
Cocoanuts, per sack	12s. to 15s.
Cumquats, per quarter-case	3s. 6d. to 4s. 9d.
Custard Apples, per quarter-case	5s. to 6s.
Granadillas, per quarter-case	...
Lemons (Lisbon), per quarter-case	8s. to 12s.
Limes, per quarter-case	...
Mandarins, per quarter-case	10s. to 13s.
Mangoes, per case	...
Oranges, (Navel), per case	9s. to 16s.
Oranges (other), per case	6s. 6d. to 7s. 6d.
Oranges (Seville), per cwt.	10s.
Papaw Apples, per case	2s. 6d.
Passion Fruit, per quarter-case	6s. to 10s.
Peaches, per quarter-case	...
Pears, per half-bushel-case	...
Peanuts, per pound	3d. to 4d.
Persimmons, per quarter-case	...
Plums, per case	...
Pineapples (Ripleys), per dozen	1s. to 3s.
Pineapples (Rough), per dozen	1s. to 2s. 6d.
Pineapples (Smooth), per dozen	1s. 6d. to 2s. 9d.
Quinces, per case	...
Rockmelons, per dozen	...
Rosellas, per sugar-bag	...
Strawberries, per dozen boxes	2s. 6d. to 5s.
Tomatoes, per quarter-case	1s. 6d. to 4s. 6d.

TOP PRICES, ENOGGERA YARDS, OCTOBER, 1916.

Animal.	OCTOBER. Prices.
Bullocks	£17 7s. 6d. to £21 12s. 6d.
Bullocks (Single)	...
Cows	£10 15s. to £14 10s.
Merino Wethers	33s. 3d.
Crossbred Wethers	35s.
Merino Ewes	25s. 6d.
Crossbred Ewes	29s. 3d.
Lambs	35s. 3d.
Pigs	73s.
Pigs (Slips)	...

TOP PRICES, ENOGGERA YARDS, NOVEMBER, 1916.

Animal.	NOVEMBER. Prices.
Bullocks	£17 15s. to £21 12s. 6d.
Cows	£11 17s. 6d. to £14 7s. 6d.
Merino Wethers	33s. 9d.
Crossbred Wethers	33s. 9d.
Merino Ewes	29s. 9d.
Crossbred Ewes	33s.
Lambs	32s. 9d.
Pigs	69s.

LONDON QUOTATIONS.

LONDON, November 4.—The market for frozen rabbits is steady, and prices are unchanged.

Jute: November-December shipment from Calcutta, £35 10s. per ton.

Hemp: October-December shipment, £51.

Rubber: Fine hard Para, 3s. 5d. per lb.; plantation, first latex crepe, 2s. 6⅝d.; smoked sheet, 2s. 6¼d.

Copra: South Sea, October-December shipment, £35 15s. per ton.

Raw linseed oil: Spot pipes, £46 per ton.

The Liverpool quotations for middling American cotton, November-December shipment, is 12·07½d. per lb.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF NOVEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING NOVEMBER, 1916 AND 1915, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Nov.	No. of Years' Records.	Nov., 1916.	Nov., 1915.		Nov.	No. of Years' Records.	Nov., 1916.	Nov., 1915.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	1·90	15	5·21	1·68					
Cairns	4·22	34	2·13	1·51	Nambour	3·44	20	4·21	4·18
Cardwell	4·20	44	4·46	3·20	Nanango	2·39	34	7·34	1·59
Cooktown	2·97	40	1·06	0·61	Rockhampton ...	2·08	29	3·33	2·62
Herberton	2·45	29	2·39	0·50	Woodford	2·92	29	5·53	2·74
Ingham	3·84	24	5·25	0·51					
Innisfail	6·55	35	2·23	0·37					
Mossman	2·39	4	2·36	1·66	*Darling Downs.*				
Townsville	1·63	45	3·75	0·33					
					Dalby	2·47	46	7·59	0·82
					Emu Vale	2·38	20	4·85	0·03
Central Coast.					Jimbour	2·30	28	0·91	5·74
					Miles	2·27	31	7·28	0·69
Ayr	1·35	29	5·14	0·12	Stanthorpe ...	2·74	43	2·89	0·14
Bowen	1·25	45	1·57	0·86	Toowoomba ...	3·13	44	7·48	1·34
Charters Towers ...	1·51	34	2·89	0·04	Warwick	2·48	29	5·22	0·05
Mackay	2·90	45	3·93	7·16					
Proserpine	3·13	13	2·42	1·14					
St. Lawrence ...	2·27	45	1·93	4·64	*Maranoa.*				
					Roma	2·04	42	6·42	0·99
South Coast.									
					State Farms, &c.				
Biggenden	2·32	17	4·93	2·42					
Bundaberg	2·51	33	6·16	1·68					
Brisbane	3·60	65	6·17	2·46	Bungeworgorai ...	2·16	4	6·84	0·55
Childers	2·55	21	6·65	0·63	Gatton College ...	2·41	17	4·96	0·76
Crohamhurst ...	4·25	23	6·38	4·21	Gindie	1·79	17	4·90	1·01
Esk	2·96	29	5·43	3·62	Hermitage ...	2·16	10	5·60	0·09
Gayndah	2·75	45	5·76	2·82	Kairi	2·06	4	5·64	...
Gympie	3·07	46	3·80	5·19	Kamerunga ...	1·77	4	2·55	1·82
Glasshouse M'tains	3·44	8	2·28	1·72	Sugar Experiment				...
Kilkivan	2·51	37	3·44	1·13	Station, Mackay	2·44	19	...	5·22
Maryborough ...	3·02	45	6·60	1·25	Warren	2·31	4	4·59	2·98

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for November this year and for the same period of 1915, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Officer.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON FOR THE FIRST FOUR MONTHS OF 1917.

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

The Phases of the Moon commence at the times stated in Queensland, New South Wales, and Victoria only.

			H.	M.	
8 Jan.,	○	Full Moon	5	42	p.m.
16 ,,	☽	Last Quarter	9	42	,,
23 ,,	●	New Moon	5	40	,,
30 ,,	☾	First Quarter	11	1	a.m.

There will be a total eclipse of the moon on 8th Jan. before it rises in Queensland, but the moon will still be partly in the shadow of the earth for about three-quarters of an hour after it becomes visible. It will be farthest from the earth on the 9th January, and nearest on the 23rd.

7 Feb.,	○	Full Moon	1	28	p.m.
15 ,,	☽	Last Quarter	11	53	a.m.
22 ,,	●	New Moon	4	9	,,

It will be farthest from the earth on the 6th Feb., and nearest on the 21st.

1 Mar.	☾	First Quarter	2	43	a.m.
9 ,,	○	Full Moon	7	58	,,
16 ,,	☽	Last Quarter	10	33	p.m.
23 ,,	●	New Moon	2	5	,,
30 ,,	☾	First Quarter	8	36	,,

It will be farthest from the earth on the 5th about midnight, and nearest on the 21st about 7 p.m.

7 Apr.	○	Full Moon	11	49	p.m.
15 ,,	☽	Last Quarter	6	12	a.m.
22 ,,	●	New Moon	12	1	,,
29 ,,	☾	First Quarter	3	22	p.m.

It will be farthest from the earth on the 2nd and on the 30th, and nearest on the 18th.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane.

At Roma the times of sunrise and sunset may be roughly arrived at by adding 17 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

On account of the alteration of Civil (Clock) Time which took place on 1st January, it is necessary to *add one hour* to all the times given on this page.

Farm and Garden Notes for January.

FIELD.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish Blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole.

KITCHEN GARDEN.—A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in a covered seed bed, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflowers, mustard, cabbage, celery, radish, for Autumn and Winter use. Sow celery in shallow, well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

FLOWER GARDEN.—To make the flower beds gay and attractive during the Autumn and Winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotten leaves. Fill the boxes with the compost, then sow

thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle life them gently one by one with a knife or a zinc label—*never pull them up by hand*, as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf mould. Then keep a sharp lookout for slugs and caterpillars. Keep a supply of tobacco dust on hand, and scatter this in the path of the slug, and he will cease from troubling you.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to over water at this season. Propagate verbenas, not forgetting to include the large scarlet Fox-hunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed boxes, mulch, shade, water, and kerosine spray, all of which imply a certain amount of morning and evening work, the flower garden in Autumn and Winter will present a charming sight, and will afford light and profitable work for girls with spare time on their hands.

An exhaustive booklet on "Flower Gardening for Amateurs" has been issued by the Department of Agriculture and Stock, and may be obtained from the Office. Price, 2s.

Orchard Notes for January.

THE SOUTHERN COAST DISTRICTS.

The fruit of the month in this part of the State is the grape, and its gathering and marketing will occupy the attention of growers. Care should be taken to cut the fruit when cool and dry, and if it has to be sent any distance the stems of the bunches should be allowed to wilt before the fruit is packed, as the berries will then hang on to the bunch better, and the bunch carry in better order. Select the fruit carefully, grade it, and pack firmly so that it will not bruise in transit. If to be sent long distances, pack in crates holding from four to six 6-lb. baskets. Pines will be ripening in quantity towards the end of the month. Gather before fully coloured, and, whether for Southern or local markets, pack and handle carefully to prevent bruising. Do not ship the fruit too green for the Southern markets, as doing so is apt to spoil the trade. Send good fruit to the canneries. Small pines and crippled fruit are no good to canners, and the sooner our growers realise that it only pays to grow good fruit the better for them and for the canners, as if the latter cannot get good fruit it is impossible for them to put a line of goods that will not only be a credit to the State, but for which a world-wide market can be obtained.

Passion fruit should not be allowed to lie about for days on the ground before gathering, as if so they are apt to become fly-infested.

Watermelons and rock melons are still in season.

Watch any late peaches, Japanese plums, or other fruits liable to be infested with fruit fly, and gather and destroy all infested fruit, or, better still, grub the trees out and burn them, as they only breed flies to destroy more valuable fruit. Mangoes will be ripening during the month. See that all fly-infested fruits are destroyed, as they will only breed up further crops to destroy later ripening fruits.

Citrus orchards can be cyanided during the month for scale insects, and spraying for Maori with the sulphide of soda wash should be continued where necessary.

Mangoes can be budded during the month, as well as citrus and deciduous trees. Tropical fruit trees can be transplanted, taking care to choose dull weather and to cover same from the direct rays of the sun till they have become firmly established. Pines and bananas can still be planted.

THE TROPICAL COAST DISTRICTS.

See that all bananas are covered with netting, as the fly is usually at its worst at this time of year.

Mangoes will be going off. See that they are not allowed to remain about on the ground to breed flies for the Autumn crop of oranges. Longan, litchi, and other fruit are in season. As the month is often a

very wet one, little cultivation can be done in the orchards. Strong undergrowth should, however, be kept down with a hoe or scythe. Tropical fruits of all sorts can be planted. Look out for Maori on citrus fruits, and spray when necessary.

THE SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Stanthorpe district, apples, pears, plums, peaches, and nectarines being in season. Do not gather the fruit too immature; at the same time, don't allow it to be over-ripe. Gather dry, handle carefully, grade and pack in attractive cases. Keep the fruit as cool as possible, and ship in well-ventilated cars. Keep a sharp lookout for fruit fly, and take every possible means to prevent its spreading, even going as far as to gather and destroy the whole of the fruit on any infected trees, as if kept in check during the month the bulk of the fruit ripening during February will be free.

Keep a sharp lookout also for codling moth, examine the bandages on the trees at least every ten days, and destroy all larvæ found therein; also gather and destroy all moth-infected fruit.

Gather Bartlett pears as soon as they are large enough, and store away in a cool shed to ripen; when they show signs of ripening, market, not before. If sent down green they will sell for cooking, and only fetch a small price. The right stage at which to gather is when the fruit is fully developed, and the flesh has lost its woody flavour, but is still quite hard. This is usually before the fly has stung it, and if gathered at this stage the fruit will ripen up properly without shrivelling, and develop its full flavour.

These remarks apply also to the Downs country, which is somewhat earlier than Stanthorpe.

The crop of the month in the Western tablelands is the grape; and the remarks I have made respecting this fruit when grown in the Southern Coast districts apply equally here. The fruit should be gathered dry, and wilted before it is packed. Too large cases are often used; cases holding from 20 to 30 lb., or crates holding six 6-lb. baskets, are preferable, the latter being the best package for shipping the fruit long distances. Keep the orchards well cultivated, and, where water for irrigation is available, give citrus trees a watering during the month, unless there has been a sufficient rainfall. When the orchard is irrigated, see that thorough cultivation follows the irrigation, so as to conserve the moisture in the soil.

Red Scale, which is prevalent on citrus trees in the dry Western country, should be treated during the month. Cyaniding is the best remedy.