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Agriculture.

THE CULTIVATION OF SWEET POTATOES.

From several districts we hear complaints of the deterioration of sweet potatoes owing, in many cases, to the attacks of the weevil or worm, and also to the tubers running out into long, thin roots. It should be understood that deterioration and disease result from the constant planting of cuttings from the same stock, and also that the best soil for sweet potatoes, in which they develop their best qualities and attain their largest size, is a fairly rich, dry, sandy loam, or a light volcanic soil in which there is not an over-abundance of nitrogenous matter. Heavy crops cannot be expected on heavy, rich, black soils. On the latter there may be an exuberant growth of vines, but very few good tubers, the majority of these running out, as said, into long, thin roots. The tuber does very well after a cleanly cultivated corn crop.

When sweet potatoes have been grown year after year on the same land, the soil becomes "potato sick." It is unquestionably bad farming to plant them for the third time in succession on the same land. Although a heavy dressing of potash and phosphoric acid overcomes the sickness, it is far better and less expensive to grow some other crop on the land for a while, especially as potash is no longer obtainable.

The land should be ploughed deeply, and (on the coast) should be thrown up into flat ridges from 3 to 4 ft. apart. In the drier Western country the planting should be on the flat.

PLANTING.

The sweet potato is usually propagated by cuttings from the vines about 8 to 12 in. in length. As, however, constant planting from the same crop results in deterioration, it is imperative to obtain for, at most, the third planting, cuttings from another district. The top of the ridge is opened with the plough, and the cuttings are set slanting about 18 in. apart. The soil is then thrown back by a specially made plough, and pressed against each plant with the foot. Planting with the plough, however, results in many misses, owing to the fact that the soil cannot be pressed firmly enough round the cuttings. A dibble is preferable, such as is used in planting out cabbages. This is, of course, tedious work, but a steady worker can plant from one-third to half an acre a day. If the work is well done, and the weather favourable, the cuttings will be well rooted within a week.

The sweet potato is exceedingly sensitive to cold. The slightest frost will destroy the vine, and it should not be forgotten that frosts have occurred as late as October, as in 1899. The planting season is usually September in the Southern districts, and good crops have been raised by planting a month or two later.

There are two other ways of raising this crop. One is by seed. The sweet potato belongs to the Convolvulus family and frequently bears seed. In 1901 a large number of plants were raised from seed at the Penal Establishment at St. Helena, and the result was very satisfactory, a totally new variety being produced.

The third method is to raise early plants from tubers planted in a hot-bed, and the procedure is as follows:—

Select a small piece of well-drained land, sheltered from southerly and westerly winds. There dig a ditch or trench 3 or 4 ft. wide, 1 ft. deep, and as long as is required, taking into consideration that a square yard of it will give you probably 1,000 shoots for transplanting. Now, build over the ditch a sort of box, about 1 ft. high on the north side and 18 in. on the southern, and close in the ends. Then shovel up the excavated earth against it. Make a framework cover, and nail calico to it. The next thing is to get a quantity of stable manure, and mix it well with about the same quantity of straw chaff. This avoids excessive heat and maintains a warm temperature. Shovel this into your ditch and box, and trample it well down. Give a good watering with a watering can, to every 6-in. layer, up to 20 in., and water again. Over this, put a couple of inches of light soil, and on it spread evenly the middle-sized

and even small tubers, leaving only ½ to 1 in. space between them (there will be from 100 to 150 tubers to the square yard). Cover them with 2 or 3 in. of light, sandy loam, shut the lid, and await results.

The warmth of the hot-bed will have wakened up the germinating powers of the tubers and kept them growing and sending out numerous young shoots. September is early enough on the South coast to plant these out, as they will, by then, have attained a length of from 8 to 12 in. They should not be pulled or broken off close to the tubers, but if cut a couple of inches underground the part left in the soil will continue to grow and produce other shoots in a very short time. On an average, each tuber will give four shoots, so that transplanting can go on well into December. When planting, the side leaves and branchlets should be stripped off, leaving only a few leaves on the top end.

A few days after planting a certain amount of cultivation is needed to keep down the weeds, using a Planet Junior scarifier. For the removal of weeds close to the rows of plants, the hand Planet Junior hoe is the best implement to use. It will not be long before the vines will completely cover the soil, and in three months the whole field will present a dense mass of green. No further work is needed till the autumn, when harvesting the crop may be begun. The yield of tubers in a favourable season, and given the proper soil, is frequently 20 tons. At St. Helena in 1897 a record crop of 35 tons per acre on 6 acres was officially recorded. The Superintendent's report was to the effect that roughly 155½ tons were sold at £4 15s. per ton, giving a return of £738 12s. 6d.; besides which, 38 tons were used for domestic purposes, valued, at the same price, at £180 10s., making a total of £919 2s. 6d. Portion of the crop brought £6 10s. per ton, so that, had the produce of the 6 acres been sold at that price, the value of the 210 tons would have been £1,365. The largest tuber weighed 34 lb., and no note was taken of the small unsaleable potatoes which were fed to stock, nor of the quantity unavoidably left in the ground after digging.

It should be noted that no manure was used on the land, which had been cropped for several years previously with sugar-cane. In addition to the crop of tubers, cattle and swine were fed on the vines for several weeks. It will thus be seen that, given a good season, and a good red volcanic soil, not too heavy in texture, the sweet potato will yield a return which, at the normal price of £2 10s. per ton, exceeds in money value any other ordinary farm crop, except perhaps coffee.

TO ASCERTAIN THE RIPENESS OF THE TUBER.

When the sweet potato is ripe the sap has reached what may be termed the crystallisable stage—*i.e.*, when the tuber is cut or broken and exposed to the air, a white crust, or artificial skin, is formed over the cut part, and protects it from the air and from the agencies of decay. If the tuber is not ripe, the cut part turns black and no such artificial skin is formed. If, therefore, proper judgment is exercised as to the time and manner of digging, handling, and storing, there is little danger of loss.

HARVESTING.

When the tubers are ready for harvesting, which should be before the first frosts set in, say, June, the digging should only be done in dry weather. The first thing to do is to cut away the vines with a sickle or scythe, when the roots may be lifted with a digging fork or a specially adapted plough, which is so constructed as to prevent the tubers falling back into the furrows. If digging with a mattock or a double-pronged hoe, dig on one side of the row till the tubers are well exposed. Then pull out the whole of them, which, in the White Maltese (the best variety to grow, by the way) hang like a bunch of carrots all round the collar of the plant. Shake off what little earth adheres to them before bagging or storing. The crop may also be lifted by the use of a strong two-horse plough passing under the tubers, a horse walking on each side of the row. The best variety, the White Maltese, is recommended on account of its white, mealy, and savoury flesh. Another good point is, that the tubers, being elongated, sink deep into the ground, which enables the plants to stand a good long spell of dry weather. The next best is the Rosella. This is a sweet but not mealy variety, and one objection to it is that the largest tubers often grow a few feet away from the main crown, to which they are united by a very thin root, whilst small tubers grow promiscuously here and there, and all are liable to be injured by implements when being dug.

When there is an extra exuberance of vines, it often occurs that no tubers, or at most only a few, will form. Also the class of soil has much to do with the non-tubering trouble. A very common cause is the want of care in selecting cuttings from the most fruitful vines. It is a well-known fact that a cutting will, in almost any case, reproduce the peculiarities of the parent plant; therefore, it stands to reason that a crop of tubers cannot be expected from an unfruitful parent. The class of soil has also much to do with non-setting of tubers. When a soil which, when newly broken up, has produced a good crop, the result after a few years is, that it becomes closer in texture, and the crop will consist almost entirely of vines. The remedy for this we have shown above.

STORING THE TUBERS.

In the first place, the tubers must be thoroughly ripe. We have already shown how to ascertain the ripeness. After digging, spread the tubers out, either in the field if the weather is favourable, or in the barn, for a few days, to cure. Then lay down a thick layer of sand, on which place a layer of tubers. Then pour sand over them till they are completely covered, and every crevice filled. Next, put down a second layer of tubers on the sand, pour sand over these, and continue the process till the tubers are all put away. The sand excludes the air and the tubers are safe and will keep, in ordinary weather, right through the winter. Cover with straw or bush hay.

LIABILITY TO DISEASE.

The sweet potato is liable to disease, like most plants, and to the attacks of insect pests, which affect both vines and tubers. The worst

pest in Queensland is the sweet potato weevil, which was discovered first in 1886. How it arrived here is not known, but it eventually spread from Brisbane to all the farming districts in the South-east, and finally reached all the coastal sugar districts to the far North, destroying both vines and tubers, the latter being pierced with holes, and traversed through and through with brown tunnellings, and more or less completely destroyed. The only certain remedy appears to be the complete destruction of the whole crop, and other crops planted instead. It is, however, probable that the raising of vines from young tubers brought from another part of the State may prove a remedy.

SEED MAIZE FOR DISPOSAL, 1916-17.

Owing to the need which has existed throughout this State in the various maize-growing districts for pure varieties of seed maize, this Department has taken up the subject with the object of improving what has hitherto been the main cereal crop of Queensland.

Owing, however, to the very questionable quality and variety of seed which is too often used by the grower, the average yield per acre in normal seasons is much below that which might be expected when our magnificent soils and climate are taken into consideration.

This Department has pursued a policy of importing seed of a number of the best varieties of maize from the United States of America and Southern States of the Commonwealth, and, with the object of effecting a further improvement in the varieties which have adapted themselves to Queensland conditions, a rigid system of selection has been consistently carried out, in order that the growers of Queensland may be able to obtain the best type of seed from these particular sources.

The Department now offers limited quantities of the varieties enumerated, on the following terms:—

Orders should be addressed direct to the Under Secretary for Agriculture, Brisbane, and be accompanied by a remittance (exchange added). Price, 8s. per bushel f.o.b. Roma Street.

Only one variety will be supplied to any one applicant.

The quantity will be limited to 2 bushels (in order that as many growers as possible may be benefited by this distribution). Orders will be filled according to priority.

In the event of orders exceeding the available supply of a particular variety, the right of substituting another is reserved. If this arrangement is not acceptable, notification to the effect should be made when ordering.

Five varieties, from amongst those tried, have been chosen, viz.:—"Improved Yellow Dent," "Hiawatha Yellow Dent," "Reid's Yellow Dent," "Boone County White," "Iowa Goldmine."

Improved Yellow Dent.—The improvement of this variety has been taken in hand in New South Wales, and the grain offered for sale has

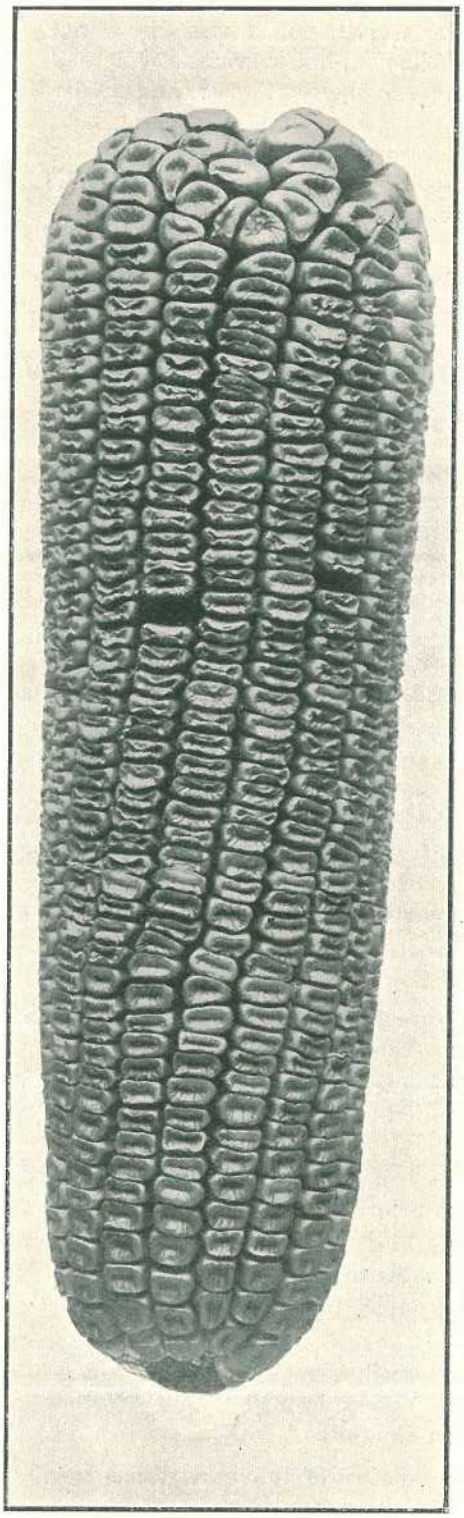
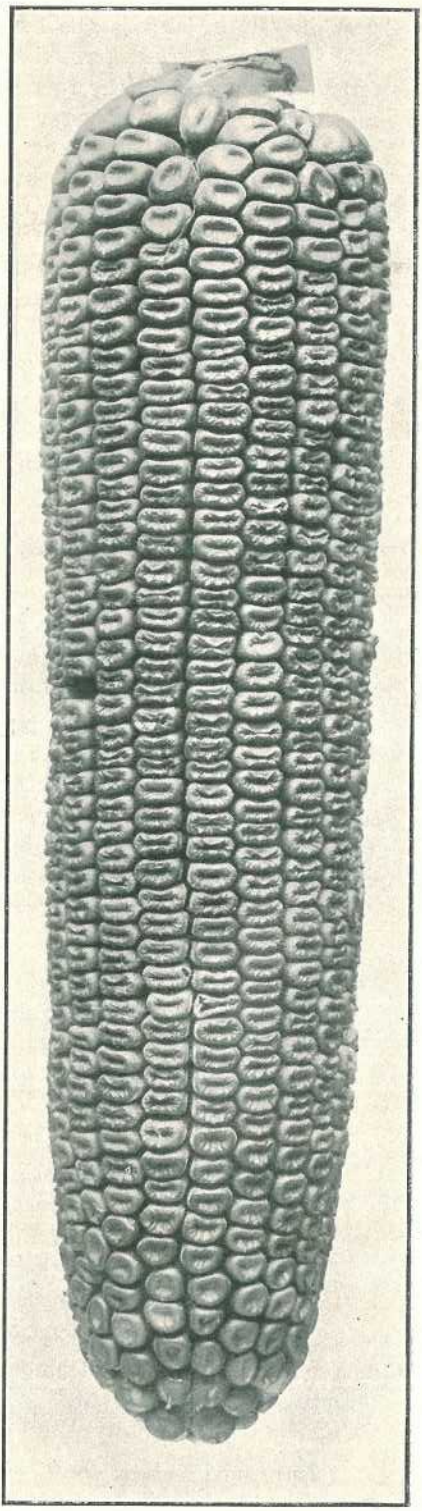


PLATE 4.—I.Y.D.-2.—IMPROVED YELLOW DENT.



HIAWATHA YELLOW DENT.

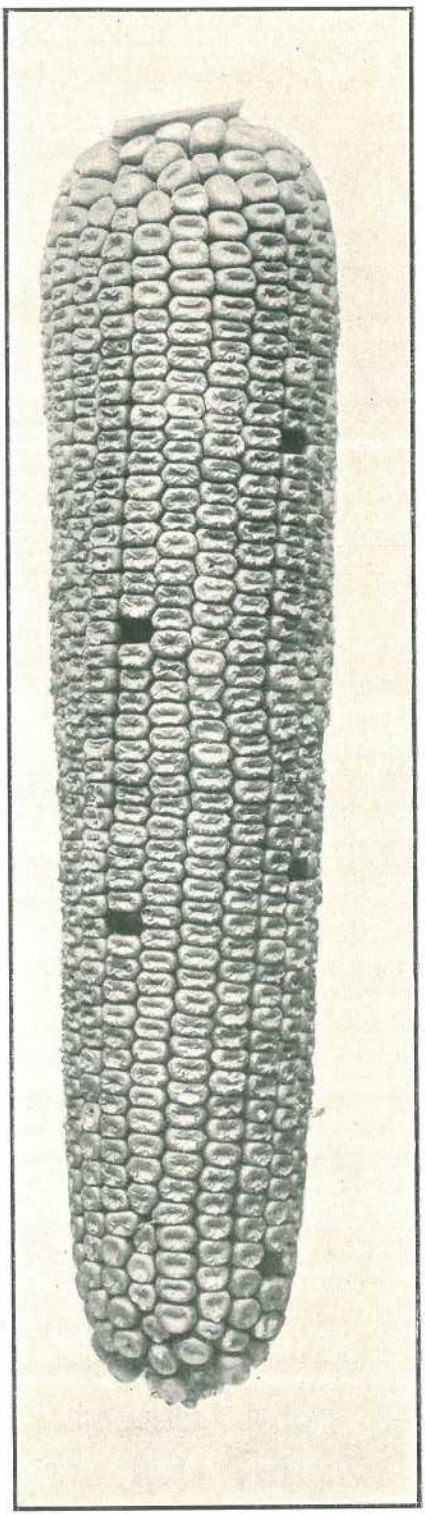
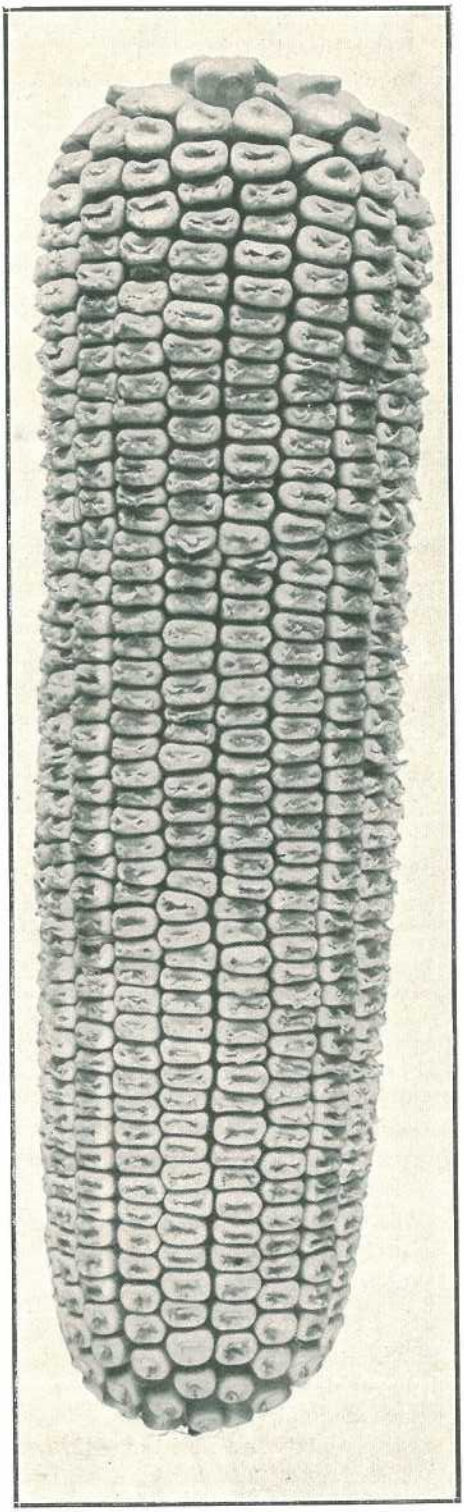


PLATE 5.—R.-8.—REID'S YELLOW DENT.



BOONE COUNTY WHITE.

been procured from selected seed obtained from the New South Wales Department of Agriculture. This variety has been experimented with in the ear-to-row tests, and has given very satisfactory results. It is a fairly tall-growing maize averaging 10 feet, stem straight and moderately stout, cobs of medium length, fairly compact, and cylindrical in shape, with rather blunt apex; eighteen to twenty rows. Grain flat, wedge-shaped, of moderate depth, slightly rounded at shoulder, showing a slightly ragged dent. Colour of kernels, characteristic yellow with pale yellow tip. Kernal shows a large proportion of horny starch, and is firm in texture. Time of maturity, approximately, five months.

Hiawatha Yellow Dent.—This is a variety credited as originating in Illinois, U.S.A., twenty-five years ago, and pure seed was imported into this State three years ago. It is a strong, vigorous grower, taking from five to five and a-half months to mature; is a prolific yielder where rainfall is good and the soil rich. Ears are long and borne on a lengthy shank, which bends over as the ears reach maturity. Grain is flat, wedge-shaped, and square shouldered, somewhat tightly packed on the ear; it is even in size, carrying a shingle dent, horny coloured with light yellow tip. Core small in proportion to size of ear and pink in colour; eighteen to twenty rows. This season the grain is smaller than usual owing to indifferent growing conditions.

Reid's Yellow Dent.—A medium early maturing variety (three and a-half to four months), plants averaging 9 feet in height. This is a prolific bearer, although inclined to sucker on rich soil; ears are long and cylindrical, the grain being packed with a characteristic tightness on the ear, which shows conclusively the great improvement effected by consistent selection. Reid's Yellow Dent readily adapts itself to new conditions, and is useful where early crops are desired. Grain is somewhat small in size, wedge-shaped, and regular and uniform in type and kind of dent. It carries a fair proportion of horny starch and shows a pale yellow tip, the general character partaking somewhat of the Early Leaming type; eighteen to twenty rows. Core red.

Boone County White.—One of the best of the white varieties. This is a medium late maturing maize of a hard nature, taking from four and a-half to five months to mature. It yields good crops on rich heavy soil, for which it seems particularly adapted. Grain is medium-sized and rectangular-wedge-shaped, amber-white in colour, with clearly defined white cap, pinch dented. Ears sixteen to twenty-two rows, core white. This is a favourite variety for coastal districts. Owing to unfavourable climatic conditions the grain is somewhat shorter this season than is usually the case.

Iowa Goldmine Maize.—This variety was imported from the United States of America in 1915, where it has shown good returns amongst the corns of its class.

A quick maturing, four months' variety, adaptable to light soils, particularly useful in localities where early sowings are made. The plant grows from 6 to 7½ ft. high, of early flowering habit, the ear borne on a somewhat long shank having the habit of turning down as it

approaches maturity. The ear is usually well furnished at both ends from 7 to 8 in. in length, having from 14 to 16 well-packed rows of grain The grain is of a square-shouldered wedge-shaped type, inclined to be small as is the case of most early varieties, and golden in colour with a characteristic "Crease" dent.

THE VALUE OF SOIL EXPLOSIVES.

We have on several occasions published articles on the value of soil explosions in breaking up hard subsoils in citrus and other fruit plantations, but we have only in one instance heard of any improvement in the growth and health of the trees due to this method—rather the reverse. For instance, a piece of land was treated on a farm near Brisbane. The adjoining block was worked in the ordinary way. Six months later, no difference was to be noticed between the crops on the two blocks. For clearing land of trees and stumps, explosives are undoubtedly of great value, effecting a considerable saving in the matter of labour.

It will be interesting to review the experiences of other countries. In the "Agricultural News" of Barbados, of 11th March, 1916 (Vol. XV., No. 362), will be found an editorial dealing with the subject as far as regards the dynamiting of orchards and sugar plantations, and showing the results of practical experiments that have been made, especially in the West Indies. Useful trials have been made by the Agricultural Departments in Dominica, Trinidad, and Antigua.

The "Agricultural News" wrote on the date abovementioned—

In one of the plots in the additional series of experiments in lime cultivation in Dominica, charges of dynamite were exploded in fifty-six holes between the young trees; but after the elapse of many months, no improvement could be observed in the condition of the trees. On another portion of the field, trees in a similar condition were treated in the same way, but after twelve months' time no improvement was observable. Judging from these and other experiments carried out by planters, no good effects can be discerned from the explosion of dynamite in lime cultivation. There may, however, be certain conditions, such as the close proximity of hard-pan to the surface, under which the use of explosives may be advantageous; but in a general way their use is not likely to be beneficial. One other experiment was tried in Dominica. When planting the plots, holes were made by dynamiting with a view to compare their efficiency for plants with those made with the spade. Each alternative row of holes was dynamited and the remainder were dug soon after. The holes were carefully filled in a few days before planting to allow time for sinking, and six months after preparation, planting was done. So far the plants growing in the differently prepared holes exhibit very little difference in appearance.

Turning to the experiments conducted by the Government in Trinidad, the recent Annual Report of the Department of Agriculture states that " dynamite experiments have been conducted on banana soil, and the figures obtained appear to show that not only a larger number of

bunches has been reaped from the dynamited plot, but also that there has been a larger number of seven, eight, and nine-hand bunches, and consequently the average weight of the bunches from the dynamited plot is 20·4 lb. against 18·8 lb. from the undynamited plot. In regard to similar experiments with coconuts, both the dynamited and undynamited plots have made good growth. So far the undynamited plot is the better of the two.'' In these experiments also, therefore, the results are not, on the whole, satisfactory.

In Antigua, trials have been conducted with sugar-cane. In these experiments, which were carried out on Delaps and Donovan's Estates, dynamite cartridges 2 oz. in weight were used, and were exploded 2 ft. 6 in. below the soil. Plant and ratoon canes were experimented with in each case. On the first-named estate, the variety of cane treated was White Transparent. The results obtained both in the case of plant and ratoon canes have indicated that dynamiting the fields under soil conditions such as obtain at Delaps is not productive of profit. The returns obtained from the controls and dynamite plots showed little divergence. At Donovan's Estate, slightly different results were obtained. Here, also, there was no gain obtained by dynamiting plant canes, and, as a matter of fact, the not-dynamited plot gave a higher yield; but with the ratoon canes there was a very appreciable increase in the case of the dynamited plot, which may, at least in part, be put down to the effects of the explosions. The soil at Donovan's Estate is especially heavy with a clay subsoil, and a reason for the increased yield from the ratoons may be found in the action of the dynamite in opening up the subsoil. In these last-mentioned experiments, the dynamited plot gave a yield of cane per acres of approximately 11 tons compared with 4 tons from the not-dynamited. The area of each plot was about 7/8-acre. But the extremely meagre return of 4 tons per acre shows that the soil conditions of the plot must have been exceptionally bad, and the results obtained therefore with dynamite in this experiment cannot be regarded as at all general in their application to the dynamiting of soil growing ratoon canes.

Taking a general view of the West Indian results, it would appear that the benefit that may be expected from the use of dynamite is more imaginary than real. As with manuring, so with soil explosions, the conditions obtaining in each case must be considered. It is probable that for breaking up the subsoil, and for removing a hard-pan, the use of explosives is worth while; but as a general operation in the routine of plantation management, it is not to be recommended on the basis of present experience.

Where it is intended to employ explosives, the object arrived at should be clear and definite. Otherwise more harm than good may result. One direction in which dynamite might possibly be used to advantage in the West Indies is in breaking up the large boulders of larva that occur in the fields in some of the islands. The removal of such obstructions in the places referred to would facilitate ploughing and cultivation generally.

In the issue of the ''Agricultural News'' for April, the subject of the value of soil explosions is again touched upon, and in connection with

experiments carried out in Kansas, U.S.A. From the following extract from the Kansas Experiment Station Bulletin No. 209, "it will be seen that very little benefit was derived from the use of explosives, the general results being in close agreement with those obtained in the West Indies. All available evidence goes to show that there is, in the ordinary way, no advantage in using soil explosives."

A series of experiments was planned to determine the effects of dynamiting on soil, the yield of crops, the moisture content of the soil, nitrate development, the bacterial flora, the physical condition of the soil, the leaching of salts in alkali soil, and the growth and vitality of fruit trees.

The crop planted on dynamited soil produced a higher yield in seven instances, while the crop planted on undynamited soil produced a higher yield in four instances. The greatest increase in yield on dynamited soil was obtained at this station with corn in 1914, when the dynamited plots produced 13 per cent. more grain than the undynamited plots. At Agra the dynamited plots produced 17 per cent. less wheat than the undynamited. In most instances the difference in yield was no greater than would occur on two areas of soil similarly treated.

Moisture determination on a series of nine dynamited and four undynamited plots on the Oswego Silt Loam at Manhattan, extending over a period of three years, showed no marked difference in moisture content of the soil. An average of all the determinations gave less than one-half of 1 per cent. more moisture in the dynamited than in the undynamited land.

Nitrate determinations on the same plots extending over the same length of time showed no greater formation of nitrates on dynamited than on undynamited soil.

A count of the number of bacteria at different distances from the centre of a dynamited area two years after the dynamiting was done showed a small increase in bacterial content in both the surface and second foot of soil as the dynamited area was approached.

A study of the effect of dynamite on the physical condition of heavy, plastic clay soil showed that the explosion forced out the soil particles at the centre of the dynamite charge into the pore spaces of the soil mass adjoining, thus producing a cavity surrounded by a hard, compact mass. The soil, instead of being shattered and cracked, was compacted and puddled, and left in poorer physical condition than before the dynamiting was done.

An alkali soil in the Arkansas River Valley dynamited in the early spring of 1912 with half-sticks of dynamite placed 2½ ft. deep at the corners of 15-ft. squares had not been noticeably improved by the fall of 1914. However, there had been some leaching of the salts from the surrounding soil.

Fruit trees planted on dynamited soil at this station in the spring of 1911 made a slower growth and survived in smaller numbers during the dry seasons following than did trees planted on similar adjoining soil that had not been dynamited.

In no instance was there improvement sufficient to pay expense of dynamiting.

OIL SEEDS WHICH MAY BE PROFITABLY GROWN IN QUEENSLAND.

SUNFLOWER SEED.

The seed of the sunflower is rich in oil content and is well worth growing for commercial purposes. There are several varieties of the plant, but we need only consider the particular variety which is the most profitable as a seed-producer. This is the Giant Russian, whose large heads contain from 1,000 to 2,000 seeds. The plant attains a height of from 6 to 12 feet, and the heads are often from 15 to 18 inches in diameter. Such heads will produce 3,000 seeds. The latter are sometimes black, sometimes light grey streaked with black. They are closely packed together in the head. The plant is easily grown in all parts of Queensland. It will bear heat, cold, drought or rain, and is subject to no disease.

SOIL AND CULTIVATION.

Although the plant is not very particular as to soil, it thrives best in a deep, well-drained loam. It is advisable to sow early, say beginning in September and ending in February. The quantity of seed required per acre is from 15 to 20 lb. if sown broadcast, but only half that quantity is needed if sown with a seed drill. The drills should be 5 feet apart, and the plants 3 feet apart in the rows. The tall-growing Russian Mammoth, which produces only one head per plant, may be planted closer, the rows being about 3 feet apart, and the plants from 10 to 18 inches in the rows. Planted at these distances, the yield may be set down at from 40 to 50 bushels per acre.

One of the advantages of sowing sunflowers is, that the crop may be harvested three months after sowing the seed. The cultivation consists in keeping the land clean, and the soil in fine tilth to enable it to retain moisture. This is a very important point, because the plant absorbs and evaporates large quantities of moisture. When full grown, it will evaporate from 1 to 2 lb. of water in twenty-four hours. When the plants have attained a height of from 12 to 18 inches they should be earthed up. The yield, if good, should be about 1,600 lb., or 50 bushels, per acre.

Various uses are made of the seed; primarily for the extraction of the oil, which possesses drying qualities. The percentage of oil extracted from the Russian sunflower ranges from 35 to 50 per cent. of the total weight of the seed, but there is, in reality, a larger quantity, which is lost in the hulls.

When the seed heads are ripe, the plants should be cut down and carted to the barn or drying shed, where they should be dried as quickly as possible to prevent the formation of mouldiness on their fleshy parts and on the seeds. When thoroughly dry, they are threshed with a flail and the seeds are then winnowed and bagged.

We need not describe the process of extraction of the oil, as that is not the farmer's business. All he has to do is grow and prepare the seed for market. A few years ago, when there was no war to limit production, enormous quantities of sunflower seed were exported from

Russia, Germany, and Hungary, the price ranging from £10 to £12 per ton. Cotton seed then was worth from £4 to £6; to-day it is worth £11 to £14; castor oil seed £16; and oil seeds generally have risen in price. We cannot say what is the present value of sunflower seeds; the yield of about 15 cwt. per acre is probably worth £12 to £15. Vast quantities of sunflowers are grown in Russia and other European countries, both for oil, oil-cake, poultry food, and for human consumption, for which latter purpose they are roasted like coffee-beans or pea-nuts, and are sold at fairs on feast days and holy days under the name of "Sèmotchky." Pigs also thrive on the seeds, and the stems are used in treeless districts for fuel. A valuable fibre is obtained from the stems, and the leaves are relished by stock, and can be converted into ensilage and hay.

The sunflower is grand bee food; at least, the bees think so, for as soon as the heads come into blossom scores of the busy workers may be seen occupied in loading their little thigh baskets with pollen, and filling their tiny stomachs with the sweet nectar to turn the spoils into bee-bread, honey, or wax. It may be added that the ash of the stalks is rich in potash, which in Northern Europe is carefully collected and sold. Such ashes, needless to say, form a valuable manure for plants requiring potash.

With the constantly increasing demand for the seed for home consumption and the exigencies of the war, a decline in the exports of oil seeds from Russia may be looked for not only for the duration of the war, but subsequently; hence prices must increase with the diminution of supplies.

CASTOR OIL.

As most Queenslanders know, the castor oil plant is so hardy that it may be seen growing luxuriantly in all sorts of soils and in any situation. It has, in fact, become a weed both in country and town districts. As a weed it is studiously eradicated, but were it looked upon and treated as a valuable source of lubricating oil, a payable industry might be added to the agricultural resources of the State. The plant revels in dry soils, to which it imparts great fertility instead of exhausting it.

The seeds should be planted in rows 6 feet apart and 4 feet between the plants in the rows, and before sowing they should be steeped in hot water for twenty-four hours. After the plants are above ground the cultivation is the same as for corn, cotton, sunflower, tobacco, &c.

When the seed pods are ripe they suddenly burst open, and scatter the seeds in all directions. Special arrangements must, therefore, be made for harvesting them. When the pods are seen to be turning brown, the spikes which bear them are cut off, and taken to a clean-swept piece of hard ground, which may be enclosed with galvanised iron set up lengthwise. Here they remain, being turned occasionally until the pods have emptied themselves. The husks are then removed by winnowing, and the beans swept up and bagged. They must on no account be allowed to get wet, although when growing wild the fallen seeds spring up in numbers, notwithstanding that they may have been exposed to heavy rains. The harvesting of this crop is so simple and easy that it may be done by young people.

EXTRACTION OF THE OIL.

As in the case of other oil seeds, the grower need not start an oil mill in order to market his crop. The seed is readily saleable as soon as winnowed and bagged. A simple mill consists of two large round stones, identical with the wheat-grinding mills of by-gone days, connected by a spindle, which are revolved by horse-power in a hollowed-out stone, in which the beans are placed. These stone mills hold about 2 cwt., and this quantity is crushed every half-hour. The oil is then poured into filtering bags, and the pure oil runs from the shelves on which the bags are placed, through tubes, into vessels placed to receive it. The yield of oil varies from 40 to 60 per cent., but the usual average is 40 per cent. The oil-cake makes an excellent manure.

The usual price for crude lubricating castor oil in pre-war times was from 2s. 9d. to 3s. per gallon, at which price, reckoning only 1,000 lb. of seed as the produce of 1 acre, the return would be £7 10s., 1,000 lb. of seed yielding 50 gallons of oil. Latterly (1916) the price of the crude oil has nearly doubled. The seed sells at about 4d. per lb.

CANAIGRE.

Canaigre is a tuberous-rooted plant much used in the past as a tanning material. It goes also by the names of "red dock," "tanner's dock," and "wild rhubarb." It is propagated by planting the small tubers and also by seed. About 1,000 lb. of tubers will plant one acre. It may be cultivated on arid soils, as it requires very little moisture. It cannot be injured either by heat, cold, wind, disease, or insects, although, as regards cold, very heavy frosts are injurious to the plant. The best season for planting in Queensland is from April to May. The tubers are set in rows 2 ft. apart, the plants in the row being 12 in. apart. The tubers rapidly increase in size, and form a cluster like sweet potatoes, growing very near the surface, and sometimes on the top of the ground. The yield ranges from 6 to 10 tons of tubers per acre. When ripe, they are sliced and rapidly dried. They contain up to 48 per cent. of tannic acid, the average being about 30 per cent. Two and a-half tons of dried roots will make 1 ton of extract, worth £12 to £14 per ton; 3 tons of fresh roots make 1 ton of dried.

As a tanning material it is very valuable. For light leather it is superior to oak, gambier, or hemlock. It is a quick tanner, and the yellow colour absorbed by the hide in the process of tanning is considered highly desirable for certain leathers. The plant thrives in Queensland and has been successfully grown at the State farms some years ago.

COTTON NOTES.

With cotton in the neighbourhood of 9d. per lb. in the British market for "Middling," and the unfavourable weather conditions over a large area of the U.S.A cotton belt, the prognostication of many cotton men of dearer cotton has proved correct. The continued dry weather has

caused much damage, and after the spring sowing, the outlook, especially in the State of Georgia, was described as serious. It is also noteworthy that in the American cotton industry wages are higher than at any previous time, thereby increasing the cost of production, and "Cotton," the official journal of the Manchester Cotton Association, Limited, indicates that "it is probable that America will have her troubles when she seeks to bring about any reduction. In the local cotton industry the Government authorities have intervened in the wages dispute, and an optimistic view was taken that the difficulties will be smoothed over."

The same journal says that it is imperative that a crop of 14,250,000 bales be grown unless there is to be a dearth of the raw material. One authority places the probabilities of the coming crop, on an acreage of 35,000,000, at 14,500,000 bales maximum, 12,250,000 bales minimum. The start made over the greater part of the belt has not been encouraging, and it has yet ahead all its troubles. The outlook at the time of writing was not bright for a maximum yield. To-day Queensland has a splendid opportunity to enter the field of cotton production, not by way of experiment, seeing that years ago the crop had passed the experimental stage. How often shall we repeat that the plant thrives and bears heavy crops from South to North and out to the far West of the State? How often are we to point out that whilst cotton fields in America are devastated by two terrible pests—the boll weevil and the cotton stainer—nothing of the kind has ever appeared in this State? Everything is in our favour. Labour in the United States is quite as expensive as in Australia, consequently it costs no more to grow and harvest a crop in Queensland than it does in Cousin Jonathan's Land. The Queensland Agricultural Department is doing all that is possible to once more place Queensland on the list of cotton-producing countries. The most valuable seed is being imported for September sowing, at no cost to the farmer; an advance of 1¾d. per lb. is offered to the grower for all the cotton he can produce, and he will have the whole profit, after all expenses have been paid, which his crop will realise. Finally, cotton is a plant which does not demand much moisture, as the deep running tap root draws up a good supply from the subsoil, consequently the grower can be fairly certain of a crop at times when ordinary farm crops fail.

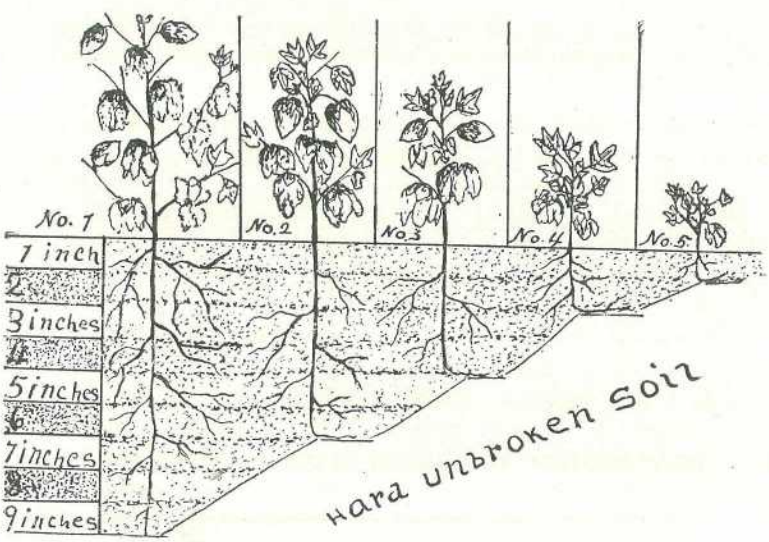
COTTON PLANTING.

As the season for cotton planting in the Southern districts will begin at the end of August, a few hints to intending growers will probably be acceptable.

In the July issue of the Journal we described several varieties of cotton, seed of some of which has been ordered by the Department of Agriculture and Stock, to be shipped from the United States of America in time to arrive here in August or September. These cottons are very highly spoken of in America, and should do well in this State, where climatic conditions and the absence of the pernicious boll weevil, the

cotton-stainer, and the leaf-eating worm, are more favourable than some of the Southern States of the U.S.A. Of fungoid diseases occurring in old-established fields in other parts of the world we have none.

With regard to the preparation of the soil, many farmers who have grown cotton in Queensland failed in this, first, because they did not turn over their land as soon as the crop was harvested; and second, because they did not plough deep enough. Cotton is one of those typical tap-rooted plants made to go deep into the soil in search of water or plant food. Aside from the taproot going deep below the surface in well-prepared ground, it throws out numerous laterals, often 4 to 5 ft. in length, the largest of which are, as a rule, just below the surface, hence after cultivation should be shallow (3 or 4 in.). In the preparation of the land, which should be taken in hand in the winter, the ploughing should extend to 9 in. in depth, thus increasing the water-holding capacity of the soil, greatly reducing injurious washing, helping to mix the latter by quickly softening the more friable portion and allowing it to percolate into the cracks made by the ploughing process. All preparation or tillage should be done when the soil crumbles the easiest, and does not ball up into a sticky mass when pressed in the hand. The accompanying



cut requires no explanation, showing clearly, as it does, the splendid root growth of the plant on the deeply-ploughed land, and the decrease in vigour in the shallow soil, where the root strikes the hard ground.

The sum of our advice to cotton-growers is: correct preparation of soil, selection of good seed, proper fertilisation (if necessary), planting at proper distances apart of the plants, and tillage. It may be added that the boll worm may be controlled by planting trap crops of maize. The worm is found in the heads of maize cobs, and as it has a decided preference for maize, the cotton planter has a means whereby he may protect the cotton bolls from injury by planting corn between the rows.

of cotton. Cowpeas are equally effective. The system of maize traps crops is to leave five rows vacant between every twenty-five rows of cotton. Plant one row as soon as possible with early-maturing corn. When the silk appears, search for the eggs of the moth, and when no more eggs are visible cut the whole plant down and burn or feed it to stock. Now plant three more rows of corn, or alternate the corn with cowpeas. The peas should come into full bloom when the corn has appeared above ground. The three rows of corn should be silking about December. On the ears of these corn plants will be found a large number of eggs. These must not be destroyed, but allowed to mature in order to prevent the destruction of the natural enemies which are parasites on the eggs and worms. The crowded condition of the worms on these ears induces cannibalism to such an extent that few reach maturity. *No destruction of these ears is recommended until the whole generation is parasited.* Now, the fifth and last row of maize is planted to catch the eggs of the remaining few which have matured, and these are destroyed by burning the ear silk as soon as laying has apparently ceased. If this plan, a very simple one, is adopted, it will be found that out of fifteen to thirty young larvæ, which may usually be found in a recently silked ear of corn, but one or two boll-worms will eventually reach maturity.

One great mistake which has been made with maize trap crops is, planting the corn at the usual time in spring, with the result that the cotton has suffered greater injury than would otherwise have occurred. The success of the trap crop idea depends entirely on *having the corn in tassel about December,* and it must be planted considerably later than the normal time of planting in spring.

A NEW SYSTEM OF COTTON CULTIVATION.

The system which is here described and recommended has been successfully tested in several localities of the United States, both by the Bureau of Plant Industry of the Department of Agriculture and by practical farmers.

The way to secure an early short-season crop of cotton is to thin the plants later and leave them closer together in the rows than is now customary. Neither of these policies is advisable if used alone, but they give a real advantage when properly combined. Keeping the plants closer together during the early stages of growth restricts the formation of vegetative branches and induces an earlier development of fruiting branches.

The spacing of the plants and stages at which thinning should be done will depend upon local conditions and will have to be determined experimentally in every case.

So long as the plants are close together they do not form vegetative branches; hence by thinning them when the stalks have grown beyond the stage in which vegetative branches are produced, the latter are controlled or suppressed. This makes it possible to leave more plants in the rows than is now customary and yet avoid injurious crowding.

The control or suppression of the vegetative branches also permits an earlier development of fruiting branches and leads to the production of an earlier crop. In regions where the period of crop production is limited either by short seasons or by the presence of the boll weevil, increased earliness is a means of securing larger yields. Hitherto no other way has been suggested whereby it is possible for the farmer to gain such direct control of the behaviour of his crop and to ensure larger yields in short seasons. The danger of weevil injury is greatest under conditions that favour the luxuriant growth of the young plants and induce the formation of large numbers of vegetative sterile branches, and it is under such conditions that the control of the formation of branches becomes most effective as a method of weevil resistance.

The boll weevil, as stated above, has never made its appearance in Queensland. We have the boll worm, which is easily controlled by trap crops of maize.

SOWING THE SEED.

The Uplands cotton, in the Southern and Central Districts of the State, succeeds best in rows from 3 to 4 ft. apart, the plants being from 18 in. to 2 ft. apart in the rows on light, sandy soils, and 4-ft. rows with 2 ft. between the plants on richer land. Under the new system, however, which has not yet, we believe, been tried in Queensland, the plants may, with advantage, be grown much closer together.

The best time to sow in the South is from the latter end of August to October. November is rather late, but full crops have been gathered from November sowings, principally in districts where frosts only occur late in June or July. Picking will begin, for early-sown cotton, about January or February; and for November sowing about March or April, and will continue until the frosts of July and August cut down the plant. Five pound per acre is ample for seeding, with three seeds in a hole. The maize planter is fairly successful in sowing cotton seed in America. In clearing out the drills, previously indicated by a marker, they should not be deeper than 3 in. The seeds then having been dropped by hand or by the seed drill should be covered with a light harrow.

In about four or five days after sowing, the young plants will appear, and may be thinned out, if sown thickly, when the third leaf has appeared. When the remaining plants have reached a height of 12 in., a further thinning will be necessary, only three plants being left, and when these attain to 18 in. two may be withdrawn, the third being now able to hold its own against insect attack. The usual after cultivation (shallow) may now be carried on.

The plants will begin to flower in about two months after thinning, and if good fortune has attended the grower in the way of absence of pests in the shape of the boll worm and cotton bug, he will now have reached the most pleasing period of the work connected with the crop—

COTTON PICKING.

Unlike the harvesting and preparation for market of wheat, maize, lucerne, and other grasses, coffee, rice, &c., there is no labour connected with the cotton harvest beyond picking and bagging for transport to the

Government or any private ginnery which may be in existence next season. The average picker in a good crop can pick from 150 lb. to 200 lb. per day between 10 a.m. and 5 p.m. Experienced pickers, including boys and girls, have far exceeded this quantity. The price paid for the work is ½d. per lb., which means from 12s. 6d. to 8s. 4d. per day of six hours. This is the standard pay for white pickers in America. The work is not at all laborious.

The average yield of an Uplands cotton crop can scarcely be stated. It ranges from 1,000 to 2,000 lb. per acre, and even more has been obtained in Queensland. (*See* "Cotton Cultivation in Queensland" (page 19), issued by the Department of Agriculture and Stock.)

SOME USES OF PRICKLY-PEAR.

The Director of Agriculture, Madras, has issued in the form of a departmental leaflet the following note on some uses of prickly-pear:—

The prickly-pear plant is considered by many ryots as a curse to the country, as it has overrun immense areas in several villages. In some places much agricultural land has been rendered temporarily useless from having been taken possession of by this troublesome pest. In very many villages the scrub jungles are overgrown with it and the land which would have otherwise been useful for growth of trees and grasses is occupied by it. It forms a safe refuge for snakes, &c. By the spread of this plant several public thoroughfares are becoming narrower every year, whilst poramboke lands are not infrequently rendered useless thereby for any purpose. The ground close to these bushes is used as a public latrine by villagers, which encourages the growth of the plant and does not add to the amenities of the village. The eradication of prickly-pear in villages is therefore one of the serious problems with which ryots have to contend.

Although attempts are being made here and there by public bodies, such as taluk and district boards, to eradicate this plant in very congested areas, yet such work is only practicable on a large scale if ryots in all the villages assist in removing it.

In parts of Coimbatore district prickly-pear is used after decomposition and composting as a manure for dry land crops such as cumbu, cholam, dry ragi, and garden crops like ragi, chillies, tobacco, wheat, plantains, sugar-cane, &c. This is, however, not resorted to by all. In many cases it is prickly-pear growing in corners of their fields or extending from outside into the fields that is cleared and composted by way of disposal. A few ryots compost prickly-pear, especially when it is abundantly available near at hand; but this is not followed as much as it might be.

Ryots, however, have taken up to the practice of carting to their fields the earth which accumulates under prickly-pear bushes for improving their lands. In tank bunds and porambokes nothing is paid for the earth itself, and the cost is only two annas per cart-load (when the

distance to be carted is about half-a-mile), for clearing the prickly-pear to get at the earth beneath, digging the earth, loading and carting it to the fields. The price per cart is becoming higher gradually owing to the increased wages. The soil under the prickly-pear bushes is of high manurial value as it is very largely composed of leaf mould and other organic matter blown in by the agency of wind. Prickly-pear itself contains more than 60 per cent. of organic matter (Dr. Leather's analysis), and if such a substance is composted with the rich soil found under these bushes the manurial value will certainly be enhanced. Many of our soils are deficient in organic matter, and if a compost of prickly-pear and the soil found under it is made and applied, the result will be beneficial. By composting prickly-pear, ryots not only obtain manure but get rid of this pest which is at present a nuisance in many respects.

The following methods may be adopted for composting:—

(1) A trench 3 ft. to 4 ft. deep and 6 ft. broad, of any required length, may be dug and kept ready during the interval between the first and second monsoons. During rainy days, when the ryots have not got busy work, prickly-pear may be cut, removed and filled in the trench and covered with soil that has been removed in digging it. The top of the trench will sink after some days owing to the decay of the stuff and at this stage the soil from under the removed bushes may be dug and thrown on the top. In places having good rainfall this will make a good compost within one year. If the thorns have not decomposed thoroughly, this may be left for another year, when the thorns also will decompose.

(2) In regions of scanty rainfall prickly-pear may be removed and heaped up in convenient mounds and allowed to dry up during season when ryots have enough leisure at their disposal. Dried bushes, grasses, and other rubbish procurable in the vicinity, may be spread over the heaps and set fire to. The thorny substance is partially burnt. At this stage the earth removed from under the bushes or from lands close by should be spread all over the heap, which can then be left for some years until decomposition is complete. In three or four years this will be fit for being carted to fields.

(3) If space is not available for the above, circular constructions similar to those used for grinding chunam should be made. The prickly-pear is then thrown into this pit and ground by a stone grinder just as chunam is ground. Owing to the large amount of water in the stems the plant, when the stuff is ground, is converted into a jelly-like substance within half an hour and the whole mass can be removed by mammuties and carried to places where compost is to be made. If this is filled in pits or covered with some earth, decomposition will easily set in. The thorns also will not stand erect but will lie flat and the nuisance they cause will be much reduced. In this case the manure will be ready within six to eight months.

Prickly-pear can also be used to serve other useful purposes than the one above referred to. The water obtained after boiling prickly-pear for some time can be used as a drier in white-washes. An ordinary pot or chatti is filled with prickly-pear cut into small pieces; as much water as the pot will hold is then added. The whole is boiled for about

three hours and stirred during the process. When cool, the liquid is strained and added to separately prepared white or colour wash in the proportion of 1 to 150 or 160. Whitewash or colour wash treated in this way becomes fast and does not rub off easily. In Indian houses this fast colour is a great advantage as it does not soil the clothing or body when the newly white-washed walls are touched.—"Indian Trade Journal," 16th June.

LIME FOR FARMERS AND FRUIT-GROWERS.

As the Department is receiving numerous inquiries respecting the benefits to be derived from the application of lime to our soils, the following answers by the Director of Fruit Culture, given in response to questions submitted to that officer, may prove of interest to agriculturists generally:—

1. The suitability of pulverised limestone for agricultural purposes:—

Answer.—A good quality limestone, when reduced to a fine state of division, is one of the best if not the best form in which lime can be applied to the majority of soils, and its use has largely superseded that of burnt lime or air-slacked lime for agricultural purposes in many parts of the world.

2. The superiority or otherwise of pulverised limestone over burnt or slacked lime.

Answer.—Pulverised limestone has several advantages over burnt or slacked lime. In the first place, there is no danger of spontaneous combustion such as occurs when burnt lime comes in contact with water. Second, it can be carried in bags without injury, as it does not swell and burst the bags as burnt lime frequently does. Third, it has no caustic action, and it is much safer to handle, as it causes no injury to the hands, face, or eyes, which frequently occur when burnt lime is used. Fourth, pulverised limestone encourages bacterial action in the soil and promotes nitrification, whereas burnt lime retards these operations at first, although, eventually, an increased action is obtained. Slacked lime has a similar effect to burnt lime, only in a less degree, and it is only after the lapse of a considerable period that caustic lime eventually reverts to the form of carbonate of lime, as it first becomes converted into the hydrate form, and the hydrate finally is converted into carbonate of lime. In other words, when the burnt lime has become absolutely air-slacked by the process of time, it reverts to the original form of carbonate of lime in which it occurred in the stone prior to its being burnt, except that it is in a fine state of division instead of the rock form.

3. The amount (approximately) of both pulverised limestone and slacked lime per acre for (1) heavy loams, (2) light or sandy loams, (3) volcanic soil.

Answer.—As the majority of the soils of coastal Queensland, no matter whether of light or heavy nature, are deficient in lime, a dressing of not less than 10 cwt. per acre or, better still, a ton per acre of either pulverised limestone or thoroughly air-slacked lime should be applied.

4. The amount (approximately) per (1) young tree, (2) full-grown tree, (3) decadent tree.

Answer.—Given 100 trees per acre, if half a ton per acre is applied broadcast over the land, then this would work out at a trifle over eleven pounds (11 lb.) per tree, but if a ton per acre is applied, it will work out at a little over 22 lb. per tree. It is unnecessary to consider the question of applying so many pounds of lime to the individual tree, as in every instance the lime should be broadcasted over the whole orchard either by hand, or preferably by a manure distributer such as the "Wallace," which can, I believe, be obtained in New Zealand, and possibly in the Southern States.

5. The minimum percentage of lime in pulverised limestone.

Answer.—Pulverised limestone should be made from the limestone containing the largest percentage of carbonate of lime; a good limestone should contain from 90 to 99 per cent. of carbonate. Ground limestone, as previously mentioned, must be reduced to a fine state of division, as it is only when so reduced that it is available for plant use. The degree of fineness to which the limestone should be reduced should be such that the whole of the material will pass through a mesh containing not less than 40 divisions to the lineal inch; any material that will not pass through a mesh of this size being too coarse and will remain a comparatively long period in the soil before it will become available, the actual period depending, of course, on the coarseness of the particles—the larger or coarser the particles, the longer it will be before they become available. Therefore, for all practical purposes, I consider that any ground limestone that will not pass through a 40-mesh has very little if any value, at any rate for a considerable time after it has been applied, whereas the material which has passed through a 40-mesh is available either immediately or within a very short time after it has been applied.

The Director further states that it is not so much the manurial value of lime that is of importance to our growers, excepting, of course, in the case of soils which are actually deficient in this material, as the effect that lime has in rendering plant foods present in the soil in an unavailable condition available for plants' use. This is of very great importance at the present time, when, owing to the war, there is a great scarcity of potash, as lime added to the soil has a tendency to render available a certain proportion of the potash contained in the soil, which is at present in an unavailable condition.

With respect to the different forms of lime and to their relative values, the Director points out that 100 lb. weight of pure limestone (carbonate of lime) when burnt will yield 56 lb. of caustic lime, that is, burnt or stone lime, 44 lb. being lost during the burning in the form of carbonic acid gas. Therefore, it can generally be assumed that 1 ton of newly-burnt limestone contains approximately twice as much actual lime as 1 ton of ground limestone, or of 1 ton of completely air-slacked burnt lime.

The value, therefore, of burnt limestone is about double that of ground limestone or air-slacked lime.

Pastoral.

PROPOSED TYPE STANDARD FOR BRITISH BREEDS OF SHEEP.

The Committee of the Flock Book for British Breeds of Sheep in Australia has drawn up type standards for the British breeds of sheep. Amongst them are two breeds which are of especial interest to farmers who are entering largely into sheep-raising on the coast lands of Queensland. These are the Border Leicester and the Romney Marsh sheep.

DESCRIPTION OF A BORDER LEICESTER SHEEP.

Head.—Medium-sized, smooth crowned, wide in forehead. Full and even down the face to a slightly Roman nose, perfectly free from wool, and covered with pure white soft hair; occasionally a black spot will appear.

Face.—Strong jaw and clean cut; nostrils wide and dark.

Eyes.—Full and prominent, but mild and placid, with a quiet, gentle expression.

Ears.—Lively mobile. Medium-size and semi-erect. White inside and out. Blacks spots sometimes appear with age.

DESCRIPTION OF A ROMNEY MARSH SHEEP.

Head.—Wide; good thick foretop; broad forehead with no horns.

Face.—Level between the ears and white in colour. Nose coal black. Face of ewes full; of rams broad and masculine.

Eyes.—Large, bright, and lustrous.

Ears.—Of good size.

Neck.—Well set in at the shoulders, strong and thick.

Shoulders.—Wide, well put in and level with the back.

Chest.—Wide and deep.

Back.—Straight and broad.

Ribs.—Well sprung; wide across hips.

Hind Quarters.—Rump well turned; thighs well let down and developed. Legs should be short, with big bone and large shapely feet of black horn. Skin should be of a clean pink colour.

A WORM NEW TO QUEENSLAND.

BY W. G. BROWN, Instructor in Sheep and Wool.

In last month's number of the "Queensland Agricultural Journal," I mentioned that a parasite of sheep, which has, hitherto, been unknown in Queensland, was found by me in a flock of sheep.

This month the accompanying plates show the kind of worm to be looked for—*Trichocephalus affinis* or Cæcum Worm. Plate 6—shows details, and is taken from Cooper Curtice's "Animal Parasites of Sheep," p. 100.

The explanation is as follows:—

TRICHOCEPHALUS AFFINIS, Rudolphi.

PLATE 6.

Fig. 1. Piece of *cæcum* with *trichocephali* attached, natural size; *a, a, females*; *b, b, males.*

Fig. 2. Male, × 7; *a, capillary cephalic end*; *b, coiled caudal end*; *c, protruded intromittent organ*; *d,* the *convoluted,* and *c,* the *straight* portion of the *seminal apparatus*; *f, seminal reservoir*; *g, intestine.*

Fig. 3. Female, × 7; *a, capillary cephalic end*; *b, vulva*; *c, vagina*; *d, uterus*; *e, oviduct*; *f, convoluted ovary*; *g, intestine*

Fig. 4. Caudal end of male enlarged; *a, end of the body*; *b, spine-covered tube of intromittent organ*; *c,* its *inflated end*; *d, spiculum.*

Fig. 5. Cross-section of end showing how the outside sheath becomes converted into the inside sheath of the tube; *a, a,* the *sheath*; *b,* the *sac* formed; *c,* the hollow *spiculum.*

Fig. 6. End of sheath, much enlarged, to show the relation between *sheath* and *spiculum.*

Fig. 7. The head.

Fig. 8. The *vulva* and *vagina,* with an egg in the passage.

Fig. 9. Eggs; *a,* eggs *without shells*; *b,* egg *with shell* and its *characteristic polar bodies*; *c, intermediate* between *a* and *b.*

Fig. 10. Enlarged portion of worm from near the head.

Plate 6 is a piece of cæcum taken from a sheep killed for post-mortem examination, and shows the enormous number of worms which were present in the animal.

Twenty-five per centum of the sheep died before the treatment (drenching with arsenic) took effect. I am pleased to state that since the fourth and last drenching the rest of the flock have quite recovered, and are quite free from this parasite, which proved so stubborn to remedial measures. I am hoping that pastoralists and sheep farmers generally will keep a sharp lookout for this pest. We may thus be able to suppress it before it is added to the long list of introduced pests in this country.

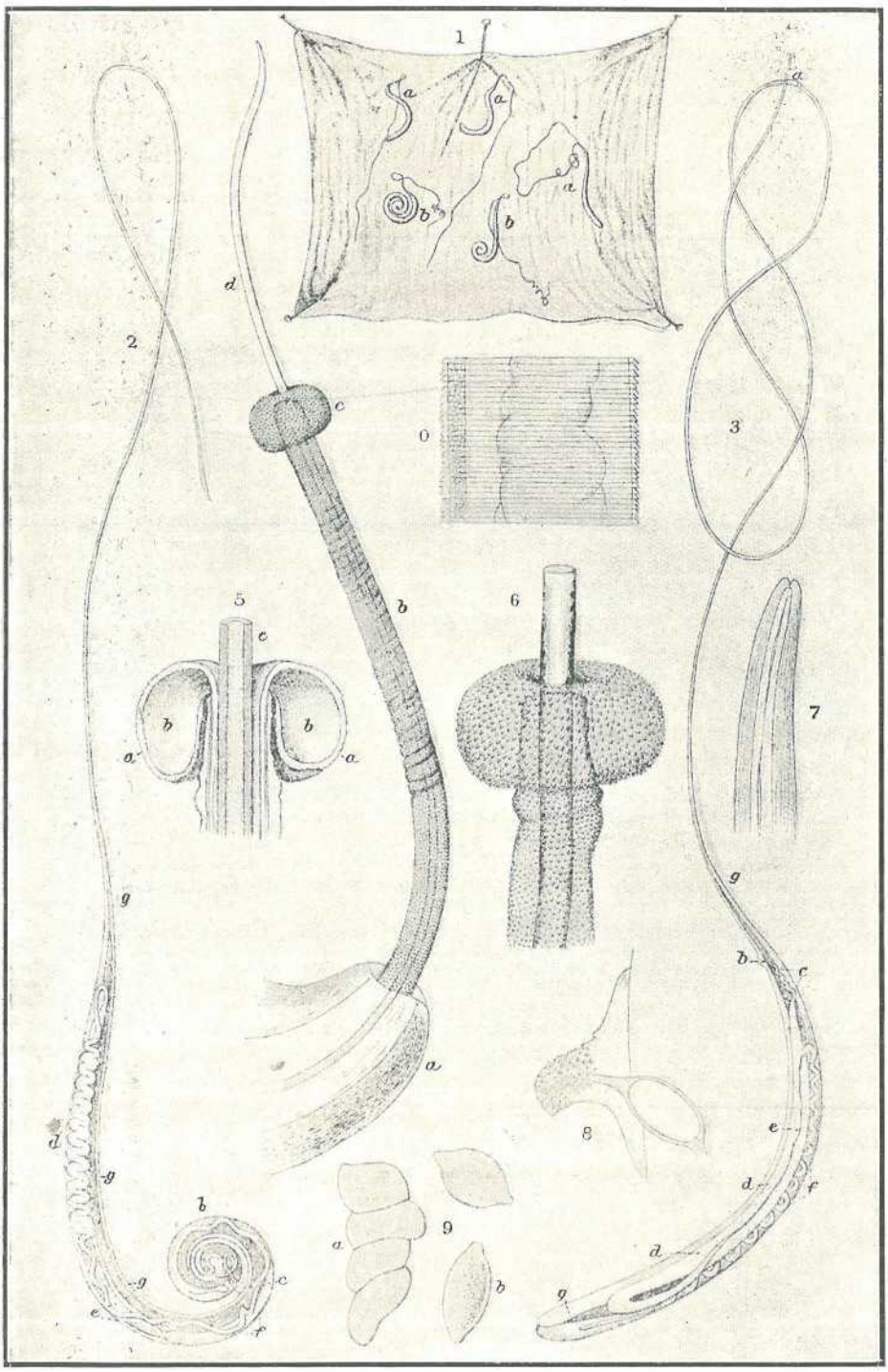


PLATE 6.—TRICHOCEPHALUS AFFINIS.
No. 1.—After Cooper Curtice.

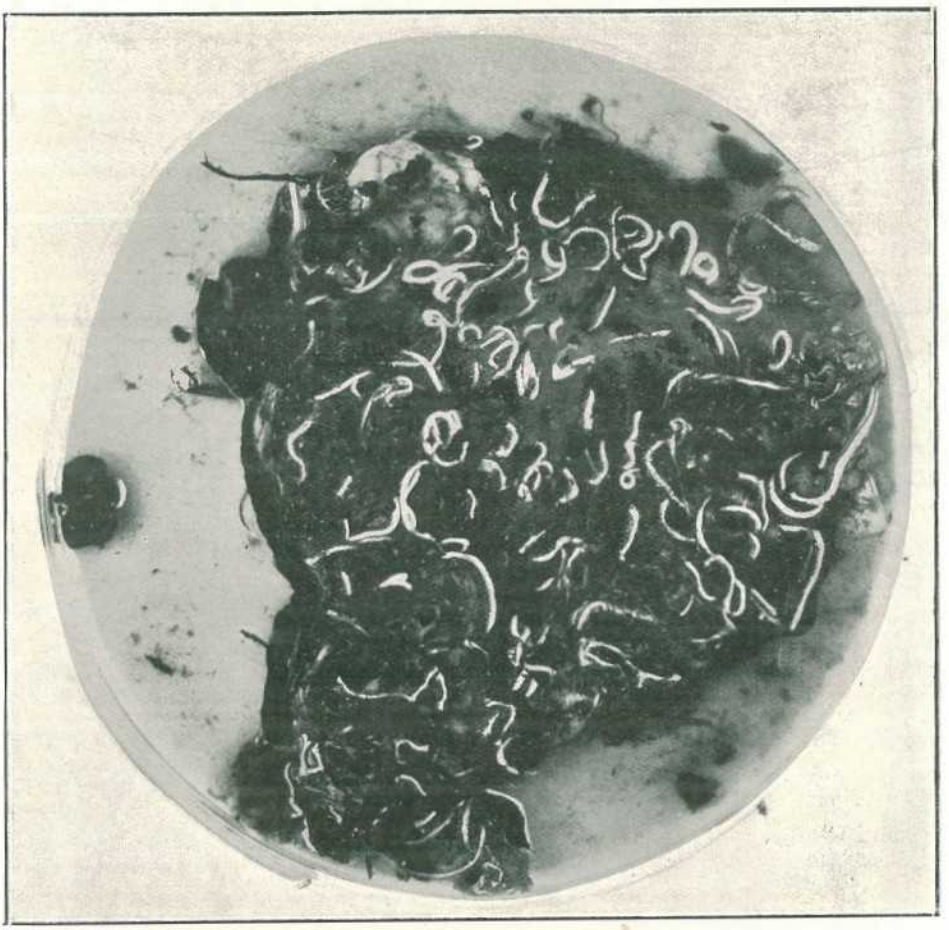


PLATE 7.—TRICHOCEPHALUS AFFINIS.
No. 2.—From a Sheep in Queensland.

IMPORTATION OF NUBIAN GOATS.

Our attention has been drawn to a paragraph in our article on the Nubian goat, in the June issue of this Journal for 1916, dealing with the regulations for the export of domesticated animals from Egypt and import into Queensland. The paragraph in question was derived from information sent from the Ministry of Agriculture, Cairo, dated 28th February, 1916, and reads as follows:—

"Prohibition as to export from Egypt and import into Queensland: Provided that the permission of the Minister shall be obtained prior to the departure of any domesticated animal from the port of shipment to Australia, such animals may be imported into Australia, presumably if covered by a certificate by a member of the Royal College of Veterinary Surgeons."

The Director of Quarantine, Quarantine Bureau, Melbourne, Commonwealth of Australia, points out that the wording of the Commonwealth Proclamation is:—

"The Minister may permit the importation into Australia of domesticated animals by the Chief Quarantine Officer of the State into which it is desired to import them, subject to permission being given by him to the departure of the animals from the port of shipment and to any further conditions which he may see fit to impose."

While the conditional importation by the Chief Quarantine Officer is permitted with the object of enabling the State authorities to import for experimental purposes, it is not advisable to allow importation, and such importation cannot be permitted. The matter is under Commonwealth control, and any importation must be effected by the Chief Quarantine Officer in accordance with the terms of the Proclamation, and the importation is governed by any conditions which the Minister may think fit to make.

We ask our readers to make a note of the above regulation in the event of any person being desirous of importing Nubian goats.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF JUNE, 1916.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Thornton Fairetta	Jersey	26 May, 1916	676	5·1	40·71	
Cocoatina ...	,, ...	17 Mar. ,,	558	5·5	36·35	
Lady Melba	Holstein	28 Oct., 1915	670	4·0	31·46	
Iron Plate ...	Jersey	20 Jan., 1916	560	6·1	31·32	
Auntie's Lass	Ayrshire	4 April ,,	604	4·0	28·36	
Lady Margaret	,, ...	14 Oct., 1915	474	5·0	27·96	
Lady's Maid	Shorthorn... ...	26 Jan., 1916	548	4·2	27·05	
Belinda ...	Ayrshire	27 Feb. ,,	569	4·0	26·72	
Lady Loch II.	,, ...	17 Mar. ,,	564	4·0	26·48	
Twylish's Maid	Jersey	22 Oct., 1915	368	6·0	26·14	
Constancy ...	Ayrshire	24 Nov. ,,	399	5·3	24·98	
Charity ...	Jersey	28 May, 1916	419	4·9	24·21	
Sweet Meadows	,, ...	28 Sept., 1915	289	7·0	24·00	
Lady Spec...	Ayrshire	6 Jan., 1916	513	3·8	22·96	
Queen Kate	,, ...	15 June ,,	495	3·8	22·06	
Violette's Peer's Girl	Jersey	8 Dec., 1915	312	5·8	21·42	
Jeannie ...	Ayrshire	1 Nov. ,,	406	4·4	21·03	
Mistress Bee	Jersey	21 Jan., 1915	327	5·2	20·08	
Netherton Belle	Ayrshire	23 April ,,	354	4·8	20·02	

For the first three weeks of the month the cows were fed on natural pasture only, but during the remainder of the time they received, in addition, a ration of Soudan grass and lucerne chaff. They showed a very marked increase in yield on being thus fed, and greatly relished the chaffed Soudan grass.

DENSITY OF AUSTRALIAN HONEY.

The Government Agriculturist in Victoria, in an article in the "Leader," referring to density of the honey of Australia, America, and Europe, says that, owing to the dry climate, Australian honey is generally more dense than that of other countries. In Europe and America the denser honey is found in capped combs, from which the atmospheric moisture is excluded, but here the experience is the reverse; the capping, instead of preventing the honey from absorbing moisture, preserves the natural moisture of the honey from desiccation, while uncapped honey is often so thick as to be extracted with difficulty. The water content of Australian honey runs from 17 down to 12 per cent., while in Europe and America it is generally from 25 to 27 per cent. One effect of this is that local honey, when in a damp atmosphere, absorbs moisture, the exposed surface becoming wet and soft. This does not affect the bulk of the contents of the jar or tin, however, as water, being lighter than honey, does not penetrate the mass. On the other hand, when honey is exposed to a dry atmosphere, the water it contains is drawn off by evaporation, even from the centre of the mass, owing to the specific gravity of the honey being greater than that of water. As an article of food the value of the honey is increased by its density.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JUNE, 1916.

Five thousand nine hundred and seventy-one eggs were laid during the month. Most of the birds that were in moult are now looking well and should soon be laying again if the weather does not keep them back. During the last twelve days we have had nine of westerly winds, with two wet days in between. This has had the effect of checking the laying somewhat. Mrs. Jobling wins the monthly prize with 125 eggs. The following are the individual records:—

Competitors.	Breed.	June.	Total.
*T. Fanning	White Leghorns	101	329
*J. Zahl	Do.	104	297
*Mrs. J. Jobling, N.S.W.	Black Orpingtons	125	295
A. Howe, N.S.W.	White Leghorns	123	277
*A. T. Coomber	Do.	90	276
*Dixie Egg Plant	Do.	100	270
*Miss M. Hinze	Do.	122	263
G. H. Turner	Do.	113	254
W. Meneely	Do.	122	252
*J. M. Manson	Do.	120	244
T. B. Hawkins	Do.	82	240
Dr. E. C. Jennings	Do.	117	240
Mrs. Munro	Do.	101	231
S. B. Tutin	Do.	88	228
W. Lyell	Do.	92	227
Geo. Tomlinson	Do.	113	225
*E. F. Dennis	Do.	92	220
*A. E. Walters	Do.	93	216
*E. A. Smith	Do.	93	214
A. W. Bailey	Do.	110	214
*J. Anderson, Victoria	Red Sussex	53	210
*J. F. Dalrymple, N.S.W.	Rhode Island Reds	102	209
Geo. Prince	White Leghorns	123	208
J. M. Manson	Black Orpingtons	103	208
*Kelvin Poultry Farm	White Leghorns	65	207
P. Brodie	Do.	86	205
H. Jobling, N.S.W.	Black Orpingtons	101	204
T. E. Jarman, N.S.W.	White Leghorns	83	203
H. W. Board	Do.	103	202
J. R. Wilson	Do.	122	198
C. P. Buchanan	Do.	89	198
T. Taylor	Do.	98	194
Mrs. W. D. Bradburne, N.S.W.	Do.	67	192
Kelvin Poultry Farm	Do.	87	190
*E. West	Do.	100	184
*W. L. Forrest, N.S.W.	Do.	107	183
A. H. Padman, S.A.	Do.	66	183
*C. Knoblauch	Do.	89	182
Mrs. C. Davis	Do.	98	178
A. F. Camkin, N.S.W.	Do.	101	178
F. Clayton, N.S.W.	Do.	88	173
*J. H. Gill, Victoria	Do.	77	173

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	June.	Total.
Mars Poultry Farm	White Leghorns ...	92	167
J. Gosley	Do.	71	157
King and Watson, N.S.W.	Do.	71	148
*J. H. Madrers, N.S.W.	Rhode Island Reds ...	53	147
R. Burns	S. L. Wyandottes ...	104	146
Cowan Bros., N.S.W.	Black Orpingtons ...	104	142
*W. H. Knowles, junr.	White Leghorns ...	69	140
E. Pocock	Do.	75	137
T. Fanning	Black Orpingtons ...	74	136
W. Hirst, N.S.W.	White Leghorns ...	74	133
E. W. Holland	Do.	46	127
W. H. Forsyth, N.S.W.	Black Orpingtons ...	78	127
J. Anderson, Victoria	White Leghorns ...	66	123
F. Clayton, N.S.W.	Rhode Island Reds ...	66	115
W. Purvis, S.A.	White Leghorns ...	57	111
R. Burns	Black Orpingtons ...	70	109
Cowan Bros., N.S.W.	White Leghorns ...	85	108
*J. W. Macrae	Black Orpingtons ...	74	107
W. Becker...	White Leghorns ...	55	106
J. G. Richter	Do.	78	106
E. F. Dennis	Black Orpingtons ...	97	100
A. T. Coomber	Sicilian Buttercups ...	31	98
L. K. Pettit, N.S.W.	White Leghorns ...	65	90
Mars Poultry Farm	Black Orpingtons ...	65	68
F. W. Leney	White Leghorns ...	32	57
W. Lindus, N.S.W.	Do.	17	51
Harveston Poultry Farm	Do.	30	48
H. Hammill, N.S.W.	Do.	20	45
F. W. Leney	Rhode Island Reds ...	0	39
E. F. Dennis	White Wyandottes ...	35	35
Moritz Bros., S.A.	White Leghorns ...	8	13
Totals	...	5,971	12,510

* Indicates that the pen is competing in single pen test.

RETURNS FROM SINGLE PEN TESTS FOR THREE MONTHS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
T. Fanning	60	64	60	58	50	37	329
J. Zahl	49	48	55	43	53	49	297
Mrs. Jobling	63	73	28	53	32	46	295
A. T. Coomber	53	55	49	36	36	47	276
Dixie Egg Plant	68	60	52	45	0	45	270
Miss M. Hinze	47	33	64	38	42	39	263
J. Manson	22	65	39	32	54	32	244
E. F. Dennis	39	53	20	48	34	26	220
A. E. Walters	36	64	26	20	48	22	216
E. A. Smith	55	26	28	59	28	18	214
J. Anderson	51	21	49	0	59	30	210
J. F. Dalrymyle	41	22	52	11	39	44	209
Kelvin Poultry Farm	31	20	46	28	46	36	207
E. West	50	39	14	19	8	54	184
W. L. Forrest	30	38	29	45	29	12	183
C. Knoblauch	42	24	16	29	34	37	182
J. H. Gill	3	59	5	58	21	27	173
J. H. Madrers	12	31	34	47	22	1	147
W. H. Knowles, junr.	39	12	28	6	27	28	140
J. W. Macrae	0	40	34	3	18	12	107

DOUBTFUL EGGS—WHO IS TO BLAME?

(By D. F. LAURIE, Poultry Expert and Lecturer.)

Recent market reports published in Sydney state that the market was depressed owing to large shipments of eggs to arrive from Adelaide. It was stated that the quality was doubtful. In Adelaide papers we read, in the market reports, that owing to the hot weather the quality of the eggs coming into the sale rooms was such that buyers were very chary of operating. Much has been written about the egg and its varying quality; and at times an element of humour has been added—not perhaps shared by those who have had an unpleasant surprise in ascertaining the quality of an egg which manifestly was not doubtful. It would seem, however, that in the 20th century, when we hear so much about the need for marketing all farm produce to the best advantage, it is a great reflection upon those who are responsible for the marketing of unsound eggs. Fatalism seems a characteristic of many people in this respect—they accept good eggs and bad with seldom a protest. Surely in these enlightened days no one cares to be thought so ignorant that good money is passively paid for produce that is not only unfit for consumption but the sale of which is in the nature of fraud.

There are various enactments which govern the sale of milk, vinegar, and so on, but there seems to be no means of bringing to book those who are responsible for the sale of unsound eggs. It is bad enough within the confines of our own State. Here the only result is that consumers are discouraged from buying as many eggs as they would if reliable eggs only were permitted to be sold. The fact that people who pay, say, a shilling for a dozen eggs, of which lot three or four are unfit to use, are in reality paying 1s. 3d. to 1s. 4d. a dozen, is a matter of domestic economy. Where the real damage to trade occurs is in regard to our surplus eggs. South Australia exports a large surplus of eggs. The price depends first on the old law of supply and demand, and secondly upon the quality of the eggs themselves. If none but fresh infertile eggs were concerned, then our merchants—with careful packing—could ship to the other States with the certainty that there would be no claims for unsound eggs. Now, some people are of the idea that the shippers are prepared at all times to bear uncomplainingly the loss on such shipments. That is not so. Due allowance is always made. During the colder portions of the year, when eggs are not affected by heat, the margin allowed is much less than in the hot months, when a large proportion of the eggs are approaching the limits of stability. At such times the risks are so considerable that buyers will not operate except at very low prices.

Now, there can be no doubt that among the producers there is a proportion who, whether from ignorance or carelessness, market eggs of most inferior quality. These people, no doubt, receive market rates, less carriage, commission, &c., and trouble no more. They do not perceive, and probably do not care for, the fact that if the eggs were of high quality, the average price paid by the collectors and others would be pence per dozen higher. The man who suffers most, and is practically impotent in the matter, is the careful poultry farmer who markets only

fresh infertile eggs. If these are sent to the salesmen he at best receives for them the highest ruling rate. But the important point is that this rate is a depressed rate, due to the unsound eggs which come from the country. The sellers of unsound eggs are a drag on the industry.

We boast that our country is a free country; but surely one could not justify the statement that producers are free to sell articles of food —eggs—which are quite unfit for human consumption. While such people exist the poultry industry is hampered. Without doubt the industry would be in a better position if all those whose habit it is to market these unsound eggs were to cease keeping poultry of any sort. You cannot build up a good trade on a rotten foundation.

In apportioning the blame, it may be pointed out that the following are contributory factors:—

1. The presence of surplus male birds on farms, and the practice of allowing the males to run promiscuously with the farm flock. In this connection I know there is much ignorant prejudice. At any rate, the fact remains that while an infertile egg will keep for a lengthy period, and is the only egg which should be sold for human use, the fertilised egg is quite unfit for trade purposes.

2. Eggs are collected spasmodically, instead of regularly once a day at least. The eggs are permitted to remain in hot nests.

3. Broody hens occupy the nests in which other hens lay. They sit on the eggs until such time as they are gathered, by which time incubation is more or less advanced.

4. The eggs are packed in mouldy straw, which is often damp. Damp packing material generates fungoid growths, which invade the egg and cause decay.

5. The method of collecting and forwarding eggs to market is archaic and needs modernising.

Much improvement would be possible if storekeepers and others set their faces against dealing in doubtful eggs. It is a well-known fact that in country districts storekeepers are practically forced to buy stale eggs or lose custom. People have told me that they could only market the eggs collected on the farm once a fortnight. Such people should go out of the business. Far more improvement would result if it were made illegal to sell stale eggs, and if that much-wished-for enactment were vigorously enforced.

Let everyone who has eggs to sell carefuly examine himself or herself on these points. Then, if the sinners are content to continue such practices, by all means let them wallow in their filth.

Local authorities are prone to display much activity in directions which to many people appear of secondary consideration. Does it not occur to them that the consumption of unsound eggs is a menace to human health? Naturally, even the most easy-going person does not

consume a bad egg when it is boiled. Evidence has been given, however, that unsound eggs are used in a cooked form. Flavouring matter is added to disguise the awful taste of bad eggs—but the discerning palate oft notices that the egg triumphs. A proper system of inspection would remedy this evil.

One result of the war is the imperative demand for greatly increased production of food for the nation. The egg is a most important article of food. Not only is it food for the ordinary man, but it is invaluable, and there is no substitute for the fresh egg for use in hospitals for our sick and wounded heroes. One feels inclined to class with the Huns those who market rotten eggs when, with a little ordinary care and cleanliness, such eggs could be sold fresh and sweet, and so increase the value of our productions.—"Journal of Agriculture, S.A.," vol. xix., No. 7.

THE TREATMENT AND PREVENTION OF SORE-HEAD, OR CHICKEN POX, BY MEANS OF VACCINATION.

("Hawaiian Forester," May, 1916.)

INTRODUCTION.

Every poultry raiser in this territory is familiar with the sores and tumors on the comb and wattles, and diphtheritic exudations in the eyes, nostrils, and mouths of chickens, which characterise this disease. It is, therefore, not necessary here to discuss its nature or cause beyond stating that it is a highly contagious disease affecting chickens, turkeys, and pigeons, and, to a much less extent, water fowl and guinea hens. When once the disease gains entrance to a flock it spreads quickly, and since the infection is very resistant to disinfectants, it is difficult to eradicate it. The need for the immediate isolation of all diseased fowls from the flock, the removal and burning of all dead fowls, and the cleaning and disinfecting of the houses and yards, is apparent.

TREATMENT.

The usual manner of treating sore-head is by removing the scabs or crusts as soon as they form, and then apply to the raw surface various chemical disinfectants, such as silver nitrate, copper sulphate, permanganate of potash, or tincture of iodine. When the disease is of a mild form, and the birds fully grown and strong, this treatment at times serves to check it, but in most cases it is of doubtful value. It is, therefore, of great interest to all poultry raisers and fanciers that a new method of treatment has been found which seems to be very promising, both as a preventive and a cure. This treatment was first suggested in 1910 by a German scientist (Manteufel), but it was not until American investigators (Hadley and Beach, 1913; W. B. Mack, 1915, and J. R. Beach, 1915) had devoted much time and study to its development and standardisation that the present method of preventive vaccination has been evolved.

PREVENTIVE VACCINATION.

The principle of this treatment consists in the preparation of a vaccine from the crusts and scabs which form on the comb and wattles of the affected birds, and the injection of this vaccine beneath the skin of both affected and exposed birds. The method of preparation is very simple, and can be undertaken by anyone who is in possession of a good dairy thermometer and understands the first principles of absolute cleanliness. But as many poultry raisers will feel timid about injecting into valuable birds a solution which they know contains the disease germ, it may be safer for them first to learn to administer the vaccine and satisfy themselves of its beneficial effect, before they attempt to prepare it. For those who feel this way about it, the following is suggested:—

COLLECTING AND FORWARDING SCABS FOR VACCINE.

Until such a time as poultry raisers in the Territory feel confident of the value of the vaccination treatment, the Territorial Veterinarian will prepare and, whenever possible, return by first mail the vaccine made from scabs forwarded to his office for this purpose.

When care is taken promptly to isolate all affected birds, the disease as a rule spreads slowly, and as it is necessary that a sufficient quantity of crusts or scabs should form in order to obtain material for the treatment of the entire flock, there is little danger of heavy losses, even if four to six days will be required for the forwarding, preparation, and return of the scabs and vaccine.

The best scabs, and in fact the only ones to use for vaccine, are those which form on the comb, wattles, and the skin of the head. In no case use the exudate which forms in the eyes, nostrils, or mouth. Place the scabs in a small bottle, previously cleaned with boiling water and drained until dry. At least one heaping teaspoonful of scabs will be required for the vaccination of a flock containing from 75 to 100 birds, but as this quantity provides for two injections (the second injection following the first after five to seven days), it is not necessary that the entire amount should be forwarded at once. For a flock of 25 to 30 chickens, a much smaller quantity will suffice for the first injection, and as the treatment does not immediately stop the further development of sores or tumors, a sufficient quantity of scabs for the second treatment will usually develop during the interval between the two injections. The second crop should, therefore, be forwarded not more than five to seven days after the first was sent.

Wrap the bottle well and place it in a small box or mailing case plainly addressed to the Division of Animal Industry, Board of Agriculture and Forestry, Honolulu, and send it by special delivery. Full information concerning the number, class, breed, and age of the birds to be treated must accompany the shipment, as well as plain instructions as to where the vaccine should be returned.

METHOD OF PREPARING THE VACCINE.

The method of preparing the vaccine, vaccination, precautions to be observed, and treatment, evolved by Dr. J. H. Beach, of the University of California, and the ones which have been followed here, are substantially as follows:—

One-half gram of chicken-pox scabs to 100 cubic centimeters* of physiological salt solution is the proportion used. The scabs are first weighed out and ground in a sterile mortar with a small amount of the sterile salt solution until they are pulverised. This amount is then filtered through absorbent cotton into a sterile flask or bottle, and the remainder of the salt solution poured through the filter so as to wash out as much of the pulverised material as possible. The flask is then stoppered, placed in a water bath, and heated at a constant temperature of 55 degrees Centigrade for an hour. The vaccine is now ready for use. It is very essential that the vaccine be used as soon after preparation as possible. Since no preservative is used, it will deteriorate if allowed to stand.

METHOD OF VACCINATION.

The vaccine is administered by injecting it beneath the skin with a hypodermic syringe. Two doses of one cubic centimeter each are given five to seven days apart. The most convenient place for administration is beneath the skin of the side under the right thigh, the skin at that point being comparatively free from feathers. The left wing is held back, the fowl laid on its left side, and the right wing and leg and feathers held back with the last three fingers of the left hand. The exposed skin is then cleansed with a piece of cotton saturated with disinfectant solution (2 per cent. solution of compound solution of cresol) and picked up with the thumb and forefinger of the left hand. Then with the right hand the syringe needle is inserted beneath the skin and the proper dose injected. A syringe of one cubic centimeter capacity is well suited for this work, when small flocks are to be treated. (Ask your druggist for Cutter's Tuberculin Syringe.)

PRECAUTIONS TO BE OBSERVED.

1. The vaccine being in an unpreserved condition will soon decompose and become unfit for use. Therefore, if possible, it should be used within three days. If old, decomposed vaccine is used, bad results will follow.

2. Vaccine should be kept in a cool place, on ice if practicable, until used, and only one bottle opened at a time.

3. A small, wide-mouthed, covered vessel, such as a quarter-pint milk bottle or a jelly-glass, should be provided as a vaccine container from which to fill the syringe. This should be sterilised by boiling before it is used, and should be kept covered at all times except when the syringe is being filled.

4. The syringe should be sterilised by boiling, or by soaking for several minutes in a 10 per cent. solution of compound solution of cresol, followed by rinsing with boiled water.

* The cubic centimeter is about 0·061 cubic inches.

5. All diseased fowls should be removed from the flock and treated.

6. The immunising effect of the vaccine does not take place immediately; therefore, the fowls already infected at the time of vaccination or soon after will, in most cases, develop chicken-pox lesions. Such cases are usually very mild and will soon recover if the fowls are removed from the flock and the lesions treated.

7. The hypodermic needle should be inserted *just under the skin* and not in the muscle.

TREATMENT.

Of the various kinds of disinfectants recommended for the treatment of this disease *tincture of iodine* has been found to be the most satisfactory. The scabs which form on the sores of the comb, wattles or skin should be removed with a dull knife or with the nails, and tincture of iodine applied to the exposed surface.

Collections of exudate on the mucous membrane of the mouth should be removed with forceps or a scoop and the exposed membrane treated with tincture of iodine. All collections of exudate within the eyelids can usually be removed by pressing with the thumb and finger tips around the eye. If any of the exudate should adhere to the eye it should be removed with forceps, and it may sometimes be necessary to use forceps also in removing the exudate from beneath the third eyelid at the inner corner of the eye. Afterwards drop a small amount of tincture of iodine into the eye.

The tincture of iodine can be applied most conveniently in all cases with a medicine dropper. Treatment should be repeated as often as the scabs or exudate reform. Any fowl that does not show a marked improvement in condition after three or four treatments will usually recover very slowly. In such cases, unless the fowl be very valuable for show, breeding, or other purposes, it is more economical to destroy it than to give further treatment.

Collections of exudate within the nasal cavities always produce marked swellings of the face. This condition is relieved by making an incision through the skin over the swelling, removing all the exudate with a pair of forceps or scoop, and then packing the cavity with absorbent cotton saturated with tincture of iodine. The cotton pack is necessary to keep the incision through the skin from healing too rapidly. If not packed, the wound will quickly heal, the exudate reform, and no benefit be derived from the operation. The pack also assists in controlling the hemorrhage, which is always severe. When the hemorrhage is unusually severe, it should be checked by the application of a strong caustic, such as silver nitrate. The cotton pack should be removed, the wound cleansed and a new pack put in every two or three days as long as the exudate continues to form. When, upon removal of the pack, it is found that no exudate has formed, the pack may be left out and the wound allowed to heal. The administration of vaccine in addition to local treatment will shorten the course of the disease and decrease the mortality from all types of the disease.

The Orchard.

FIJI BANANA TRADE.

The "Fiji Planters' Journal" for May, 1916, published the following statistics realtive to the Fijian exports of bananas during the first quarters of 1914, 1915, and 1916:—

Month.	To Australia.	To New Zealand.	Total.
	Bunches.	Bunches.	Bunches.
1916.			
January	92,980	52,837	145,817
February	86,277	33,365	119,642
March	141,789	38,110	179,899
	321,016	124,312	445,358
1915.			
January	51,913	22,111	77,024
February	41,982	19,984	61,966
March	58,111	16,825	74,936
	165,606	58,920	213,926
1914.			
January	106,324	31,864	138,188
February	116,958	26,674	143,632
March	106,514	37,033	143,547
	329,796	95,571	425,367

The record quarter-year's export was 425,367 in 1914.
The record quarter-year's export was 445,358 in 1916.
The bananas were packed in cases, each containing two bunches.

"Fruit World" (1st July) publishes the following information on the Fiji banana trade:—

Mr. J. W. Philpott, Inspector of Produce, furnishes particulars of the export of bananas from Fiji to Australia and New Zealand for the first five months of this year.

The figures are as follows:—

	Australia. Bunches.	New Zealand. Bunches.	Total.
January	92,980	52,837	145,817
February	86,277	33,365	119,642
March	141,789	38,110	179,899
April	86,828	42,757	129,585
May	93,261	41,180	134,441
Totals	501,135	208,249	709,384

The total shipments are equal to 709,384 bunches.

For the corresponding period of last year the total was 303,268 bunches, so the export is more than double that of last year.

EXPERIMENT IN SHIPPING DURIAN SEEDS.

From the "Bulletin of the Department of Agriculture" of Trinidad and Tobago, the "Agricultural News" of Barbados takes the following useful note on the shipping of Durian seeds:—

It is often thought that seeds which are to be sent long distances should be thoroughly dried, and packed as dry as possible to insure a good germination. The following experiment made with seeds of the famous Malayan fruit the durian (*Durio zibethinus*), shows that this is not always the case.

On 4th May, 1915, Dr. P. J. S. Cramer, Chief of the Plant Breeding Station, Buitenzorg, Java, sent by parcels post three boxes, each of which contained four durian seeds. These seeds are moderately large, about ¾ in. to 1 in. long and ½ in. or more in diameter. The boxes were all the same size—namely, 4 by 3 by 2 in. The seeds were loosely packed with charcoal mixed with coconut fibre refuse. Box No. 1 was packed dry; 25 c.c. of water was added to box No. 2, and 50 c.c. of water to box No. 3. The seeds reached Trinidad on 6th July, having been two months on the way.

When the boxes were opened it was found that all the seeds in box No. 1 had dried up completely and were mere shells which could be crushed between the fingers. In box No. 2 there were two good seeds which had already begun to germinate, while the other two were rotted. In box No. 3 all the seeds were good and had germinated *en route*, but one had grown so much that the shoot was badly broken. The seeds were handled carefully and planted in pots in a mixture of coconut fibre refuse and sand. One plant got broken off accidentally, but the other four have grown well, three now being 14 in. high and one 20 in. high.

As the durian seed has the reputation of being a difficult shipper, four plants from twelve seeds after a journey of two months would seem to be very good. With many similar seeds it is probably principally a question of giving the right degree of moisture to the packing material.

[In 1882 we obtained some seeds of Durian and Mangosteen at Batavia, which were dried. On arrival at Brisbane, we found them all dried up and useless.—ED. "Q.A.J."]

FARMING AT LANDSBOROUGH.

The accompanying two photographs represent portion of the Messrs. Skerman's banana plantation, Bald Knob, Landsborough, and part of an experimental plot of 3 acres belonging to Mr. J. Brennan, which are situated on the north side of Landsborough towards Tunnel Ridge. We hear very little about this part of the country, either from fruit-growers or agriculturists, yet the photographs serve to indicate that there are people in the district who are testing its capabilities. These pictures were sent to us by Mr. Richard E. Swan, of Landsborough, who further states that the Messrs. Skerman's banana plantation covers 20 acres, and has been continuously under this crop for nine and a-half years, which affords a good illustration of the great fertility of the soil, which is further indicated by the fine growth of plant sugar-cane on Mr. Brennan's land.

PLATE 8.—PORTION OF MESSRS. SKERMAN'S 20-ACRE BANANA PLANTATION, LANDSBOROUGH.

PLATE 9.—PLANT CANE ON J. BRENNAN'S FARM, NEAR LANDSBOROUGH.

SOME NOTES ON CITRUS CANKER.

BY J. R. CULLEN,

President of the Montville Fruitgrowers and Farmers' Progress Association.*

Although this disease has, as far as is known, not yet been introduced into Australia, still it is quite time that the citrus-growers and nurserymen here should have some knowledge of this dread disease, so that, in the unfortunate event of it being introduced into the Commonwealth, it will be at once recognised as such, and steps taken to have it stamped out before the infection has had the time or opportunity to spread; for there is not the slightest doubt that when those interested know what citrus canker really is they will leave no stone unturned to prevent it getting a hold amongst the orchards and nurseries of the Commonwealth. We have had quite enough experience already of imported pests. "Forewarned is forearmed."

This paper makes no pretensions to be a scientific monograph on the subject of citrus canker, but it aims at providing all those who are in any way interested in citrus culture with the requisite knowledge to enable them not only to recognise the disease should it appear in Australia, but also to insist on such precautions being taken as will practically prevent its introduction amongst us.

The disease known as citrus canker (occasionally called Japanese canker) seems originally to have come from Japan or Eastern Asia, and was introduced from there to the Philippine Islands and then from either or both of these sources into the Gulf States of the United States of America, originally in Texas. It has spread and ravaged the citrus orchards in Florida, Alabama, Missisippi, and Louisiana, and it is in these States that the disease has been thoroughly investigated and studied by the inspectors and officers of the States Experimental Stations; and, finally, so serious has it become that it has been taken over by the U.S.A. Federal Department of Agriculture, who are at present moving heaven and earth in the hope of eradicating it, and enormous sums of money have already been spent, subscribed to by the departments, by various organisations, and also by private subscription.

The disease was, it is thought, originally introduced on the stocks of Satsuma and Trifoliate orange imported for planting, and was not for some years recognised as a new disease. At first, too, it was thought that the only variety affected was the Grape Fruit or Pomelo, but since then its ravages have been found to affect almost equally all varieties of orange and mandarins, seedling or worked, and even the Australian native orange, the kumquat, sometimes used there as a stock for budding, has been affected with the pest. Both limes and lemons, too, are attacked, with the same fatal results, and it appears that the disease is as impartial as to what variety it affects as it is virulent in its action. When it is remembered that it was as short a while ago as September, 1912, that it

* In "The Journal of Scientific Research," Department of Agriculture, Washington, Vol. VI., No. 2, April, 1916, will be found a full monograph on "Citrus Canker," by F. A. Wolff, Plant Pathologist, Alabama Agriculture Experiment Station, and to whom I am greatly indebted for much of the information in these notes.

was first noticed, and even July, 1913, before it was definitely announced as a new and dangerous disease, it will be seen to what extent it has spread.

Citrus canker is general in its action, and affects equally leaves, twigs, branches, and fruit, and upon any of these the disease, when fully developed upon the part, is of a light-brown colour, and the diseased part projects more or less above the surrounding tissue, which, on careful examination, consists of a corky mass of cells covered by a lacerated greyish membrane. When it is fully developed as described above, it can be determined with certainty without a microscopic examination, but as it is much more difficult to determine in its earlier stages, being sometimes mistaken for citrus scab, it is perhaps better to describe more fully its special development on each part of the tree.

ON THE LEAVES.

1. Small, oily or watery dots, usually on lower leaf-surfaces, and darker green than rest of leaf.

2. Dots become convex and extend through leaf, appearing on upper surface as yellowish spots.

3. Convex spots develop until leaf-skin breaks and tissues are exposed, which become corky and darken with age.

Margin of spot at all stages has an oily appearance. Spots are always circular and vary from the very minute to one-quarter of an inch; often many spots fuse into one irregular mass. Cankers are elevated on both leaf-surfaces. As cankers develop, leaves fall off.

ON THE TWIGS AND BRANCHES.

1. Small, circular watery dots which rapidly enlarge, becoming blister-like.

2. Skin of bark breaks and exposes projecting cankerous tissue below.

3. Bark skin persists as greyish broken membrane at margin of canker.

Usually attacks young twigs, but larger branches are subject to infection and are often ringbarked by canker. Affected trees show stunted growth, with numerous unhealthy-looking shoots below affected part.

ON THE FRUIT.

Similar in appearance at first to leaf-cankers but much larger; usually circular and quite superficial; often unite to form large scaly areas which often burst open, when fruit becomes prematurely yellow and drops. All cankered fruit is most unsightly and unsaleable.

It is almost impossible to bud into stock that is affected, as canker starts where the bud is inserted.

Citrus canker is caused by a bacterial parasite named *Pseudomonas citri*, Hasse, and commonly associated with it is a fungus belonging to the genus *Phoma*; and these have been extensively studied, but without any success so far as regards prevention or cure.

The disease is one of the most infectious plant diseases known, as inoculation can be introduced by simply handling an affected part and then an unaffected one, the period of incubation being from seventy-two hours to ten days, varying with heat and moisture. As the disease passes its whole life-cycle within the tissue of the host plant, it will soon spread completely over a tree. It usually appears in the spring with the young growth, and it is thought that the organism is able to survive right through the winter on fallen leaves, so that it is easy to see that a few cankered leaves blown about will quickly infest a whole orchard, when also, as there is every reason to believe that it can remain alive a long time in the soil, it becomes obvious how extremely difficult it is to stop the infection spreading, and that there seems, too, no way of controlling it. The disease, too, is disseminated on the feet and body of birds and insects; in fact, practically anything touching a canker can spread the infection. Instances are on record of citrus-growers travelling to infected orchards to examine the disease and unwittingly bringing it back by brushing against trees which were infected. It is obvious, therefore, that this disease should be recognised and experts summoned to deal with it immediately upon its discovery, as many of the early steps taken to combat the disease in the Gulf States only spread it further afield.

There is no known method of controlling this disease. Sprays of all kinds were tried, but had no effect whatever, even when used strong enough to defoliate the trees; neither has any spray been found that will in any way protect healthy trees from infection. At present the remedy being used in infected areas is the drastic one of completely burning, even to the roots, every tree that is cankered, the work being done by experts, who are careful to do as little handling of infected parts as possible, special care being taken to prevent any infection being carried away. Whole citrus groves have been thus exterminated, and there is ground for thinking that it may be possible to exterminate canker in this way.

At present the disease has not spread to California, but when the infectious nature of it is fully realised, it is obvious that the embargo that the Federal authorities have placed on all citrus fruits, plants, and buds being imported here from Japan, America, and the Pacific Islands, is absolutely necessary, and no relaxation can be thought of until the pest is exterminated in the infested countries, as its introduction would probably wipe out the whole citrus industry in Australia.

Tropical Industries.

SISAL HEMP.

A few years ago it appeared as if the cultivation of sisal hemp was about to become one of the payable industries of Queensland. The demand for this fibre was very great in Europe, in the United States of America, and, to some appreciable extent, in Australia. The Department of Agriculture and the Home Secretary's Department took a great interest in the endeavour to establish the industry, by precept and example, as well as by an exhaustive pamphlet on the whole subject. The plant was established on the island of St. Helena, and small machinery was installed for extracting the fibre. Thousands of plants were distributed to farmers in most of the coastal districts, notably at Childers and in the Logan district. At that time the highest price obtained in the oversea markets for the fibre was £50 per ton, eventually gradually falling to £24 per ton. But sugar-growing and dairy-farming appealed more to farmers who preferred the annual and monthly cheques for their produce to a prospective larger return after waiting for three or four years for a first crop of sisal, although the subsequent returns annually for the latter showed, in the case of two or three small plantations, that sisal planting was a very payable business. Hence the cultivation of the plant was abandoned by all but two planters. The return from one of these plantations was 1¼ tons of fibre per acre, and the net profit thereon was £12 per ton. Only white labour was employed at regulation wages and hours of labour. At this time of writing, the price of the fibre is £60 per ton. As it can be produced under the conditions stated, the profit per acre would be from £40 to £48, exclusive of the value of the tow and the sale of plants. During the war, sisal hemp exports from Progreso, Mexico, dwindled until, in June last, it was announced that stocks in that country were exhausted, and now that Mexico is apparently on the eve of war with the United States, there is no hope of any hemp reaching Europe or the States thence for an indefinite period. Meanwhile British East African planters are reaping a rich reward for their enterprise, in which, for the present, they have no competition. With the cheap native labour of East Africa, the profit on a crop of sisal sold at £50 to £60 per ton is clearly very considerable, as compared with that of the Queensland planter, who, under present labour conditions, both in the field and in the factory, is under a great disadvantage as compared with labour in that country, notwithstanding which, large profits could now be made in this country had the cultivation of the sisal agave been extensively carried on during the past five years. The uses of sisal fibre are numerous, particularly for the wheat-growers, in the shape of binder twine; also for various descriptions of rope and other cordage. In some countries the plant is utilised for enclosing cultivation grounds, and forms a hedge impenetrable by cattle or other stock. The fibre derived from these hedges is extensively used for local agricultural purposes.

RUBBER.

Writing on the rubber famine in Germany, the "India Rubber World" has the following:—

When the war broke out German business circles recognised that the extraordinary conditions it created would have a far-reaching effect on the commercial and industrial life of the empire. But there still seem to be a good many people in Germany who have not yet been impressed with the changed conditions, and among them are quite a number of dealers in the rubber trade, who complain very loudly that the manufacturer does not turn out their orders as acceptably and as rapidly as he would in normal times. The rubber journals are taking these complainers to task, and seeking to convince them that under present trade conditions they should make all proper allowances for the extraordinary difficulties under which the manufacturer labours, and that they should not be too insistent on immediate deliveries or on getting exactly the quality at precisely the price mentioned in their orders.

The Allies' blockade is being felt more and more each day, and the list of rubber goods "no longer obtainable" is increasing constantly. Each day increases the inconveniences created by the lack of raw materials, and the discovery, or even the pretended discovery, of some new substitute for a scarce or "no longer obtainable" raw material is heralded throughout the Press. It was announced lately that the Kaiser had motored to the front in a machine equipped with artificial rubber tyres. Immediately the Press announced that the great problem had been solved, that artificial rubber was at last practicable, that Germany would no longer have to rely upon foreign countries for her crude rubber supplies. Rubber would now be home-made. It appears, however, now that the much-talked-of artificial rubber tyres of the Kaiser's automobile were only experimental ones, produced at a great cost, or at least at a cost that would prohibit their being produced on a commercial basis, or even on a basis permitting their use for the present military needs.

Another substitute that is receiving wide publicity in Germany appears to offer greater possibilities. It is known as "textilose," and is to be used as a substitute for the jute Germany formerly imported in great quantities from British India.

Textilose is made by spreading paper on a fibre gauze and cutting the product in strips, which are then spun into yarn and can be woven in a similar manner as other paper yarns. Two factories are said to be producing about 44,000 lb. of textilose bags per day, and it is also stated that over 40,000,000 marks (9,520,000 dollars) have been subscribed for the promotion of the manufacture of this jute substitute both in Germany and abroad.

When the war broke out there was a very large supply of cotton, and even after the beginning of hostilities, large quantities of raw cotton from time to time reached Germany. Manufacturers used freely of this supply, with the result that when the Allies tightened their effective blockade the supply of raw cotton was considerably depleted. Since

1st August the manufacture of cotton has been absolutely prohibited. The Government's order is far-reaching and strikes all kinds of goods made of cotton or containing any of this staple. Without distinction it prohibits the manufacture of all cotton yarns, cotton threads, fabrics, wearing apparel, bags, belts, and all woven or knitted goods containing cotton. Since 1st August it has been legal to use cotton only in the manufacture of military requisites. Long before the Government decided on these restrictions the price of raw cotton had reached the alarmingly high price of 30 cents. per lb. The efforts made to encourage the planting and harvesting of hemp and flax have not yet given any material result.

Another Government operation of great importance to the rubber industry is the recent seizure of all supplies of sulphur. However, the seizure of sulphur supplies is considered an advantage to the rubber trade, for the Government has promised to distribute sufficient quantities to answer the immediate needs of all.

Lubricating oil is becoming so scarce, and its price too high, that only few rubber manufacturers can afford to use it for their machinery. Even graphite, which is used as a substitute therefor, is becoming rare and expensive.

The Allies' blockade has created such a rubber, gutta-percha, and copper famine that the D.V.E. (Union of German Electrical Engineers), which fixes the standards for rubber and gutta-percha insulated wires, has been obliged to modify its standards to make their observance possible under present conditions. As far as possible iron will be used instead of copper, and rubber and gutta-percha insulations will be replaced by impregnated paper wherever practicable. In cases where impregnated paper cannot be used, reclaimed rubber will take the plac of the usual insulator until normal conditions are re-established.

The war has increased interest in farming here, and farmers, owing to lack of labour, are obliged to use modern machinery to a much greater extent than they formerly did. This creates an unusual domestic demand for many rubber mechanical articles, and especially for belts, in view of the fact that the use of leather for other than military purposes is strictly forbidden. But, because of the high cost of raw materials necessary for making these belts, it is almost impossible for manufacturers to make reasonable profits in producing these necessities. Of course, those who had a large stock of belts on hand are securing large profits, for farmers are glad to take what they can get, and are using all sorts of belts on their threshing machines and other agricultural implements.

Packings and the like that can easily be made of substitute materials are giving but little trouble. The hose industry, generally speaking, is dead. No orders are forthcoming; people who use hose are doing the best they can by keeping their old hose in repair.

Before the war, maritime as well as river navigation offered a great market for all sorts of mechanical rubber goods. River navigation is at a standstill through lack of freight and lack of hands; maritime navigation, as far as Germany is concerned, is stopped almost entirely by the activities of the Allies' fleets.

In a word, the rubber industry is badly affected by the war, and were it not for Government orders for tyres and other mechanical and surgical rubber goods, the whole industry would be at a dead standstill.

As an illustration of the thoroughness with which the Germans conduct their military operations, a paragraph in a letter recently written from Northern France is interesting. The writer says:—

"After every battle in which Germans have been victorious the field is literally scoured, and all the junk is transported to headquarters. Scores of ripped and torn auto tyres are collected and sent to an establishment where the rubber can be utilised in the making of new tubes."

The saving of every possible scrap of waste rubber has now become such an important matter in Germany that not only the Imperial Government but State and municipal authorities have taken the matter up; and the Red Cross organisation particularly is instructing the public in regard to collecting old rubber articles so that nothing shall be missed. The newspapers even go to the extent of giving general instructions as to how waste rubber articles shall be sorted before being turned over to the factories for use, so that the delay of re-classification be avoided.

On 1st June, Austro-Hungarian rubber manufacturers increased their prices of rubber goods from 50 to 100 per cent.

THE RICE FARMER.

It would appear that, consequent on Mr. T. F. Keane's success in rice-growing at Carbeen, Mareeba, North Queensland, a little more interest has been aroused amongst agriculturists in the Cairns district. Perhaps the following notes on rice-farming and rice farmers, published in one of our American exchanges, will be of value to present and future growers of this valuable crop, which supplies food to many millions of the inhabitants of the world:—

The fact that rice is the principal food for more than half the world answers two very practical questions—which of the cereals is the best food for the human race, and which is the most profitable for the husbandman to produce, taking a series of years? Rice would not bring a higher price than wheat, rye, or barley in the Orient unless it were in greater demand than those grains for the food supply, and this demand would not continue for thousands of years unless the shrewd Oriental found that rice, in proportion to its cost and the expenditure of vital force necessary to digest it, imparted more vigour to the system than any other grain.

On the other hand, Oriental farmers would not continue to raise rice on such vast areas unless it paid better than other crops. To pay better, it must be a more certain producer, a larger yielder, less subject to destruction by storms, diseases, or insect enemies, and must, on an average, bring better returns. Nothing is more erroneous than to suppose that the Japanese, Chinese, or Indian farmer is a stupid fellow who plants year after year the same grain because his father did so. There are no shrewder farmers on the globe than the Japanese and Chinese. They do things because it pays and they figure very closely. The man

who has a well-improved rice farm with an abundant supply of fresh water is to be congratulated. He need not envy the owner of a Texas oil well nor the proprietor of a gold mine. However prosperous he may be, it is not safe to ignore certain fundamental principles in agriculture.

It is neither safe nor economic farming to produce only one crop and buy everything else necessary to the supply of the farm. One-crop farming is opposed to nature. The soil prefers a change and produces better under a rotation of crops. Safety and economy lie in producing upon the farm as many of the things demanded of the farm consumption as possible.

Generally, upon the rice farm, a small field may be found suited to the production of sugar-cane. A few barrels of open kettle sugar and molasses are valuable additions to the home.

No well regulated farm should be without plenty of cows. They utilise crops that would otherwise be waste, the rice straw and the after growth of the rice fields in the fall. The straw from an acre of rice, at a conservative estimate, is worth five dollars per acre for stock food.

The farmer who has 200 acres in rice and allows the straw to be burned does not realise that he has wantonly wasted 1,000 dollars.

The after growth of the rice fields in the fall is worth at least 1 dollar per acre annually. Here there is liable to be an additional loss of 200 dollars. The average crop of rice on 200 acres of land will furnish 30 tons of bran and pollard worth 350 dollars. Thus the farmer without cattle is annually donating to the wind 1,550 dollars from each 200 acres of rice.

No thrifty farmer can afford to do without hogs on the farm. They are the natural scavengers which convert waste into money. The great variety of root crops, leguminous plants, and rich grasses that can be produced in the South are evidence that swine farming will become one of the most profitable lines of industry on the Southern farm.

The rice farmer should produce the grain for the horses and mules.

Corn is a responsive crop if properly managed. There are varieties of soft rice which yield enormously and are excellent food for work animals.

A Southern farm without fruits ought to be an anomaly, when it is capable of producing so many luscious varieties. Fruits and flowers make home attractive and are significant that a higher civilisation has touched the soil. Soils are intelligent, and they know when a master mind is directing the implements of husbandry. They are afraid of the farmer who has fruits and flowers around his house and they try to do their best for him.

To speak plainly, the great majority of Southern rice farms lack the substantial improvements which indicate progressive farming and thrift. Here is a lack of permanency in the improvements; as if the farmers were renting or just ready to move.

VALUE OF RICE.

All the Government statistics of this staple have been taken with lowland rice as a basis; so little of the upland variety was grown in the

rice-producing States that it cut no figure in the census. In Florida, however, there is hardly any other than the upland variety grown. The census taken by Commissioner Wombwell in 1899 showed an average yield of 20·36 bushels per acre, worth 1 dollar a bushel.

According to the reports of the Department of Agriculture, the yield of wheat in the United States averages very little, if any, above 13 bushels per acre. Wheat, No. 2 red, is worth at present in Chicago 68 to 68¼ cents a bushel. The acre of rice, therefore, is worth 20·36 dollars; the acre of wheat 8·87 dollars. The rice requires to be cultivated two or three times and takes twice the labour in threshing—at least unless rice-threshing machines are introduced—but to partly counterbalance this, rice rattoons and furnishes two or three months of excellent pasturage for milch cows, or working stock either. Wheat stubble is worth gleaning with a herd of swine, but the gleanings do not equal the value of the rice aftermath, and the straw of the threshed-out crops, which, if properly protected from the weather, may be cured into forage nearly as good as hay.

Wheat, rye, barley, and all the cereals except oats, may be cut, bound, and stacked or housed practically at one and the same time, for when the grain is ripe, the straw and roots are dead and dry. Oats, however, require some sun-drying in the swath. But rice is different. When the heads are ready for harvesting, the stalks are green and the roots still vigorous, ready to rattoon as soon as the stalks are harvested. Rice has to be sun-dried in the swath, and it ought also to be cured in the stack a week or more before it is stacked or housed; or else it will heat and "stack-burn" or "mow-burn," which tinges the grain yellow, and materially depreciates its selling value.

This accounts largely for the superior value of rice straw as a forage over that of wheat, rye, or other cereals except oats. The sooner the rice is harvested after the heads are fully matured, the better for the farmer, for two reasons in particular. First, the greener the the straw when cut, the better forage when cured, because containing the more nutritive sap; second, the sooner the first growth is cut, the better it will be for the rattooning process, and the greater amount of rich, nutritious feed it will produce.

The harvesting should be conducted with a view to the mode of threshing which is to be employed. If the crop is small and is to be threshed and cleaned by some manual process, as is generally the case in Florida, then the rice should be cut, laid, and bound as even and as straight as possible, taking care to have the heads all turned the same way, which will save much trouble and loss of time.

Rice should never be threshed immediately after harvesting; it should be stacked or housed for at least fifteen days. This causes it to undergo a sweat (not the destructive "mow-burn" which results when it is not dried in the swath)—and this sweat in the bulk is beneficial. It is considered by experienced planters that it hardens and whitens the grain. Hence, old rice-planters leave their rice stacked from two to four weeks before threshing.

A NEW INSECT PEST OF SUGAR-CANE.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following monthly report from Mr. E. Jarvis, Entomologist at Gordonvale:—

Experimentation against the grub form of albohirta having been discontinued owing to the commencement of the pupal stage of this insect more time has been available for outside field work, and the study of certain phases of the complex question of natural control, relating exclusively to conditions of a physical nature which no doubt influence the economy of cane-beetles very materially.

With reference to field observations, close examination of an extended area of young plant-cane in the neighbourhood of Gordonvale has resulted in the discovery of another insect pest of this plant, which, although of very minor importance, deserves recognition owing to its not having been hitherto recorded as injurious to sugar-cane in Queensland.

The insect in question is the well-known "Leaf butterfly" (*Melanitis leda* Linn.), ranging from Cape York to Sydney and occurring also in New Guinea and other countries. It measures about 3 in. across the extended wings, which are of a uniform chocolate-brown colour on the upper surface, merging into dull orange on the fore wings, which are deeply scalloped on their outer edges and ornamented with a conspicuous black eye-like blotch enclosing two large white spots.

The coloration of the lower surface varies from light to very dark purplish-brown, and is crossed by a few blackish lines resembling the veining of a leaf; while the outer angles of the hind wings are prolonged in the form of two short tails.

This butterfly, which affords a good example of protective coloration, does not fly far when disturbed, but seeks to escape notice by dodging about in an erratic manner for a short distance and then settling hurriedly on the ground or amongst withered leaves, &c., when it remains motionless, shutting its wings so as to expose to view only their leaf-like lower surface.

The deception is so clever that unless one's eye has followed the insect closely and watched it alight there is little chance of locating the specimen.

Knowing the larvæ to be grass feeders I was at first disposed to think their presence on cane leaves might be accidental, but later research having resulted in the discovery of both eggs and larvæ in widely separated plantations there can be little doubt that this butterfly, although of sparing occurrence in cane fields, breeds habitually in such situations.

The pretty pale-green eggs, which are spherical and 1 m.m. in diameter (scarcely 1/16 in.), resemble tiny glass beads, and are laid side by side on the under surface of the leaf-blade in batches of from 3 to 8.

The caterpillar is grass-green, sluggish in habit, and about 2 in. long; the body tapering slightly towards each extremity and presenting a rough appearance.

Owing to its colour, and custom of resting on the lower surface of leaves, it usually escapes detection, but when found is at once seen to differ from the larvæ of other cane pests in having two remarkable reddish or dark-brown horns rising vertically from the head, and a couple of pointed fleshy protuberances projecting horizontally from its hinder extremity.

A number of these strange-looking caterpillars were bred recently at the laboratory, and just prior to pupating suspended themselves by the tail-end to the under surface of cane leaves and roof of their breeding-cage.

The pupa is 1 in. in length, stoutly proportioned, and of a uniform lovely shade of pea-green.

This pest feeds openly, attacking the foliage only, and occasioning injuries very similar in general appearance to those inflicted by grubs of the common "army-worm" (*Leucania unipuncta*).

No parasites were bred, but several pupæ succumbed to what appeared to be a bacterial disease (not yet identified), which caused them to blacken and decompose a few days after pupation.

While dealing with the lepidopterous enemies of sugar-cane I may mention that several caterpillars of hesperid butterflies were collected this month from various plantations near Gordonvale.

The common "skipper" (*Paruara mathias*), figured in Bulletin No. 3 of this Bureau (p. 20, fig. 20), is evidently widely distributed in canefields, most larvæ collected being of this species.

The following notes on the life-history of mathias, supplementary to those given in the abovementioned bulletin, will be of interest:—Its egg is dull yellowish-white, dome-shaped, and deposited singly on the upper surface of cane leaves. The larvæ, in addition to being destroyed by a braconid wasp, are much infested by grubs of a tachinid parasite resembling a small house fly.

It was noticed that individual caterpillars contained from 2 to 4 of these parasitic grubs, which after devouring the fluid contents of their host crawled out of its body and pupated openly on the leaf-blade close to the empty skin.

No doubt this fly renders valuable assistance in checking the increase of *P. mathias*, and possibly other hesperids.

The second species found attacking cane this month was *Telicota augias-kreffti*, previously figured and described in Bulletin No. 3 of this Bureau (p. 20, fig. 21).

Botany.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

No. 4.

ON TWO SPECIES OF GOMPHOCARPUS (WILD COTTON) NATURALISED IN QUEENSLAND.

By J. F. BAILEY, Government Botanist, and C. T. WHITE, Assistant Government Botanist.

Of late numerous specimens have been received of *Gomphocarpus fruticosus* (R. Br.) and *G. physocarpus* (E. Mey.) for identification and report, so it seems advisable to publish the following information on these two very closely allied plants. Both species are here figured, and the accompanying plate should aid in their recognition. In most characters the two species are very similar, the chief distinction being in the fruits (follicles).

G. FRUTICOSUS:—Follicles 2-3 in. long, ovoid, tapering into a beak.

G. PHYSOCARPUS:—Follicles subglobose or obliquely ovoid, 1½-2½ in. diam., obtuse or slightly apiculate, more inflated than in *G. fruticocus*.

GOMPHOCARPUS FRUTICOSUS, R. Br.

WILD COTTON.

A shrub 3-6 ft. high, branches erect, puberulous. Leaves more or less ascending, lanceolate, 2-6 in. long, shortly stalked. Umbels lateral, 6-10 flowered, on peduncles of ¾-1½ in. Flowers white or cream-coloured, on stalks of ½-1 in. Follicles bladdery, beset with soft bristles, 2-3 in. long, ovoid, tapering into a beak. Seeds numerous, each with a tuft of white hairs at the apex.

A native of Africa, also found in the Mascarene Islands, Madeira, Canaries, Arabia, and Southern Europe, perhaps naturalised in some of these latter places. It has long been a naturalised weed in New South Wales, where it is generally known ac Cape Cotton. In Queensland it was first recorded as naturalised in Botany Bulletin 5 (1892), and since that time had spread so rapidly as to become one of our worst weeds.

GOMPHOCARPUS PHYSOCARPUS, E. Mey.

WILD COTTON.

A shrub 3-6 ft. high, stems branched pubescent. Leaves ascending or spreading lanceolate, acute 2-5 in. long. Umbels lateral, 5-10 flowered on stalks of ½-1¾ in. long. Flowers white or cream-coloured on stalks ½-1 in. long. Follicles subglobose or obliquely ovoid, 1½-2½ in. diam., inflated, covered with long soft bristles. Seeds numerous each with a tuft of silky hairs at the apex.

PLATE 10.—GOMPHOCARPUS.

G. fruticosus. G. physocarpus.

A—Seed.

A native of South and Tropical Africa and the Cape Verd Islands, it is here recorded for the first time as naturalised in Queensland; apparently it is not so common as *G. fruticosus.*

These plants have several times been suspected of causing losses amongst stock, and, as they belong to a dangerous family, the Natural Order Asclepiadeæ, this most likely has some foundation, but, though very common weeds, they seem to be seldom eaten by animals.

The question is often asked if the down or silk-cotton surrounding the seeds has any commercial value. It is of no use for textile purposes, the fibre being too short and brittle, and could only be used in the same way as kapok, but its collection for such a purpose would never be a payable proposition. The bark contains a fibre which is thought may yet prove of some value.

The genus GOMPHOCARPUS contains about 80 species and is merged by some modern writers into the older and larger genus ASCLEPIAS; as, however, the species under notice are much more generally known under GOMPHOCARPUS, it has been thought better to retain that name.

Eradication.—If plants are large and fruiting, cut off below the surface of the ground and burn when dry; if young hoe or pull them up.

TO WATERPROOF A COAT.

Take as much boiled oil as is necessary, and mix enough lamp black with it to blacken it. For yellow coats, use ground yellow ochre instead. Then lay the fabric on a smooth surface and put the oil on with a paint brush. Let the first coat get quite dry before applying another. Lay the oil on as thin as possible, or it will not dry. A little patent dryer will make it dry quicker, say ½ lb. to a gallon of oil. Three coats of oil are usually given. If the last coat remains sticky after it is dry, take 1 lb. shellac and simmer gently with 2 quarts of water, and when near boiling add a little liquor ammonia. If for a black coat, add a little lamp black to it when cold, and apply it to the coat with a sponge. In the case of a coat which lets the rain through only in places, one or two coats of oil may be enough. Patent dryers ready for use can be purchased at paint stores, and these can be recommended.—"Town and Country Journal."

Science.

A NEW AND PROLIFIC SOURCE OF GLYCERINE.

The "Mindanao Herald" (Philippes), of 20th May, published the following interesting account of the present position of the glycerine market and of the discovery which has lately been made of its occurrence in Lumbang oil.

GLYCERINE FROM BIAU OIL.

The "Weekly Drug Markets" (New York) of 24th November, states that owing to the war something like a glycerine famine exists at present in the United States.

Quite 60 per cent. of all glycerine used in America formerly came from Europe in a crude form. This avenue of supply has now been cut off by the embargoes of the warring Governments, a condition which is causing much concern, "as the home production of glycerine is entirely inadequate to meet the demands, and refiners have now on hand no more stock than can be exhausted in three to four months."

The world's output of glycerine is estimated at from 90,000 to 100,000 tons per annum, and it is almost exclusively a by-product industry of soap and candle manufacture. Glycerine is also a by-product of the alcoholic fermentation of sugar, but this source of supply is minimissimal compared with the amount obtained as by-product in first-mentioned industries.

Glycerine is used for many purposes, such as in the manufacture of leather, in spinning, weaving, dying, and calico printing, manufacture of waterproof paper, for filling gas meters and hydraulic jacks, in photography, in the manufacture of cast iron, &c., &c., but most important of all it is an indispensable factor in the manufacture of nitroglycerin, dynamite, and other high explosives.

Previous to the war crude glycerine had a market value of 10 cents. gold per lb., and refined glycerine a value of 20 cent. gold per lb. The price rose for crude glycerine in 1915 to 22 cents. gold per lb., and has since July last year suddenly risen greatly in value, the present price being 60 to 61 cents. gold per lb.

Glycerine is, in fact, a by-product of the palm oil gained from the African oil palm kernels, of which oil quite a large percentage of all the soap and candles manufactured in the world are made, and the crude glycerine is gained as a side-product during the process of manufacture. Until quite recently no trials were made with any of the other known vegetable oils to ascertain whether glycerine could be gained from them.

It was reserved for Mindanao to originate the first trial, and the result has proved very successful. That this trial was made is due to Mr. W. F. C. Asimont, the agent of the Department Governor, he having been first to recognise the possibility of gaining glycerine from the well-known Biau or Lumbang oil.

When Mr. Asimont visited Cotabato Province he found that Mr. A. J. Fenner, the analytical chemist and expert of Cotabato Oil Mills, was engaged on trials to manufacture a good soap from Lumbang nut oil, which trials proved most successful. On examining the detailed analysis made by Mr. Fenner of the Lumbang oil, Mr. Asimont noticed that it showed that the oil contains not less than 7·2 per cent. of glycerides, whereas the oil of the African oil-palm shows from 9 to 10 per cent. of glycerides.

He immediately drew the attention of Mr. Fenner to the possibility of gaining glycerine from Lumbang oil. His suggestion was followed out, and trials resulted in excellent crude glycerine being manufactured, samples of which have since been forwarded to Europe.

That this discovery may prove of very great commercial value and may greatly increase the value of the Biau nut is quite to be expected, and it is possible that at no distant date Biau nut oil will play a more important rôle in the market.

ROSELLA AND TOMATO VINEGAR.

A correspondent would be glad to obtain a reliable recipe for making the above.

We have received the recipes here given, but cannot give an assurance of their correctness:—

1. To every 8 or 10 gallons of rosella wine, add 2 to 3 spoonfuls of yeast. Place the cask in a warm spot, and in ten or fifteen days add a sheet of white blotting-paper smeared with molasses and torn into narrow strips. The paper is necessary to form the "mother" or life of the vinegar.

2. Rack off the wine and expose it to the air. Then take a vinegar cask and place in it a gallon of the strongest vinegar, such as Seppelt's, best white vinegar. Mix it with a gallon of your wine and let it remain two or three days; then add 1 gallon of wine daily till the cask is two-thirds full. Then stir it up and let it remain a few days till, by taste, you find it completely acidified. Now draw off the clear vinegar into another cask and start again, adding a gallon a day to the residue in the first cask. When the second cask is full put it in the open under the shade of a tree to mature for a few weeks, when you should have excellent vinegar.

3. We have not been able to obtain any recipe for making tomato vinegar.

General Notes.

THE WORKERS' COMPENSATION ACT OF 1916 IS NOW IN FORCE.

The Insurance Commissioner is now prepared to grant and issue Accident Insurance Policies for the purposes of the Act.

Application Forms may be obtained at the State Accident Insurance Office, Parbury House, Eagle street, Brisbane, and at any Railway Station or Government Savings Bank or from any Clerk of Petty Sessions.

Lodgment with or posting to the Insurance Commissioner of an application will act as a cover for the Policy applied for until the Policy is issued.

JOHN GOODWYN,
Insurance Commissioner.

State Accident Insurance Office,
Parbury House, Eagle street, Brisbane.

INFALLIBLE REMEDY FOR SEA-SICKNESS.

Sprinkle 2 or 3 drops of petroleum on a piece of lump sugar and eat, and the feeling of sickness will disappear immediately. This is not nearly so nasty as it seems, and I have never known it to fail. If a second dose is required, it may be repeated in about ten minutes, but the first is generally quite effectual.

A correspondent sends the above news par. It is easy to verify the statement.

Answers to Correspondents.

AREA OF AUSTRALIA AND NEW ZEALAND.

"INQUIRER," Brisbane—

State.	Area in Acres.	Area in Square Miles.
Western Australia	624,588,800	.. 975,920
Queensland	427,838,080	.. 668,497
South Australia	243,254,800	.. 380,070
(Northern Territory)	335,116,800	.. 523,620
New South Wales	198,848,000	.. 310,700
Victoria	56,245,760	.. 87,884
Tasmania	16,778,000	.. 26,215
Commonwealth	1,902,670,240	.. 2,972,906
New Zealand	66,861,440	.. 104,471

USE OF EXPLOSIVES IN SUBSOILING CITRUS FRUIT TREES.

"PRO BONO PUBLICO," Palmwoods—

1. The best explosive to use is Nobel's Glasgow gelignite, on account of its wide wave of expansion.

2. The depth to which the explosive should be sunk for old trees depends on the nature of the soil. Roughly, however, from 2 ft. 6 in. to 3 ft. Be sure and use a sufficient quantity of explosive, say, at 3 ft., one and a-half plugs of inch gelignite to each hole.

3. The distance from the trunk at which the holes should be sunk rather depends on how the trees are planted. If in rows, it can often be done by placing holes about 9 ft. apart between them. It must be remembered that it is the smaller roots that principally supply the tree with its vitality, and these are usually further than that from the trunk. Should the trees be standing alone, place four holes about 7 to 8 ft. from the trunk, equi-distant apart all round it.

4. Apply to Brabant and Co., Brisbane, for their book on this work, by John F. Griffith, Nobel's expert in Queensland. You will find it useful.

5. If for some unknown reason young trees are not doing well, the explosive must be placed right under the tree at a depth of at least 3 ft. for trees up to 3 in. in diameter. It will often be found that one plug of gelignite at this depth is hardly sufficient, in which case put in a bit more. The trees will often jump two or three inches into the air. This will not hurt them in the least and the chances are 100 to 1 that they will grow, flower, and bear in a manner astonishing.

TO CORN BEEF.

"FARMER," Pittsworth—

An American recipe for corned beef says:—"The parts to be corned should be cut into pieces about 6 in. square. Try to cut the pieces all the same thickness in order to get an even layer when packing them in a jar or barrel. After the meat has been cut, weigh out about 10 lb. of common barrel salt for every 100 lb. of meat. Sprinkle a thin layer of salt into the bottom of the vessel and then pack a layer of meat. Sprinkle another layer of salt and then a layer of meat. Keep on in this manner until the meat is packed. Try to have enough saltpetre left from your brine mixture to cover the last layer. For every 100 lb. of meat packed weigh out 4 lb. of brown sugar, 4 oz. of saltpetre, and 2 oz. of baking soda. Dissolve this mixture in about 1 gallon of boiling water, and let stand until coloured; then pour it over the meat in the barrel. Add enough cold water to cover the meat and then weight the latter down by putting a round piece of clean board and a stone on top to keep all parts in the liquid. The object in using the ingredients mentioned is as follows:—The salt has an astringent effect, and will preserve the meat, but if used alone will harden the muscle fibre. The sugar is used to soften the muscle fibre, and at the same time to add flavour to the meat. The small amount of saltpetre is used to retain the natural red colour of the meat, which is destroyed if only salt and sugar are used. The baking soda will aid in keeping the brine sweet. Meat pickled in this way is ready to be used at the end of from 20 to 25 days, but should be left in the brine until used. The vessel with the meat should be kept in some cool place, as the sugar will have a tendency to ferment if it becomes too warm. In case the brine becomes thick and ropy it should be poured off, the meat washed with clean water, and a fresh brine put over it."

TO OBTAIN A RIGHT ANGLE.

"NEW CHUM," North Coast—

When building either a yard or laying a foundation for a home, all you have to do is to remember three figures, as we have pointed out in some of the earlier issues of this Journal, and now find in "The Farm," South Australia, as follows:—

"For those who are not acquainted with the fact, there is considerable difficulty in getting a right angle for building purposes or the making of yards. A very simple system can be adopted which will give you an accurate angle. The use of three measurements or any measurements of the same multiple will give you a correct angle. Six feet one way and 8 ft. the other at a right angle, will give you 10 ft. across from the two points, and by working on these figures, 6, 8, and 10, you always have a right angle where the six and eight meet. These figures are easily remembered, and the method easily adopted either by ordinary lining up of a building with a 10-ft. cross stick or by using a wooden angle of that size."

The Markets.

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

Article.		JULY.
		Prices.
Bacon	lb.	9d. to 11d.
Barley	bush.	...
Bran	ton	£5 15s.
Broom Millet	,,	£37
Butter	cwt.	140s.
Chaff, Mixed	ton	£7 10s.
Chaff, Oaten	,,	£6 to £7
Chaff, Lucerne	,,	£7 to £8 10s.
Chaff, Wheaten	,,	£6
Cheese	lb.	9¾d.
Flour	ton	£12 5s.
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten (Victorian)	ton	£7
Hay, Lucerne	,,	£7 to £7 10s.
Honey	lb.	6d.
Maize	bush.	4s. 4d.
Oats	,,	3s. 6d. to 3s. 11d.
Onions	ton	£6
Peanuts	lb.	2d. to 3d.
Pollard	ton	£7 5s.
Potatoes	,,	£9 10s. to £12 10s.
Potatoes (Sweet)	cwt.	2s to 2s. 6d.
Pumpkins (Cattle)	ton	£1 7s. 6d.
Eggs	doz.	1s. 6d. to 1s. 8d.
Fowls	pair	5s. to 8s.
Ducks, English	,,	4s. 6d. to 5s. 6d.
Ducks, Muscovy	,,	7s. to 8s.
Geese	,,	7s. to 8s. 6d.
Turkeys (Hens)	,,	11s. to 12s.
Turkeys (Gobblers)	,,	18s. to 22s.
Wheat	bush.	5s. 6d.

VEGETABLES—TURBOT STREET MARKETS.

Cabbages, per dozen	4s. to 7s. 6d.
Beans, per sugar bag	7s. to 9s.
Beetroot, per dozen bunches	9d. to 1s.
Carrots, per dozen bunches	6d. to 1s.
Cauliflowers, per dozen	6s. to 16s.
Chocos, per quarter-case	1s. 6d. to 2s.
Celery, per bundle	1s. 3d. to 1s. 9d.
Custard Marrows, per dozen	1s. 6d. to 3s.
Vegetable Marrows, per dozen	1s. 6d. to 3s.
Lettuce, per dozen	4d. to 9d.
Peas, per sugar bag	4s. to 9s.
Sweet Potatoes, per sugar bag	1s. 9d. to 2s. 6d.
Table Pumpkins, per dozen	2s.
Tomatoes, per quarter-case	4s. to 7s.
Turnips, per dozen bunches	4d. to 6d.
Rhubarb, per dozen bundles	8d. to 1s.

SOUTHERN FRUIT MARKETS.

Article.	JUNE. Prices.
Bananas (Queensland), per case	8s. to 20s.
Bananas (Fiji), per case	13s. 6d. to 15s.
Bananas (G.M.), per bunch	15s. to 17s. 6d.
Custard Apples, per tray	4s. to 6s.
Mandarins, per case	6s. to 10s.
Mangoes, per case	...
Oranges (Navel), per case	10s. to 13s.
Oranges (other), per case	6s. to 8s.
Passion Fruit, per half-bushel case	4s. to 6s.
Lemons (Local), per bushel case	7s. to 11s.
Papaw Apples, per double-case	7s. to 10s.
Persimmons, per half-case	...
Pineapples (Queens), per double-case	6s. to 9s.
Pineapples (Ripleys), per double-case	4s. to 7s.
Pineapples (Common), per double-case	5s. to 6s. 6d.
Tomatoes, per quarter-case	5s. 6d. to 7s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	JULY. Prices.
Apples, American, per case	7s. 6d. to 9s.
Apples, Cooking, per quarter-case	6s. to 7s. 6d.
Bananas (Cavendish), per dozen	2d. to 5½d.
Bananas (Sugar), per dozen	1¾d. to 3d.
Citrons, per cwt.	10s.
Cocoanuts, per sack	12s. to 15s.
Custard Apples, per quarter-case	3s. to 4s. 6d.
Granadillas, per quarter-case	...
Lemons (Lisbon), per case	6s. to 11s.
Lemons (Italian), per case	...
Limes, per quarter-case	...
Mandarins (Local), per half-case	10s. to 16s.
Mangoes, per case	...
Oranges, (Navel), per case	9s. to 11s.
Oranges (other), per case	5s. to 8s.
Oranges (Seville), per cwt.	10s.
Papaw Apples, per quarter-case	1s. 3d. to 2s.
Passion Fruit, per quarter-case	4s. to 6s. 6d.
Peaches, per case	...
Pears, per half-bushel case	7s. to 11s.
Peanuts, per pound	2d. to 3d.
Persimmons, per quarter-case	...
Plums, per case	...
Pineapples (Ripleys), per dozen	2s.
Pineapples (Rough), per dozen	9d.
Pineapples (Smooth), per dozen	1s. to 1s. 3d.
Quinces, per case	...
Rockmelons, per dozen	...
Rosellas, per sugar-bag	1s. to 2s.
Strawberries, per dozen boxes	5s. to 10s.
Tomatoes, per quarter-case	3s. to 6s. 3d.
Piemelons, per cwt.	7s.
Watermelons, per dozen	...

TOP PRICES, ENOGGERA YARDS, JUNE, 1916.

Animal.	JUNE. Prices.
Bullocks	£15 10s. to £19
Bullocks (Single)	£21
Cows	£9 17s. 6d. to £12 15s.
Merino Wethers	29s.
Crossbred Wethers	35s. 6d.
Merino Ewes	23s. 3d.
Crossbred Ewes	30s. 6d.
Lambs	25s. 9d.
Pigs (Porkers)	...
Pigs (Slips)	...

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

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

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	June.	No. of Years' Records.	June, 1916.	June, 1915.
North Coast.	In.		In.	In.
Atherton	1·85	15	0·51	0·61
Cairns	2·92	34	2·21	2·16
Cardwell	2·13	44	1·00	1·19
Cooktown	2·10	40	1·47	2·06
Herberton	1·04	29	0·30	0·66
Ingham	2·53	24	1·88	0·33
Innisfail	7·27	35	3·39	6·35
Mossman	1·56	4	1·45	0·60
Townsville	1·39	45	0·26	0·02
Central Coast.				
Ayr	1·44	29	0·11	Nil
Bowen	1·69	45	0·33	0·20
Charters Towers ...	1·52	34	0·16	Nil
Mackay	2·80	45	1·81	0·56
Proserpine	4·31	13	1·56	1·50
St. Lawrence ...	2·60	45	0·92	0·11
South Coast.				
Biggenden	1·91	14	2·54	0·47
Bundaberg	2·89	33	3·33	0·58
Brisbane	2·66	65	2·79	1·44
Childers	2·36	21	2·73	0·26
Crohamhurst ...	4·43	23	3·06	0·78
Esk	2·05	29	2·36	0·65
Gayndah	1·87	45	2·21	1·47
Gympie	2·58	46	1·86	0·29
Glasshouse M'tains	4·52	8	2·88	0·23
Kilkivan	2·03	37	1·96	Nil
Maryborough ...	2·93	45	3·14	0·82

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	June.	No. of Years' Records.	June, 1916.	June, 1915.
South Coast—continued:	In.		In.	In.
Nambour	3·59	20	2·57	0·61
Nanango	2·00	34	2·37	0·26
Rockhampton ...	2·12	29	1·80	Nil
Woodford	2·71	29	2·24	0·20
Darling Downs.				
Dalby	1·65	46	2·80	0·34
Emu Vale	1·32	17	1·72	0·42
Jimbour	1·49	24	2·45	0·27
Miles	1·99	31	2·95	0·22
Stanthorpe ...	1·79	43	3·13	0·91
Toowoomba ...	2·35	44	3·52	0·67
Warwick	1·67	29	2·01	0·67
Maranoa.				
Roma	1·68	42	3·11	0·15
State Farms, &c.				
Bungeworgorai ...	2·05	4	3·07	0·03
Gatton College ...	1·72	17	1·95	0·05
Gindie	1·67	17	1·29	Nil
Hermitage ...	2·07	10	1·95	0·40
Kairi	1·04	4	0·34	1·15
Kamerunga ...	2·72	26	0·95	1·99
Sugar Experiment Station, Mackay	2·55	19	2·10	0·42
Warren	2·47	4	1·82	Nil

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for June 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 SECOND FOUR MONTHS OF 1916

Date.	MAY.		JUNE.		JULY.		AUGUST.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·14	5·16	6·31	5·0	6·40	5·3	6·30	5·18
2	6·14	5·15	6·31	5·0	6·40	5·4	6·30	5·18
3	6·15	5·14	6·32	5·0	6·40	5·4	6·29	5·19
4	6·15	5·13	6·32	5·0	6·40	5·4	6·29	5·20
5	6·16	5·13	6·33	5·0	6·40	5·4	6·28	5·20
6	6·17	5·12	6·33	5·0	6·40	5·5	6·28	5·20
7	6·17	5·12	6·34	5·0	6·40	5·5	6·27	5·21
8	6·18	5·11	6·34	4·59	6·40	5·6	6·26	5·21
9	6·18	5·10	6·35	4·59	6·39	5 6	6·25	5·22
10	6·19	5·10	6·35	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·35	4·59	6·39	5·7	6·23	5·23
12	6·20	5·9	6·35	4·59	6·39	5·7	6·22	5·24
13	6·20	5·8	6·36	4·59	6·39	5·8	6·21	5·25
14	6·21	5·8	6·36	4·59	6·39	5·8	6·20	5·25
15	6·21	5·7	6·36	4·59	6·39	5·9	6·19	5·26
16	6·22	5·7	6·37	4·59	6·38	5·9	6·18	5·26
17	6·22	5·6	6·37	4·59	6·38	5·10	6·17	5·26
18	6·23	5·6	6·38	5·0	6·37	5·10	6·17	5·27
19	6·24	5·5	6·38	5·0	6·37	5·11	6·16	5·27
20	6·24	5·5	6·38	5·0	6·36	5·12	6·15	5·28
21	6·25	5·4	6·38	5·0	6·36	5·12	6·14	5·28
22	6·26	5·4	6·39	5·1	6·36	5·12	6·13	5·28
23	6·26	5·3	6·39	5·1	6·35	5·13	6·12	5·29
24	6·27	5·3	6·39	5·1	6·35	5·13	6·11	5·29
25	6·27	5·2	6·39	5·1	6·34	5·14	6·10	5·30
26	6·28	5·2	6·39	5·1	6·33	5·15	6·9	5·30
27	6·28	5·1	6·40	5·2	6·33	5·15	6·8	5·30
28	6·29	5·1	6·40	5·2	6·32	5·16	6·7	5·31
29	6·29	5·1	6·40	5·2	6·32	5·16	6·6	5·31
30	6·30	5·0	6·40	5·3	6·31	5·17	6·5	5.32
31	6·30	5·0	...	...	6·31	5·17	6·4	5·32

The Phases of the Moon commence at the times stated on or near the 150th Meridian, East Longitude.

			H.	M.	
2 May	●	New Moon	3	29	p.m.
10 „	☾	First Quarter	6	47	„
18 „	○	Full Moon	12	11	a.m.
24 „	☽	Last Quarter	3	16	p.m.

The moon will be farthest from the earth on the 7th, and nearest on the 19th.

1 June	●	New Moon	5	37	a.m.
9 „	☾	First Quarter	9	59	„
16 „	○	Full Moon	7	42	„
22 „	☽	Last Quarter	11	16	p.m.
30 „	●	New Moon	8	43	„

The moon will be farthest from the earth on the 4th, and nearest on the 16th at midnight.

8 July	☾	First Quarter	9	55	a.m.
15 „	○	Full Moon	2	40	„
22 „	☽	Last Quarter	9	33	„
30 „	●	New Moon	12	15	p.m.

The moon will be nearest to the earth on the 15th, and farthest from it on the 28th.

7 Aug.	☾	First Quarter	5	6	a.m.
13 „	○	Full Moon	10	0	p.m.
21 „	☽	Last Quarter	10	52	„
29 „	●	New Moon	3	25	a.m.

The moon will be nearest to the earth on the 12th, and farthest from it on the 25th.

A partial eclipse of the moon will occur on 15th July at 2·30 p.m., when the moon will be below the horizon in Australia.

An eclipse of the sun will take place on 30th July. It will be partial only in Queenslamd but annular, or leaving the edge of the sun visible as a magnificent golden ring at Adelaide, and in a line across the south-west of Australia.

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 this time of the year.

At Roma the times of sunrise and sunset during May, June, July, and to the middle of August may be roughly arrived at by adding 20 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.

Farm and Garden Notes for September.

FIELD.—Spring has now arrived, and with it there will be the usual trouble with weeds, especially on carelessly prepared ground. Therefore, the cultivator and the horse and hand hoe must be kept vigorously at work to check the weed pests and save the growing crops as well as much future labour. Attend to earthing up any crop which may require it. There may possibly occur drying winds, dry weather, and even very late frosts, which have not been unknown in parts of this State even as late as September. Still, good showers may be looked for in October, and much useful work may be done during the present month which will go far to afford a fair prospect of a good return for labour. Plant out *Agave rigida,* var. Sisalana (sisal hemp plant), in rows 6 to 8 ft. apart, according to the richness of the soil. All dry places on the farm, too rocky or too poor for any ordinary crops, should be planted with this valuable aloe. Especially should limestone country be selected for the purpose. If the soil is very poor, and the plants very small, it is better to put the latter out into a nursery of good soil, about 1 ft. apart. Next year they will be good-sized plants. Keep down tall weeds in the plantation, and do not allow couch or buffalo grass to grow about the roots. Sisal will do no good if planted on low-lying wet land, or on a pure sandy soil. It thrives best where there is plenty of lime, potash, and phosphoric acid, all of which (except potash, unobtainable under present war conditions) can be cheaply supplied if wanting in the soil. Sisal requires so little labour from planting to maturity that it can be grown to good profit despite the high cost of white labour. The price of the fibre now ranges from £50 to £60 per ton for British East African, the Mexican being unobtainable. Sow cotton—Sea Island near the coast, and Uplands generally. Caravonica succeeds best in North Queensland. Sow maize, sorghum, imphee, mazzagua, Indian cane, prairie grass, Rhodes grass and paspalum, panicum, tobacco, pumpkins, and melons. Sugar-cane planting should be vigorously carried on. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, ginger, and canaigre, the latter a tuber yielding a valuable tanning substance. Plant out coffee.

KITCHEN GARDEN.—Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Failing a sufficient supply of these, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case, stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be of great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly dug beds. What the action of salt is, is not exactly known, but when it is applied as a top dressing it tends to check rank growth. A

little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile, and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow Guada bean, providing a trellis for it to climb on later. Sow cucumbers, melons, marrows, and squash at once. If they are troubled by the red beetle, spray with Paris green or London purple. In cool districts, peas and even some beetroot may be sown. Set out egg plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, chicory, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory, provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

FLOWER GARDEN.—Continue to plant bulbs as directed last month. Protect the plants as much as possible from cold westerly winds, which may still occur, notwithstanding the increasing temperature. Be careful that the bulbs do not come in contact with fresh manure. Keep a good lookout for slugs. Plant out chrysanthemums, palms, and all kinds of tropical and semi-tropical plants. If hot weather should ensue after planting, water and shade must be given. Sow dianthus, snapdragon, and coleus, seed or cuttings of the latter. Roses will now be in full bloom. Keep them free from aphis, and cut off all spent blooms. This latter work should be done in the case of all flowers. If you wish to save seeds, do not wait for the very last blooms, but allow some of the very best to go to seed. If you have any toads in the garden or bush-house, encourage them to take up their abode there. They are perfectly harmless, in spite of their ugliness, and they destroy an astonishing number of insects injurious to plants. Fill up all vacancies with herbaceous plants. Sow zinnia, gaillardia, amaranthus, cockscomb, balsam, sunflower, marigold, cosmos, summer chrysanthemum, coreopsis, portulaca, mesembryanthemum, calendula, &c.

Orchard Notes for September.

THE SOUTHERN COAST DISTRICTS.

The marketing of citrus fruits, in the later districts, of the late winter or early spring crop of pines and bananas, also of strawberries and Cape gooseberries, will continue to occupy the attention of fruit-growers. We can only repeat the advice we have so often given in these Notes respcting the marketing of all kinds of fruit—viz., to grade the fruit evenly, pack honestly, and display it to the best advantage if you want to get good returns.

September is a very important month to the fruitgrower, owing to the fact that it is usually a dry month, and that it is essential in all cases to keep the land in a high state of tilth, so as to retain the moisture that is required by the various trees that are in blossom, thus securing a good set of fruit. Where irrigation is available, it is advisable to give the trees a good watering should the ground be dry, as this will induce a good growth and cause the fruit to set well. If an irrigation is given, it should be a thorough one, not a mere surface watering, and once the land is saturated the moisture must be retained in the soil by constant and systematic cultivation. If this is done, one good watering will usually be enough to carry the trees through in good condition to the thunderstorms that come later or even to the summer rains, if the soil is of a deep sandy loamy nature.

No weeds must be allowed in the orchard or vineyard at this time of the year, as they are robbing the trees and plants of both the water and plant food that are so essential to them at this period of their growth.

There is not much to be done in the way of fighting scale insects during the month, as they are more effectually dealt with later on; but where young trees are showing signs of distress, owing to the presence of scale insects, they should be treated, the gas method being the most efficacious.

Beetles and other leaf-eating insects often make their appearance during the month. The best remedy is to spray the trees or plants with one or other of the arsenical washes that are recommended by me in this journal. The vineyard will require considerable attention. Not only must it be kept well worked, but any vines that are subject to the attack of black spot must be sprayed from time to time with Bordeaux mixture. Disbudding must be carefully carried out, as this work is equally as important as the winter pruning, as it is the best means of controlling the future shape of the vine. A very common fault with vines grown in the coast districts is that the buds often remain dormant, only the terminal bud and possibly one other starting into growth, thus leaving a long bare space on the main rods, which is undesirable. When this takes place, pinch back those shoots that have started, and which are taking the whole of the sap, and force the sap into the dormant buds, thus starting them into growth. This will result in an even growth of wood all over the vine—not a huge cane in one part and either a stunted growth or dormant buds on the rest.

Every care should be taken during the month to prevent the fruit-fly from getting an early start. All infested oranges, loquats, kumquats, or other fruits should be gathered and destroyed, as the keeping in check of the early spring crop of flies, when there are only comparatively few to deal with, will materially lessen the subsequent crops. Land that is to be planted to pines or bananas should be got ready now, though the planting need not be done till October, November, or even later. Prepare the land thoroughly; don't scratch the surface to the depth of a few inches, but plough as deeply as you have good surface soil, and break up the subsoil as deeply as you can possibly get power to do it. You will find that the extra money expended will be a profitable investment, as it will pay every time.

THE TROPICAL COAST DISTRICTS.

September is usually a very dry month, and fruit trees of all kinds suffer in consequence. The spring crop of citrus fruits should be harvested by the end of the month, as, if allowed to hang later, there is a great risk of loss by fly. The fruit should be well sweated, and, if carefully selected, well-graded, and well packed, it should carry well to, and fetch high prices in, the Southern States, as there are no oranges or mandarins grown in Australia that can excel the flavour of the best of the Bowen, Cardwell, Cairns, Port Douglas, or Cooktown fruit.

As soon as the fruit is gathered, the trees should be pruned and sprayed with the lime and sulphur wash, as this wash is not only a good insecticide, but it will keep down the growth of all lichens, mosses, &c., to which the trees are very subject.

Every care should be taken to keep down the crop of fruit-fly during the month. All infested fruit should be gathered and destroyed, particularly that in or adjacent to banana plantations. Watch the banana gardens carefully, and keep well cultivated. New land should be got ready for planting, and where land is ready planting can take place.

Papaws and granadillas are in good condition now, and, if carefully gathered and well packed in cases only holding one layer of fruit, they should carry well to the Southern markets if sent in the cool chamber.

THE SOUTHERN AND CENTRAL TABLELANDS.

Prune grape vines at Stanthorpe in the early part of the month, leaving the pruning as late as possible, as the object is to keep the vines back in order to escape damage from late spring frosts. All vines subject to the attack of black spot should be treated with the winter dressing when the buds are swelling; this treatment to be followed by spraying with Bordeaux mixture later on.

Where fruit trees have not received their winter spraying, they should be treated at once before they come out into flower or young growth. Where the orchard or vineyard has not been ploughed, do so, taking care to work the land down fine as soon as it is ploughed, so as to keep the moisture in the soil, as the spring is always the trying time for fruit trees.

Look out for fruit-fly in the late oranges and loquats in the Toowoomba district. Keep the orchards and vineyards well cultivated; disbud the vines when sufficiently advanced. Spray for codlin moth.

In the Central tablelands irrigate vines and fruit trees, and follow the irrigation with deep, constant, and systematic cultivation. Keep down all weed growth, and fight the red scale on citrus trees with cyanide. The objective of the fruitgrowers throughout Queensland during September and the following months is, "How best to keep the moisture in the soil that is required by the trees, vines, plants, and vegetables"; and this objective can only be obtained by irrigation where same is available, or by deep, systematic, and constant cultivation where there is no water available for irrigation.