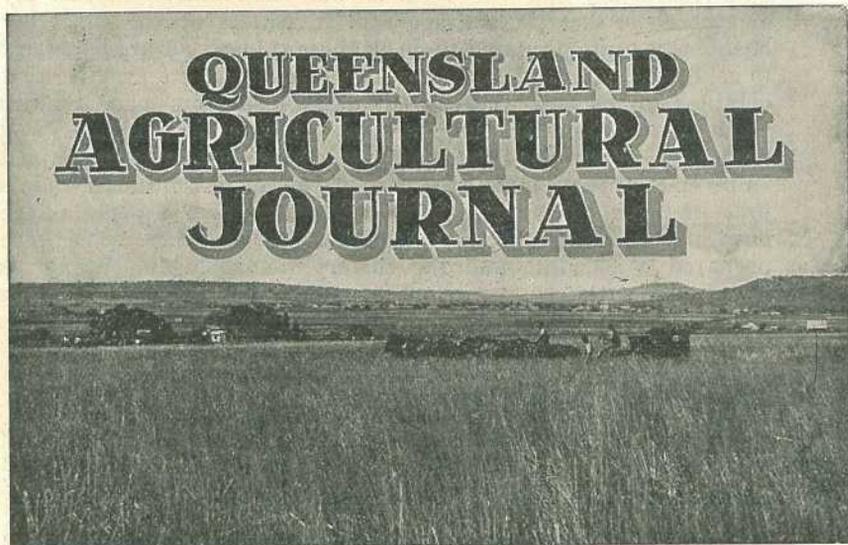


## ANNUAL RATES OF SUBSCRIPTION.

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PART 5

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## Event and Comment.

### The Quality of Dairy Products—Move to Improve.

FROM a primary producer's point of view, one of the notable events of the month was the introduction of the Dairy Produce Acts Amendment Bill, the object of which is to provide regulatory measures for the improvement of the quality of dairy products. The major principles of the Bill involve, firstly, the necessity of a cream supplier giving twenty-eight days' notice of his intention to discontinue supplying one factory in favour of another; and, secondly, the licensing of cream carriers. The Bill was introduced by the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, who, in the course of its Initiation in Committee said—

It must be remembered, in approaching a question such as is involved in this Bill, that the days of production, and production alone, are definitely past. The farmer to-day needs an economic organisation to make marketing profitable. The provision of that marketing organisation and his cultural care are both matters that require the practical sympathy and whole-hearted support of the Government, whatever Government happens to be in power. A good deal of attention has been focussed during the last twelve months on the question of quality in Queensland produce. . . . It is no exaggeration to say that the campaign on which I am entering is necessary in order to preserve stabilisation

and more essential in order that we should give the British people the very choicest butters. There are some people who habitually do not produce cream that will churn into first-class butter, or send milk to a factory that will ever make first-class milk standards. My experience is that the average farmer, who is not in any other business, is quite prepared to do all those things that are necessary to achieve equal standards. We have abandoned the practice that obtained in the past whereby our dairy inspectors made regular visits through regular territory and inspected in a regular way the dairies of various producers with whom they came in contact. In reversal of that policy—for I believe a true test of a dairyman's practice lies in the can that he delivers—our dairy inspectors have now in the main been attached to dairy factories. We have prepared a schedule and the factory managements supply us each week with the names of suppliers who forward inferior cream. We do not bother the man who is supplying first-class cream.

#### Maintenance of a High Cream Standard.

**E**XPLAINING the amending legislation, the Minister remarked that one or two important departures were proposed, but, apart from the entirely new principles involved, its general provisions were mainly of a machinery nature. He added—

The first new principle requires an individual to give twenty-eight days' notice before diverting his milk or cream supplies from one factory to another. . . .

The provision prohibiting supplies being removed for twenty-eight days is a very definite attempt to bring about what I believe to be necessary, and what the industry believes to be necessary—an improvement in quality. . . . When a dairy inspector goes along to the factory and finds that a man who is supplying three times a week has had three condemnations, he will immediately get in touch with that individual; and the individual concerned will know that the dairy inspector is on his track. Is there not a temptation for the producer to transfer his supply of cream to some other factory? We could follow that cream, no doubt, but it would mean that the man attached to the factory in the district to which the cream was sent would have to get in touch with the individual in the district where the cream belonged, and that would lead to all sorts of difficulties, much correspondence would result, and valuable time would be lost. My aim is that when a man sends in bad cream we shall have twenty-eight days in which to discover the reason. At the end of that time he can go to Timbuctoo, or as his fancy dictates; but during that period of twenty-eight days, in the interests of the industry and the individual himself, we claim we can do material work to improve substantially the quality of his cream. If he can pull out as soon as we get on to his track then the whole system tends to defeat itself, and the valuable work of valuable officers may be nullified. . . .

New Zealand has much more rigid conditions in this respect than I propose to impose. New Zealand butter always sells at a higher price than Australian butter. I know there are other factors. . . .

One reason why New Zealand butter sells at a higher price than Australian is because there is less variation in its quality. That is obtained by regimenting supplies, practically zoning factory districts and forbidding suppliers to change over from one factory to another. That is practically prohibiting "wandering suppliers." By these means they have made it possible to market two brands of butter only . . . . and thereby protected dairy quality. . . . At one time there was no regulation so far as cream suppliers were concerned; they could send their product from one end of Queensland to the other, if it were feasible. For example, cream may be sent from Gympie to be churned at Kingston, and cream may be sent from Kingston territory to be churned, say, at Gympie. I am using those factories as an illustration to prove my statement. I have had a careful analysis made of supplies, and I find the "wandering supplier" is a serious factor in factory efficiency. The figures relating to a factory situated closer to this House than any other illustrates the whole position. Out of 121 suppliers of second quality cream, forty-eight are outside what may be termed the immediate manufacturing zone. There is a very grave lesson to be learned from these figures. I believe, with my friend, the hon. member for Fassifern, that the real solution of the question of the "wandering supplier" is zoning; but I believe we shall have to approach zoning through a series of graduated supplies, and that will eventually be accomplished.

#### Transport of Cream.

**S**TRESSING the necessity for an improvement in the system of cream cartage now in vogue in practically every dairying district in the State, Mr. Bulcock continued—

Associated with this question of quality of dairy produce is the transport of cream. There are people living here, there, and everywhere and various delivery vans bring in the cream at varying intervals. Some vans make two deliveries a week and others one every day. It is desirable that there should be some control over the road transport of cream and this Bill provides that road transport licenses shall be issued to carriers under the jurisdiction of the factory. That certainly will have a tendency towards achieving the objective of zoning—it is certainly another step in that direction. Hon. members representing sugar areas could not contemplate letting sugar go past one mill to be processed at another. Areas are assigned to each mill, and cane is not a highly perishable product such as cream.

Cream is sometimes transported under very undesirable conditions. I admit that from an administrative point of view much has yet to be done. I recognise that even though we can very substantially strengthen the organisation so far as road transport is concerned it is still necessary to pay some attention to rail transport in order to effect the general improvement that is necessary.

## White Wax Scale.\*

By W. A. T. SUMMERVILLE, M.Sc., Assistant Entomologist.

**T**HERE are two species of scale insects found in Queensland which are aptly described by the vernacular name white wax, but only one of these attacks citrus trees. The two species are very similar in external appearances, and before taking any measures to eradicate a species of plant because it carries a population of such a scale insect, it may be wise for citrus growers to obtain a definite identification, particularly when the expenditure of money is involved.

The species which attacks citrus is found on a number of other plants also, the commonest of which are river cherries, Gardenia, persimmon, and guava.

Like its close ally, the pink wax scale, the white wax (Plate 1) is more commonly found in humid coastal parts than in more inland districts, and it is in fact a rather rare insect west of the Great Dividing Range. It appears that the white wax is partial to temperate climates, and this is no doubt the reason why the scale is much more important in New South Wales than in this State. Until recently white wax has rarely caused orchardists in Queensland any concern, but during the past few years there has been a considerable increase in the amount of the scale found here, particularly in citrus producing districts in the south-eastern parts of the State. This increase may prove to be only temporary, but it is advisable for growers to keep the scale well in check by taking appropriate steps for its control whilst there is no great amount of it in their orchards.

### Description.

The following description is necessarily too general to allow growers to differentiate between the two species of white wax, but will serve to show the difference between the white wax and other species found on citrus. As has been stated the vernacular name describes the general appearance quite well. The young crawlers after a brief migratory period settle down to feed and then quickly become covered with a waxy coating, the margins of which are produced in a series of arms or rays. Soon the form changes and the wax takes on a general conical shape. As development proceeds the conical shape is gradually replaced by a more globular form, somewhat flattened on the top and with irregular protruberances on the sides. Colonies are frequently so crowded that the outline of the scales may be considerably modified and the whole appear like a series of irregular masses of wax along the twig. The colour at first is pure white and shining, with a snow white line of flatter tone marking the position of the openings of the breathing organs. Later the general colour becomes duller, and old specimens may be almost grey. The average length of the scale of full grown females is about three-eighths of an inch.

### Habits and Life History.

As white wax has up to the present been of but minor importance in Queensland, comparatively little work has been done in connection with it, and consequently a complete account of its habits and life history

\* *Ceroplastes destructor* Newstead.

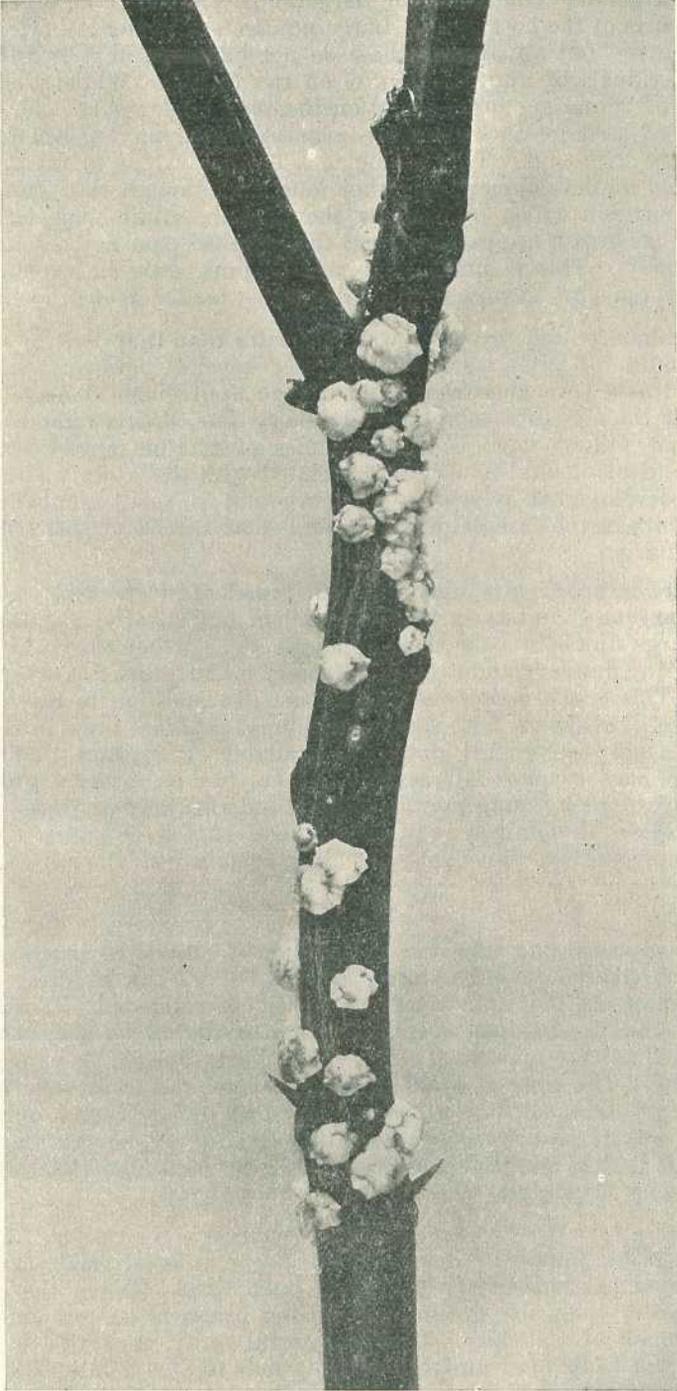


PLATE 183.

White Wax Scale showing infestation on small branch.

cannot be given. The scales for the most part settle down on the more tender parts of the host plant. Large numbers of young are often found on the leaves, but apparently these do not persist, and it is unusual to find individuals of appreciable size on the foliage. Whilst the largest colonies of young are to be found on the very tender parts, the greatest number of well grown scales are generally seen on hardened growth just below the twigs. This is due to a certain extent to the fact that the period of development is rather long and, though the young select tender parts on which to feed, by the time the adult stage is reached the tree has grown appreciably, and the attacked part has become somewhat woody. This is unlike the case of pink wax, in which species the individuals are always found on the most tender growth available.

The damage done by white wax is greater than that done by comparable colonies of pink wax. The former species, however, cannot be described as a voracious feeder and though appreciable damage is done by larger colonies in a comparatively short time, this is light compared with what follows when similar colonies of red or mussel scales are present. Sooty mould is usually associated with the white wax colonies, but its development is seldom excessive and is small compared with what occurs in the case of pink wax and some species of soft scale such as *Pulvinaria*.

There is apparently only one full brood of white wax each year. Young may be found as early as November, but usually it is December before large numbers make their appearance. Further emergencies take place during January and even in February many crawlers are sometimes found. This is the main breeding season. In addition to this in some parts there is evidence that smaller hatchings take place later in the year, and although no verified data are available it appears that chance hatchings may occur as late as May. There is thus rather a protracted period over which young may be found, and this may at times make it rather difficult to obtain a very satisfactory control. Fortunately, however, it appears that the chance hatchings are always rather light.

### Control.

It is necessary to time the application of control measures so that, whilst the emergence of young is as complete as can be desired, it is the youngest possible individuals which will be combated. It will often be impossible to wait long enough to allow of the total emergence being completed without some of the new brood being too old to be assuredly vulnerable. The time of application of control measures thus becomes a matter of judgment. The time of breeding depends on a number of variable factors and therefore a definite time of application cannot be stated. It is thus essential in all cases for growers to make the necessary observations themselves and use their own judgment.

When a very few trees are lightly infested, as is the case now in many orchards in the Maroochy district particularly, it is advisable to remove the infested portions of the trees and burn them. When the number of colonies or their size prevents this being practical or economical, use must be made of scalicides. The most useful spray, generally, is a wash consisting of  $1\frac{1}{2}$  lb. of clean fresh washing soda to each 4 gallons of water. The resin-caustic soda-fish oil mixture, the formula of which is resin 10 lb., caustic soda of good commercial quality 3 lb., fish oil, preferably herring oil,  $1\frac{1}{2}$  lb., and water 40 gallons, is also very effective if used at

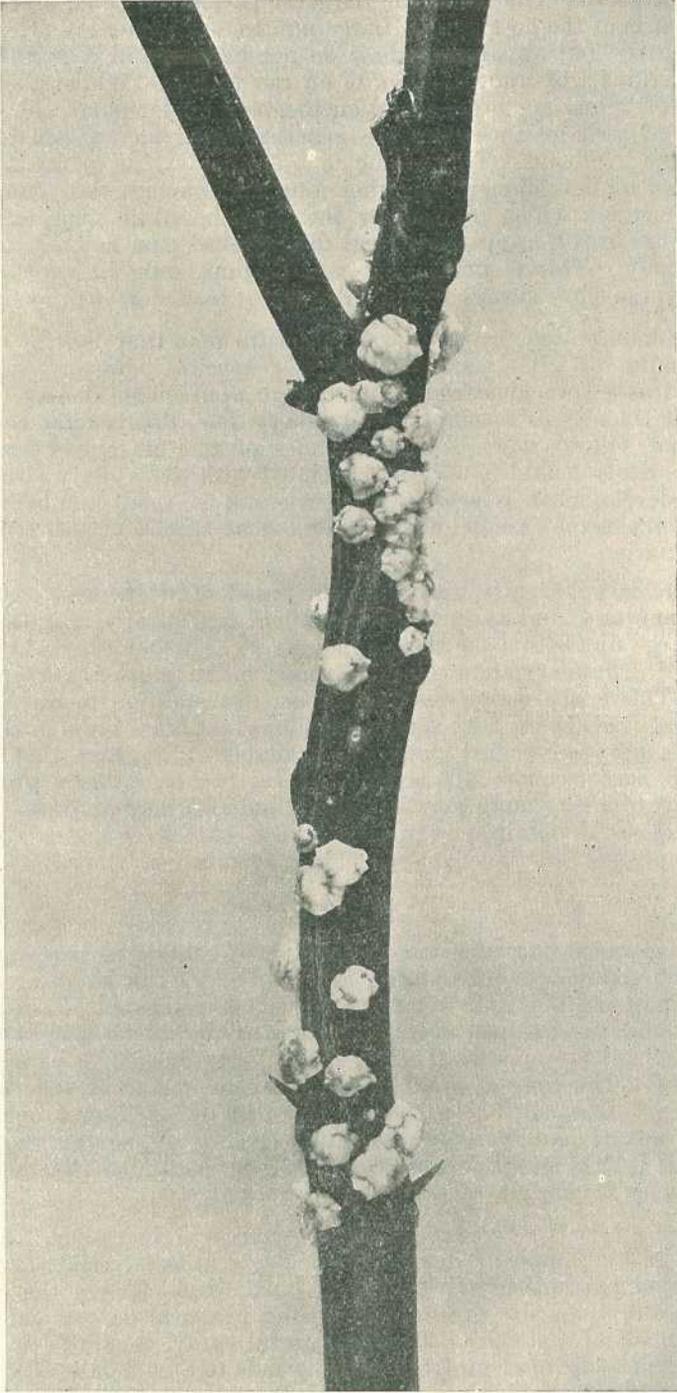


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the correct time. This spray, the details of the preparation of which are available in other Departmental entomological publications, is most useful in those districts in which the bronze orange bug occurs, or where a complexity of scale insects must be combated.

Fumigation with hydrocyanic acid gas is not likely to find much employment against white wax, as in those districts in which this species is a pest, fumigation is not recommended as a rule owing to climatic conditions. The fumigant has not been tested for this reason, but it would almost certainly be effective against the scale.

The soap and washing soda mixture recommended for use against pink wax cannot be recommended in this case for general use, as it is efficient only when applied against the very youngest individuals. From what has been stated above it will be seen that most frequently only a proportion of the insects at any one time would thus be vulnerable to this spray.



PLATE 184.

MONUMENT TO PIONEERS OF THE SUGAR INDUSTRY.

The unveiling of the Memorial Cairn at Ormiston, near Brisbane, was performed by the Premier, Hon. W. Forgan Smith, LL.D., in the presence of a large gathering, including delegates to the Fifth Triennial Congress of the International Society of Sugar Cane Technologists, representing twelve countries besides Australia. Mr. Forgan Smith delivering the dedicatory address.

## Spraying Experiments for the Control of Fruit Fly in the Stanthorpe Districts.

By HUBERT JARVIS, Entomologist.

**D**URING the 1933-34 season a nicotine sulphate-white oil spray was tested for fruit fly control on Granny Smith apples, and the results appeared sufficiently promising to warrant further experiments. It was accordingly decided to continue such experiments but to design them to embrace earlier susceptible varieties of apples, and certain varieties of plums. The results obtained during the 1934-35 season are detailed in the following report.

### Experiment No. 1.

The first experiment was carried out at The Summit on the orchard of Mr. A. H. Paget, the fruit selected being Wilson plums. The effect of applying a white oil spray to plums was unknown and it was considered that there might be some risk of spray injury or of destroying the bloom of the fruit, hence only five trees were selected for this experiment. The trees chosen were of a reasonable size for spraying with a knapsack spray fitted with a four foot extension rod and they carried a very good crop of fruit.

The sprays tested were nicotine sulphate-white oil, used at a strength of half a pint of nicotine sulphate and half a gallon of white oil to 40 gallons of water, and white oil alone used at the rate of half a gallon of the oil to 40 gallons of water.

The sprays were first applied on October 29th, when the plums were about half grown, and further applications were made at weekly intervals until December 10th, making six treatments in all, the final sprays being applied when the fruit was almost ready to pick. On the last mentioned date a disastrous hail storm occurred causing the almost complete destruction of 70 per cent. of the fruit.

No actual damage to the fruit from the white oil, or from the nicotine sulphate-white oil sprays could be detected, but it was noticed that the sprays used accelerated the colouring of the fruit although they did not cause any fruit drop. Both sprays, however, rendered the appearance of the fruit somewhat unattractive in that they caused it to become rather shiny and greasy. This, however, was not considered by the grower to be a serious detriment to its market value.

At the time of each spray application a general examination was made of the fruit on the experimental trees, and no indication of fruit fly infestation was discovered either on the sprayed or unsprayed trees. The experiment was accordingly inconclusive.

### Experiment No. 2.

The second experiment was also carried out at The Summit on the orchard of Mr. R. Wells, work therein commencing on November 7th.

The trees selected were twenty-one in all, there being seven each of the following varieties of apples—Marjory Hay, Gravenstein, and Delicious. Marjory Hay is one of the earliest apples, being ready for market by the middle of December, and is very susceptible to fruit fly

attack. The Gravenstein and Delicious, on the other hand, are varieties which mature very much later and had received only one application of spray when the fruit was destroyed by hail; hence the following notes on Experiment No 2 refer entirely to Marjory Hay apples. The sprays used were nicotine sulphate-white oil, white oil alone, and a colloidal sulphur. The first and second sprays were used at the same strength as in the first experiment, while the colloidal sulphur was used at the rate of one ounce to four gallons of water. The first application was made to the Marjory Hay apples on November 7th, when the fruit was about an inch in diameter, and further treatments were given at weekly intervals until December 10th, when the experimental trees were very severely damaged by hail.

During the course of the experiment a good deal of fruit drop was noted, but this is in accordance with the general character of the variety. The nicotine sulphate-white oil and white oil alone caused slight scalding where apples were exposed to the sun's rays, and the colloidal sulphur application caused the formation of minute discoloured spots immediately beneath the droplets of spray where they had dried on the fruit. Both blemishes, however, were barely perceptible and did not affect the market value of the fruit.

The windfalls were gathered every week and a general examination of the apples on the sprayed and unsprayed trees was also made, but no indication of fruit fly incidence was noted, either in the windfalls or in the fruit on the trees up to December 10th, when the fruit was destroyed by hail. This experiment was also inconclusive.

### Experiment No. 3.

The third experiment was carried out in the orchard of Mr. E. Cran at Severnlea, on whose property the work was instituted last season. Four trees each of the Gravenstein, Jonathan, and Delicious varieties of apple were selected for the experiment, each of these varieties being subject to fruit fly attack.

The trees chosen were fairly wide apart, each variety being in a separate row, and the sprays employed and the strengths were as in the preceding experiment. Approximately one gallon of spray fluid was used per tree per application, the cost of the four applications of nicotine sulphate-white oil per tree being 7.08d., of the white oil alone 3.06d., and of the colloidal sulphur 2.12d. Four treatments were given to the Gravensteins and five to the Delicious and Johnathans, all the applications being made during sunny weather. The experiment was then discontinued owing to the practical disappearance of fruit fly from this orchard. The fruit fly was of course present during the earlier stages of the experiment as was indicated by the heavy infestation in the Gravenstein control tree. The Gravenstein matures several weeks before the Johnathan and Delicious, and when the fruit fly infestation occurred in the firstmentioned variety, the others were too immature to be attractive to the fly.

Slight scalding owing to hot sunshine occurred in the case of the nicotine sulphate-white oil and white oil alone, more particularly on the Johnathans, and the minute spotting under the droplets of colloidal sulphur, mentioned in discussing the previous experiment, also occurred in this case. As before, the blemishes were of no practical consequence.

The results obtained in the case of the Gravensteins are set out in Table I., and indicate that all three sprays gave some measure of protection from fruit fly attack. Owing to the high cost of the nicotine sulphate-white oil mixture, it was particularly desired to ascertain if white oil alone would be as effective as the combination spray, but this was not the case, white oil being the least satisfactory of the three as it gave only 59.6 per cent. of sound fruit. The colloidal sulphur with 70.6 per cent. of sound fruit was not far behind the nicotine sulphate-white oil spray in efficiency, the latter giving 77.6 per cent. of sound fruit. The colloidal sulphur is an easy spray to mix and apply, and is more economical than the nicotine sulphate-white oil mixture.

TABLE I.  
RESULTS OF FRUIT-FLY SPRAYING EXPERIMENT ON GRAVENSTEIN APPLES.

Treatment.	Total Number of Apples.	Sound.	Per Cent. Sound.	Unsound.	Fruit Fly-Infested.
Nicotine sulphate-white oil	156	121	77.6	35	35
White oil alone .. ..	213	127	59.6	86	86
Colloidal sulphur .. ..	143	101	70.6	42	42
Control .. .. .	177	79	44.6	98	98

After the harvesting of the Gravenstein apples late in January, no data of any value was secured from this experiment.

The owner of the orchard, who had obtained good results from the nicotine sulphate-white oil spray on Gravenstein apples, not included in the experiment now under discussion, in other parts of the orchard, then decided to spray the whole of the remaining crop of apples of all varieties at weekly intervals, and this may have had some influence on the subsequent scarcity of the fly in the orchard. Further treatments were given to the Johnathan and Delicious trees on the experimental plots, but practically no fly infestation occurred either in the treated or untreated trees, and on the 27th of February, the experiment was discontinued.

#### Experiment No. 4.

The fourth experiment was carried out at Broadwater, on the orchard of Mr. H. M. Jones, where four President plum trees carrying a good crop of fruit were selected from a row of 20 trees, one sprayed tree and one control tree being situated at each end of the row.

The spray used was the nicotine sulphate-white oil combination at the strength employed in the other experiments. Three applications were made commencing on January 18th, the fruit being picked on February 14th.

The natural colour of the President plum is a deep purple red with an attractive bluish bloom, and this appearance was spoiled by the spray, the plums being greasy and dull in patches, with a little bloom showing here and there. They were, however, quite saleable and realised a fair price on the market.

The spray appears to have afforded some protection from fruit fly attack in this case as will be seen by reference to Table II., which shows that the treated trees gave 87.0 per cent. and 94.2 per cent. of sound fruit, whereas the untreated trees yielded only 57.5 per cent. and 51.7 per cent. of sound fruit.

TABLE II.  
RESULT OF FRUIT-FLY SPRAYING EXPERIMENT ON PRESIDENT PLUMS.

Tree.	Total Number of Plums.	Sound.	Per Cent. Sound.	Unsound.	Fruit Fly-infested.
Sprayed Tree, No. 1 ..	477	415	87.0	62	62
Sprayed Tree, No. 2 ..	411	387	94.2	24	24
Control Tree, No. 1 ..	452	260	57.5	192	192
Control Tree, No. 2 ..	387	200	51.7	187	187

### Summary.

The results of the season's experiments with fruit fly sprays were rather inconclusive partly because of the hail incidence and partly because of the absence of fruit fly infestation in certain of the experimental orchards during the course of the work. Nevertheless, the results obtained seem to warrant further investigation of the possibilities of sprays for the control of fruit fly.

### Acknowledgements.

The writer desires to record his appreciation of the very helpful co-operation rendered by those orchardists who made their trees available for the purpose of the experiments, and also his appreciation of the assistance and advice of the Chief Entomologist, Mr. Robert Veitch.

### EXPIRED SUBSCRIPTIONS.

A very large number of subscriptions to the Journal expired in September and October, and have not been renewed. A further large number expires with this issue.

Subscribers whose term has expired have been continued on our mailing list, and a yellow wrapper on this month's Journal (November) is an indication that their subscriptions are now due.

Address renewals without delay to the Under Secretary, Department of Agriculture and Stock, Brisbane.

## The Buffalo Louse (*Haematopinus tuberculatus*), Nitzsch, on Cattle in Queensland.

By F. H. S. ROBERTS, D.Sc., Animal Health Station, Yeerongpilly.

THE common sucking louse of cattle in Queensland is the short-nosed cattle louse, *Haematopinus eurytarnus*, Nitzsch, of which two forms have been seen. In the tropical portions of the State, the species is represented by a large dark form, whilst in the south, these lice are in general, smaller and lighter in colour. On young cattle the long-nosed cattle louse, *Linognathus vituli*, Linnaeus, is fairly frequent. Recently (1935) the writer recorded the presence of a third species of sucking louse on cattle in this State, namely *Solenopotes capillatus* Enderlein, the tubercle bearing cattle louse.

In 1929, a specimen of the tail switch of a cow which was literally covered with louse eggs was received from Townsville. As no lice were present, no identification of the species to which the eggs belonged could be made. Four years later, a further specimen from a bullock was received from Gregory Downs, Gulf of Carpentaria, taken by the Stock Inspector, Mr. Seamer, and with it were several well grown specimens of a sucking louse. These lice were subsequently identified as *Haematopinus tuberculatus*, Nitzsch, the sucking louse of the buffalo, *Bubalus buffelus*. Enquiries made by the writer during a visit to this district elicited the information that tail switches heavily infested with lice are not uncommon among the cattle here. It is considered that these infestations are concerned with this louse, as the tail switch is the most usual site of infestation by this species. The species was first recorded from Australia in 1913 by Johnston and Harrison who noted its presence among dromedaries in north-west Australia. It was later reported by Dickinson and Hill (1916) as infesting calves at Darwin, Northern Territory.

The buffalo louse is mentioned as infesting cattle in Mozambique and in the West Indies. Van Volkenberg (1934), reporting on its presence in Porto Rico, refers to the species as the large tail louse of cattle, and notes that heavy infestations are found especially on stalled cattle. The species is said by him to be very common among cattle on the southern coast of the island.

Other records show this louse to be present in Italy, Belgian Congo, Phillipine Is., Guam, and British Guiana, where it has been taken on imported Indian buffaloes.

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## Sown Pastures for Queensland.

By C. W. WINDERS, B.Sc.Agr., Assistant (Agronomy) in the Agricultural Branch.

### INTRODUCTION.

STATISTICS show that in Queensland an area of about three-quarters of a million acres is under artificially sown pastures, and of this total the area carrying winter pasturage is but a few hundred acres. The grasses sown for summer grazing purposes are for the most part not native to Australia, but are introductions from countries experiencing climatic and soil conditions resembling those occurring in those parts of Queensland which are devoted to dairying and other semi-intensive grazing industries.

A large proportion of the artificially sown pastures established in the State is found in the coastal areas originally covered by rain forest or scrub. The rain forests correspond with rich basaltic and alluvial soils, and on such soils in areas with a rainfall of over 40 inches, such as the Atherton Tableland and those portions of the coastal fringe on which dairying is conducted, a South American native, *Paspalum dilatatum*, finds conditions suitable to its vigorous development. It should be remarked, however, that although *Paspalum dilatatum* has a rather high temperature requirement, its optimum appears to be lower than is provided by the climate of our tropical coast, for there it does not thrive too well, and grasses such as *Brachiaria mutica* (Giant Couch) and *Melinis minutiflora* (Molasses grass) are proving most useful under moist, tropical conditions.

In addition to the rain forests of the coastal areas there occur in the country lying between the coastal ranges and the crest of the Great Divide scrubs of a drier type. Softwood areas of this nature occur on basaltic soils and on rich alluvium, and in most of the settled districts the original timber has been felled and the land sown to *Chloris gayana* (Rhodes grass) for grazing by dairy cattle. Rhodes grass and paspalum have also been sown extensively after clearing of the heavily-wooded blackbutt forests lying close to the coast, and on the cleared sections of the brigalow scrub areas of Queensland Rhodes grass has been sown with good results.

The main features of the chief sown grasses and legumes, and hints as to the management of pastures are set out hereunder.

### SUMMER PASTURE GRASSES.

#### *Paspalum dilatatum*. Poir.

A native of South America, *Paspalum dilatatum* is now widespread in many tropical and sub-tropical countries, and in Australia it is the chief dairying grass of the north coast of New South Wales, the south and lower north coast of Queensland, and the elevated Atherton Tableland in North Queensland. In habit it is a perennial, tufted grass with clustered erect stems and shortly creeping rootstocks by means of which a pasture of paspalum forms a sod. Though it evinces a preference for low, moist situations it has a wide range of adaptability to soil types, but the fertility and moisture content of the soil must be fairly high to support a good stand of paspalum. The drought resistance of paspalum is not very high, nor is its ability to withstand frosts, and as a natural

corollary of its moisture and warmth requirements paspalum makes almost its entire growth between October and May, with the maximum development during the hot wet months of January, February, and March.

Paspalum should be sown in spring or early summer either on fresh scrub burns or on ploughed and worked down land of reasonably high fertility. A seeding rate of 8 to 12 lb. per acre is recommended. Australian seed is free of the ergot which has retarded the use of paspalum in the United States and in South Africa, but the germination capacity is only fair and long-delayed germination is common. However, established paspalum plants produce abundant seed and a thin stand is soon thickened up by means of volunteer growth of paspalum. White Clover is one of the few plants which thrive in combination with paspalum, and seed of this species should be included in all sowings. *Lespedeza striata* is also of value in a paspalum pasture.

The feeding value of young growth of paspalum as shown by chemical analyses and by cream production is good, but as with all grasses the nutritive value falls rapidly with approaching maturity. Thus, typical analyses show a range from 20.6 per cent. protein, .412 per cent. phosphoric acid, and .618 per cent. lime in the case of leafy growth 6 inches tall, to 4.1 per cent. protein, .239 per cent. phosphoric acid, and .139 per cent. lime in the case of tall, stemmy growth.

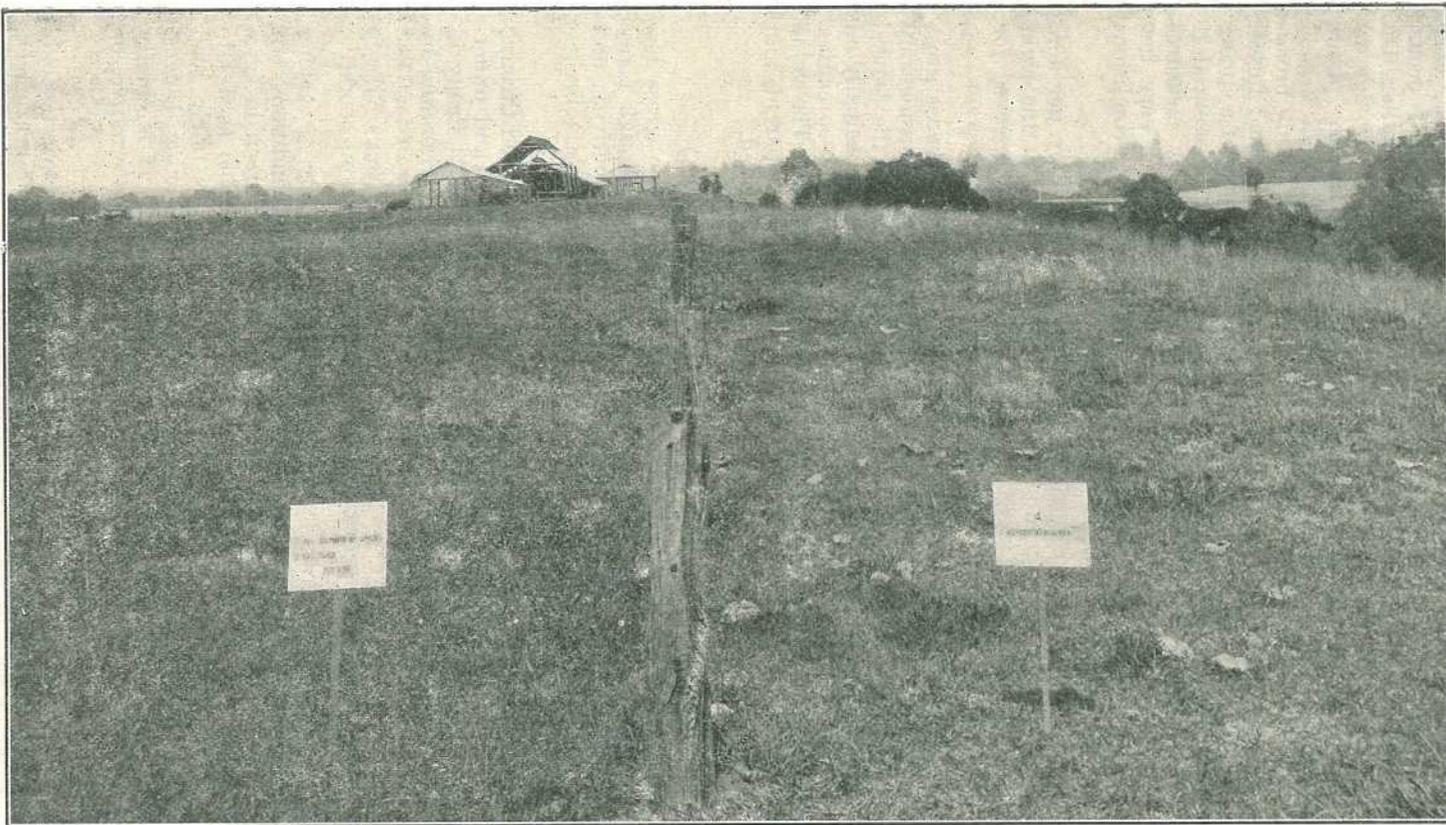
Paspalum makes good hay and silage, and the excess feed produced in the flush months should, if possible, be conserved as hay or silage for use when required.

On many old-established paspalum areas there has been formed a more or less pure turf so stunted and sodbound that little feed is produced from the paspalum itself and conditions are too hard for any associate species, such as White Clover, to thrive. When this stage is reached it is necessary to break up the matted grass. On badly matted grass ploughing up the paspalum is perhaps the only satisfactory way of reinvigorating the pasture. This operation should be carried out during the rainy season of late summer, the sod being turned on its side and the land levelled off with the harrows. On areas not badly matted good results have followed treatment in early autumn by special paspalum renovators, which aerate the soil and remove loose and dead grass.

#### **Rhodes Grass (*Chloris gayana* Kunth.)**

Rivalling in importance *Paspalum dilatatum*, Rhodes grass is now grown over a wide area in Queensland and is the chief pasture grass in many districts too dry to support paspalum. It is a native of South Africa and has been introduced into cultivation in many tropical and warm temperate countries.

Rhodes grass is a perennial tufted plant with erect leafy flowering stems and spreading surface runners which root at the nodes or joints. From each node is produced leaves and stems, and so readily are the runners produced that a good ground cover is quickly obtained under favourable soil and weather conditions. Rhodes grass is primarily a summer grower, and under the present conditions of management produces little or no feed during the cooler months of the year. By appropriate means it can be induced to provide some green growth during the winter, however, provided severe frosts are not experienced. A rainfall of at least 20 inches per annum is required by Rhodes grass.



Paddock No. 1.—Showing Growth after First Grazing.  
1½ cwt. Sulphate of Ammonia and 2 cwt. Super, per acre.

PLATE 185.

A.—Without Fertilizer.

Spring and summer planting of Rhodes grass seed is best, since the young plants must be well established before the heavy frosts occur. Sowings from October to January usually give the best results. On scrub lands the ashes left after burning the felled timber provide an excellent seedbed in which the seed germinates quickly and the plants spread rapidly, but on forest country it is necessary to provide a good seedbed by cultivation. No useful results are obtained by simply broadcasting seed of Rhodes grass through native grass in ringbarked forest. The land requires to be ploughed, or at least worked by means of a spring tooth cultivator or disc harrows. Thorough preparation is essential if a long lived productive stand is to be obtained. Half-way measures are certainly better than no preparation at all, but after a very few years the pasture will require to be re-seeded if the requisite conditions are not complied with.

Rhodes grass is an excellent hay grass, the yield of hay per acre being high and the feeding value good if the grass is cut at the right stage. On every Rhodes grass farm a paddock should be reserved for hay purposes, two or three cuttings being made during the season.

Until recent years the central Burnett was the chief Rhodes grass centre in Queensland, but the areas have now been extended considerably in the Burnett and Dawson Valley districts, as well as on the Downs and Maranoa. In all these areas the grass has been sown principally on land cleared of Brigalow and light vine scrubs, from which it is spreading into ringbarked country and dominating the native grasses. The value of Rhodes grass on prepared forest country is becoming apparent, and its usefulness in the cotton rotation has been demonstrated.

#### **Kikuyu Grass (*Pennisetum clandestinum* Hochst.)**

Introduced from East Africa some years ago, Kikuyu grass has enjoyed considerable popularity amongst dairy farmers, though many old-established stands now appear to be declining in productivity, and owing to the difficult country on which many occur, cannot be reinvigorated by drastic renovation.

Kikuyu grass is a perennial which spreads rapidly over and through the ground by means of running stems. Both the surface and underground runners root freely at the nodes, anchoring the plant firmly in the ground and forming a dense turf which stands heavy tramping by stock. The creeping and erect stems carry a large quantity of leaf and the stems themselves are very succulent. Under good conditions Kikuyu grass makes a very dense growth, often as much as two feet in height.

In Queensland the grass has adapted itself very readily to varying climatic conditions. It does best under moist subtropical conditions, but will withstand a considerable amount of cold and keeps green in spite of fairly heavy frosts. For this reason it is very valuable as a late autumn and early winter grass. Its drought resistance is fairly good and some success has been attained on the western Darling Downs, throughout the Burnett, and in other sub-coastal areas. It is chiefly used at present in the moister dairying districts as an alternative, or as a supplement to, paspalum.

Kikuyu grass spreads most quickly and produces heaviest yields on loose, rich soils, and while it may and does provide fair grazing on some less fertile soils of a sandy or clayey nature, it is most advisable

to ensure a permanent stand by planting on fairly productive soils. Under special circumstances the grass is recommended for poorer soils, such as in rough places, or as a soil binder to prevent erosion.

The grass does not usually set seed in Australia (though in moist seasons it flowers well) and propagating material is obtained by dividing the crowns of well rooted plants, by cutting the rooted runners into sections, or by making cuttings of the erect stems. Each planting slip need only be a few inches in length, but must have one or two nodes. Planting should be carried out in spring or summer during or following rain.

If the grass is to be planted on land which can be ploughed, drills may be struck out three or four feet apart and the cuttings set a similar distance apart in the drills. The cuttings may be covered by hoeing earth on to them, leaving about one-third of the length out of the earth. Where the country is too rough to be worked the cuttings may be mattocked in and the soil firmed about each set by tramping.

Being a vigorous, smothering grass, Kikuyu is useful for planting in bracken-infested country. It should, however, be kept away from cultivation areas, and from areas likely to be brought into cultivation later, as it is extremely difficult to eradicate. In wet weather portions of the grass are often broken off by grazing animals and such pieces may be carried by the animals' feet to other portions of the farm.

Kikuyu grass is strongly recommended for pig pasture, as it provides all-the-year grazing in many localities and stands up to the rough treatment given by the pigs.

#### Para Grass or *Panicum muticum*.

Para grass (*Brachiaria mutica* Stapf.) is known in Queensland also as *Panicum muticum*, Giant Couch, or Baneroft grass. It is grown to a large extent in many tropical and sub-tropical countries, where it is a valued summer fodder grass. The grass is a rapidly growing perennial, spreading by means of stout runners which grow along the ground and root at the nodes. Vertical shoots are produced at the rooting nodes and reach a height of up to 5 feet. The runners spread very quickly, and the area occupied by the grass rapidly increases in size and in density of cover. So thick is the resultant stand that no other plants are able to grow vigorously in competition with Para grass. Stock are fond of both leaves and succulent stems, but the trampling of animals injures the runners, so under some conditions it may be advisable to cut the grass and feed it green, rather than to graze it heavily. The feeding value of Para grass is fairly good.

Para grass is proving most useful on the coast, as it is not very resistant to frost or drought. In North Queensland it has established a good reputation and is widely grown. It prefers wet or even swampy land and a paddock on a wet portion of most coastal farms might be planted with it to give a change from paspalum. Some success is reported from the Burnett district.

Seed of Para grass is usually of poor quality and not readily available, hence propagation by rooted cuttings is the usual method. These may be planted on ploughed land in furrows, with 6 feet between the cuttings each way, or started by mattocking in on the edges of waterholes or damp patches.

### **Molasses Grass (*Melinis minutiflora* Beauv.)**

South America is the native home of Molasses grass, which was introduced into Queensland over thirty years ago. It is a perennial grass, creeping in habit, but often forming a mat of stems and foliage three to four feet in depth. It has a strong and distinctive smell due to the presence in the foliage of an essential oil. In addition the leaves exude a sticky secretion which is reputed to be repellant and perhaps fatal to ticks and mosquitoes. Stock at first show a distinct distaste for the grass, but in North Queensland at least soon grow accustomed to the grass and eat it readily enough.

Under moist tropical conditions Molasses grass is a very rapid grower, spreading quickly by means of creeping stems which root at the nodes, and smothering out other growth by the dense mat which it forms. The ability of the grass to cover a cleared area quickly, to the exclusion of weeds, makes it very valuable for sowing on burnt-over scrub areas on which weeds such as Red-ink plant come away very quickly.

As already remarked, the palatability of Molasses grass is not of a high order, though the nutritive value of short, leafy material is fair. The grass gives best results when kept grazed down and it is useful also as hay.

The seed of Molasses grass is exceedingly light, and a seeding rate of 2 lb. per acre is ample.

### **Blue Panic Grass (*Panicum cymbiforme* Hughes.)**

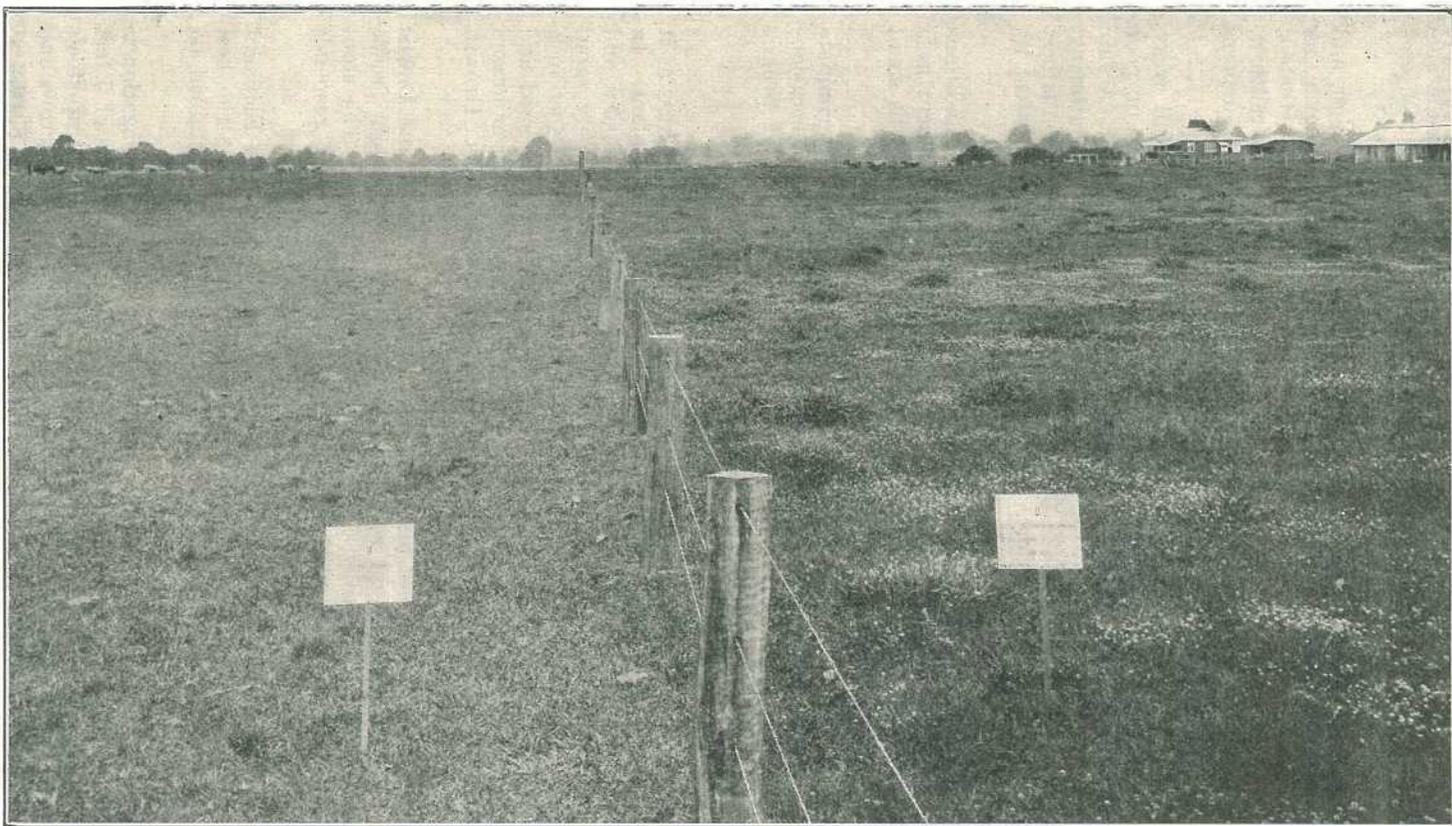
Blue Panic grass is a native of the northern parts of Australia and is also common on plains country in India. It is tufted grass with an exceptionally vigorous rooting system, forming strong underground stems from which it sends up succulent foliage stems, and later cane-like flowering stalks. By virtue of its root system it extends its area and is able to withstand heavy feeding and dry conditions. It is particularly valuable in dry localities, making good growth and remaining green when other native grasses are browning off. Heavy frosts cut the grass back, but light frosts do not interfere with the production of green shoots. Blue Panic grass is very responsive to light falls of rain and is eaten readily by sheep and cattle.

The feeding value of the grass is fairly good, but it must be understood that the nutritive value of a grass is at its highest when the plant is in the young leafy stage, and Blue Panic should be kept eaten down to prevent the formation of the cane-like stems. This suggests that the grass should be sown in small enclosed areas upon which stock may be concentrated in numbers sufficiently large to ensure that the grass is eaten at the correct stage.

As indicated above, the main usefulness of Blue Panic grass lies in its drought resistance, hence it is recommended for use in drier districts, such as the Burnett, Western Darling Downs, and Maranoa. Like that of many other natives, the seed of Blue Panic grass, unless very carefully selected, is likely to be unreliable as regards germination capacity. The grass establishes quite well from rootlets.

### **Guinea Grass (*Panicum maximum* Jacq.)**

Guinea grass is a perennial, tufted grass, native to Africa, where it covers a wide range of environmental conditions and assumes many different forms. From Africa it has been introduced in most tropical



PADDOCK No. 3.—Showing Growth after First Grazing.  
2 cwt. Super, per acre.

PLATE 186.

PADDOCK No. 2.—Showing Growth after First Grazing.  
1 cwt. Sulphate of Ammonia and 2 cwt. Super, per acre.

and sub-tropical countries, in many of which it is grown to a considerable extent as a cultivated fodder. The grass has been established in Queensland for many years and it is fairly common along the coastal strip.

In Queensland the plant grows in large tufts 2 to 6 feet high, and does not form a turf as do our better pasture grasses. Moreover, its tufty nature makes the use of a mower rather difficult. Nevertheless, owing to its fairly high feeding value and to the fact that stock relish it, Guinea grass is valuable both as pasture and as hay. For hay purposes it should be cut at the time of blooming.

Though best results are obtained on rich soil in high rainfall areas, the grass is fairly drought resistant and also makes some growth on poor soils, so its possibilities for various conditions are fairly good. A fair amount of seed is set, but owing to uneven ripening and easy shattering, much of the seed collected is of poor germination and propagation is best effected by setting out rootlets. These should be planted out 2 feet by 2 feet when rain falls in spring or early summer.

Guinea grass appears to be well suited to Far North Coast conditions and even in our *paspalum* country a paddock of it could be kept as a change of feed for the cows. In the Burnett and on the Downs small paddocks might similarly be established.

A note of warning should be sounded in regard to the indiscriminate use of Guinea grass, since it has been suspected on one or two occasions of causing death to animals by reason of the development of prussic acid.

#### **Elephant Grass (*Pennisetum purpureum* Schum.)**

In Africa, its native country, Elephant grass (or Napier grass as it is known there) is held in high regard as a summer fodder plant. In habit of growth it somewhat resembles sorghum, being tussocky and stooling freely. Under favourable conditions it makes extremely rapid growth, and when allowed to go unchecked often reaches 20 feet in a season. Stems more than a few feet high are, however, very hard and woody and unsuitable for green feed. The grass should be cut or grazed when less than 2 feet high, in which stage it is fairly nutritious. Growth after cutting is rapid.

Elephant grass is best adapted to the coast, sub-coastal and Downs areas. It is fairly drought resistant and is not affected by light frosts, though the foliage is killed by heavy or continued frosts. The stout underground parts are very hardy, however, and the plant responds quickly on the return of favourable weather conditions.

A well-drained soil is necessary to the best development of Elephant grass. Alluvials, scrub volcanics, and rich sandy loams are the best soils for the Elephant grass, though good stands may be obtained on less rich soils.

Seed of Elephant grass is not readily obtainable and propagation is effected by planting out root divisions or stem cuttings in rows of 5 feet by 3 feet. Furrows should be run out and the pieces of broken up stools or the 3-4 noded cuttings from mature stems dropped in the furrows and covered. The best time for planting out is following rain in spring or early summer.

### Water Couch (*Paspalum distichum* L.)

The value of this relative of the common *Paspalum* lies in its usefulness as forage in wet and muddy situations where more nutritive grasses usually will not thrive. There would appear to be considerable scope for the planting of Water Couch on areas which are occasionally flooded during the summer and which are bare mud holes in the winter, as well as in the swamps.

Known also as Knot grass and Joint grass, Water Couch is creeping in habit, developing numerous creeping stems which form a vigorous root system at each of the joints or nodes. This habit enables the grass to stand close feeding, but it also makes the plant a pest of cultivations, the stems forming a close mat very difficult to plough. The same spreading character causes the grass to be troublesome in bore drains, irrigation channels, &c., but aids it in binding banks.

The feeding value of water couch is fairly good, but planting should be restricted to damp situations where *Paspalum dilatatum* will not do well. Owing to its succulence, water couch turns blackish on drying, and consequently is valueless for hay. The grass grows best during the summer and autumn months and is cut back by frosts in winter.

Seed is not available commercially, but the grass is easily established by setting out rooted cuttings in the spring or summer.

### SUMMER PASTURE LEGUMES.

A perusal of the foregoing list of summer pasture grasses established by artificial or semi-natural means in Queensland reveals a wide field from which selections to suit various purposes may be made, but, unfortunately, there is a paucity of legumes which may be grown in conjunction with the grasses. The choice at present is confined to lucerne, *Stylosanthes sundiaca* (Townsville lucerne), and species of *Lespedeza* from the Orient.

#### Lucerne (*Medicago sativa*.)

The value of lucerne as a hay and hay-and-grazing crop is well known and need not be reiterated here. It does seem pertinent, however, to draw attention to the use of lucerne alone or lucerne-grass mixtures as purely grazing propositions. Most sown pastures would be improved by the addition of a pound or so of lucerne seed per acre at seeding time. *Paspalum* swards generally will not hold lucerne, but a Rhodes grass pasture suitably managed should not oust a scattering of lucerne plants. With all winter pastures lucerne is an important ingredient from the coast to the drier dairying districts, and even in the semi-arid Maranoa, light sowings of lucerne seed have produced useful grazing pastures.

#### Lespedezas.

Three species of *Lespedeza*—all natives of the Orient—have been introduced into Queensland from the United States of America, where the value of at least two of the species has been proven. These two—*Lespedeza striata* (Common Lespedeza or Japan Clover) and *Lespedeza stipulacea* (Korean Clover)—are annuals, while the third, *Lespedeza sericea* (Perennial Japanese Clover), is a perennial.

The annual Japanese Clover is a low, spreading plant, single plants sending out numerous horizontal branches up to 18 inches in length, which form a dense carpet over the surface of the ground. The actual

height attained by the plant depends chiefly on soil conditions and ranges from four inches to eighteen inches. The chief use of this annual *Lespedeza* is as a grazing plant, but it has also been shown to make a useful hay and to be a good soil improver. It is a self-seeding legume, which thrives and spreads in native pastures as well as in *paspalum* swards. It is a summer grower which matures and sheds its seeds in late summer. It is fairly drought resistant, though its growth is much better in fairly moist places than on dry ridges. The seed may be sown in spring on cultivated land or broadcast on permanent grass and harrowed in. The plant is a heavy seeder and a small nursery plot would yield a good supply of seed for general distribution. *Lespedeza striata* is recommended for trial in coastal districts and on the Downs, Burnett, Lockyer, Fassifern, &c.

Korean *Lespedeza* is an earlier and coarser species than Japanese Clover, but the former is preferable under Queensland conditions where the long summer will allow of a long grazing period before maturity.

*Lespedeza sericea* has aroused some interest during the last two or three years, but its growth, being coarse and stemmy, is hardly suitable for grazing purposes unless eaten in the very young stage.

#### **Stylosanthes sundiaca (Townsville Lucerne).**

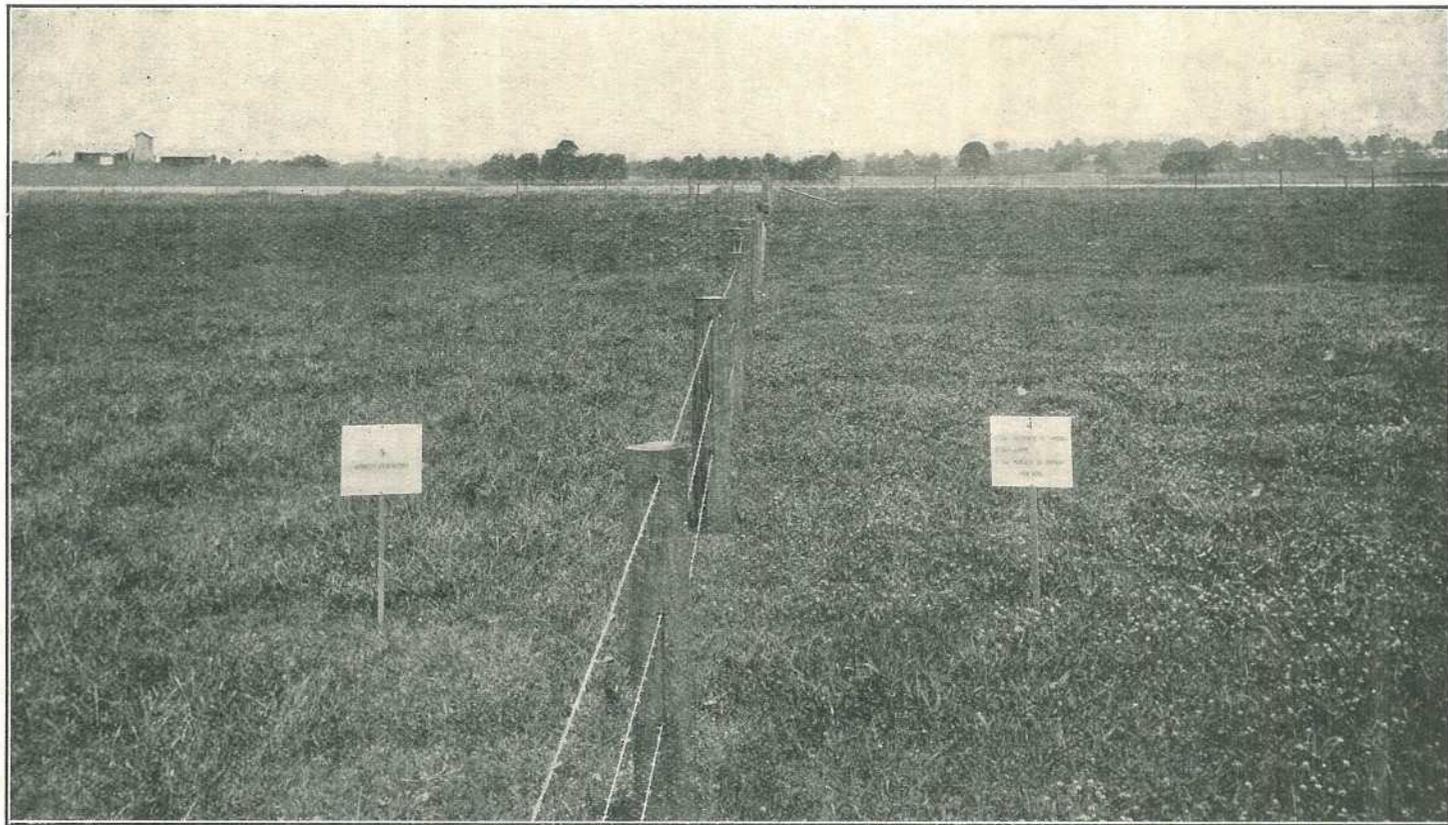
Revelling in hot, humid conditions, Townsville lucerne or wild lucerne has shown itself to be a particularly useful summer legume for coastal conditions in North Queensland, where it was naturalised many years ago. It is an annual plant, producing spreading prostrate stems which hug the ground for the most part, though they become more erect in a mixed pasture. Germination occurs with early summer rains—rarely before October—and if tall smothering grasses are absent, the young plants soon spread and form a dense mat of herbage. The period of full growth coincides with the hot, wet months of January and February, but the rank growth produced at this time is not relished by animals as much as the less luscious growth of March, April, and May. The plant is self-haying and is greedily eaten when dry; stock even scoop up broken portions from the ground. Thus a certain amount of palatable feed is provided well into autumn, when the plant finally disintegrates and is regenerated by seed. Seed is produced freely in the late summer, and the failure of the legume to become important south of Rockhampton probably is due to the shorter summer experienced in the south militating against seed production.

Townsville lucerne establishes and produces most freely on scrub country in tropical Queensland, but is also suitable for coastal grazing country kept well grazed and provided with a good rainfall. It is spread by animals scattering the seed in the dung or carrying the hooked fruits on their legs.

The feeding value of Townsville lucerne is quite good, though the fibre content of the numerous stems lowers the proportion of crude protein and minerals. The appearance of the legume in northern pastures should be welcomed as narrowing the nutritive ratio of the forage offered to stock.

#### **WINTER PASTURES.**

It will be evident from remarks made in connection with summer pastures that the growing season of such pastures is limited to the warmer months of the year, and that in the winter the summer pastures



PADDOCK No. 5.—Showing Growth.  
Without Fertilizer.

PLATE 187.

PADDOCK NO. 4.—Showing Growth after First Grazing.  
1 cwt. Sulphate of Ammonia, 2 cwt. Super, and  
 $\frac{3}{4}$  cwt. Muriate of Potash, per acre.

fail to maintain cows in profit, and fail to ensure a regular supply of fat stock to the markets. The dominating influence controlling pasture growth is that of climate, and it is due to climate factors, such as drought and frost, that the grazing value of a pasture varies so much from season to season. One means of evading the influence of the lean period, which extends from April to September in most years, is the provision of winter pasturage.

During the past few years a certain amount of exploratory work has been carried out along the lines of determining the suitability of various winter growing grasses and legumes to the soil and climatic conditions obtaining in different districts. Trial plots have been laid down by many farmers and pastoralists in co-operation with the Department of Agriculture and Stock and other bodies interested in pasture improvement work, and though many of the trials have not yet been carried out over a sufficient number of years to enable conclusive results to be obtained, yet they have provided deductions as to which pasture plants may be expected to show up well under a certain set of environmental conditions.

In the following notes are summarised the observations made upon various winter pasture plants.

#### Toowoomba Canary Grass (*Phalaris tuberosa* L.)

Outstanding among the perennial winter growing grasses is *Phalaris tuberosa*, a Perennial Canary grass, known also as *Phalaris bulbosa* and Toowoomba Canary grass. A native of the Mediterranean region, this relative of the canary seed of commerce was introduced into Australia over fifty years ago, being first sown in this country at the Toowoomba Botanic Gardens in 1884. Some twenty years later, seed from Toowoomba produced plants in Southern Australia which came under the notice of agriculturalists as possessing the advantages of drought resistance, permanency, high productivity, and adaptability to varying soil types. Though it has been tried in Queensland to a limited extent, the grass would appear to possess—at least in Southern Queensland—all the characteristics which have earned it a great reputation in other States; provided, however, that the rainfall during the seeding year is sufficient to ensure a successful stand.

The productivity of *Phalaris tuberosa* during dry spells is due first to the fact that its deep roots tap food and moisture resources not available to shallow-rooting plants, and second to the migration of nutrients produced during the flush period of growth to underground storage organs, this reserve being drawn upon as required.

As a consequence of its slow establishment, even when sown under the most favourable conditions, *Phalaris tuberosa* does not produce a large bulk of feed during its first year, and only two or three light grazings should be made in this period, the first being not less than about ten weeks after seeding. After the first year the well established plants will stand comparatively heavy grazing during the autumn, winter, and spring months, and the grass is also responsive to falls of rain during the summer months. A pasture of *Phalaris tuberosa* has a high carrying capacity, producing a large quantity of herbage, which, if fed off before the seed heads have emerged, has a particularly high feeding value and is extremely palatable. In habit the grass is somewhat like paspalum, and single plants may reach a diameter of 2 or 3 feet by means of short underground runners.

*Phalaris tuberosa* has performed very well on the Darling Downs, on the South Coast and Lower North Coast, in the Lockyer, and in the Fassifern, and there is every reason to expect that it will thrive in all the southern dairying districts and in the more humid of the sheep and cattle areas, provided it is sown on rich, well prepared land. A seeding rate per acre of 4 lb. is sufficient, and the seed should be mixed with fine dry sand for better distribution. Lucerne and Phalaris do well together, and 1 to 2 lb. of this legume should be included in all sowings.

It has been noticed that a stand of Phalaris is apt to decline in productivity if the soil becomes compacted by heavy tramping of stock; renovation by means of a tine cultivator will correct this tendency.

#### **Perennial Prairie Grass (*Bromus marginatus* Nees).**

Native to the Pacific Coast region of the United States of America, *Bromus marginatus* was introduced into Australia some years ago and has attained some prominence in New South Wales and in Queensland. It is an erect, tufted, leafy, somewhat coarse grass which makes its main growth in the autumn, winter, and spring months and lasts through the summer in the vegetative form, not as seed, as does the annual Prairie grass. The grass is a rapid stooler and produces an abundance of palatable and nutritious feed. No information is available regarding the length of time a stand of this grass may be expected to yield good grazing, but in Queensland Perennial Prairie pastures now in their third year are still producing well and show little sign of deteriorating.

Perennial Prairie grass should be sown at the rate of 15 lb. per acre, with a little lucerne mixed in. The grass seeds very freely, and from a small acreage a large yield of seed for distribution over larger areas may be obtained.

This grass is recommended for trial in all the dairying districts. Its use for sheep pasturage in closer settlement areas is also suggested.

#### **Cocksfoot (*Dactylis glomerata* L.)**

A useful, hardy grass for incorporation in permanent pasture mixtures in cool districts is available in Cocksfoot. This is a deep rooting grass of good feeding value, but is inclined to become tussocky. It makes good growth in spring, and so augments the major constituents of the pasture at a time when other feed is scarce. The seed of Cocksfoot is often of poor germinating capacity and poor strikes are common.

#### **Perennial Rye-grass (*Lolium perenne* L.)**

In some of the more climatically favoured districts—such as Nerang and Maleny—the true Perennial Rye-grass, which is the basis of the wonderful dairying and fat-lamb pastures of New Zealand and the chief pasture grass of the old established pastures of Europe, has met with some success. It is, however, a fairly shallow rooting grass, and for this reason is not very resistant to the effects of dry spells. It would appear to have a limited sphere of usefulness in Queensland, success being likely to attend its sowing only in districts assured of regular falls of rain during the winter months, and there only on soils which do not rapidly dry out.

### Italian Rye-grass (*Lolium multiflorum* Lam.)

While permanent pasture is undoubtedly the cheapest form of stock feed, there is nearly always a place in the farm rotation for an annual grazing crop, and where winter fodders such as Oats are successfully grown an area of Italian Rye-grass as a supplement, or as an alternative to Oats, is recommended. This rye-grass is in temperate countries a true biennial, but under our conditions it lasts only one season. It is a vigorous grass which comes away well from seed and stools profusely. It will stand heavy stocking and recovers very quickly after grazing. Three or four grazings of palatable, nutritious feed may be obtained during the winter and spring, or the grass may be grazed a couple of times and later cut for hay. Italian Rye-grass seeds freely and often a thick stand may result from self-sown seed. However, the grass is unreliable in this respect, and it is safer to sow it down each autumn. Some farmers make a practice of scattering a few pounds of seed through the rows of a maize crop at the time of final scuffling and so have a good crop of feed during the winter. During the severe winter of 1935 areas of Italian Rye-grass sown in the autumn at the rate of 10 lb. to the acre, together with 2 lb. of Red Clover, produced a dense mass of succulent feed in a number of districts.

### Wimmera Rye-grass.

Almost as productive as Italian Rye-grass, but more drought resistant and earlier in maturing, is Wimmera Rye-grass. This, too, is an annual, but possesses the very useful property of ready self-regeneration from seed. That is to say, if the stock are kept off the first year's stand at seeding time the plants will shed an enormous amount of seed which will germinate with the following autumn rains and produce a vigorous new stand of grass. A harrowing in March would assist this reestablishment. Wimmera Rye-grass is possibly the most active in establishment of all the winter grasses, and fair stands are sometimes obtained by broadcasting the seed over native pastures and harrowing it in. It usually pays to cultivate for the grass, however, and under cultivated conditions Wimmera Rye-grass is able to produce abundant feed during dry winters. In sub-coastal areas, on the Darling Downs, and in the Maranoa, there appears to be much scope for such a grass, and a number of dairymen, sheep raisers, and cattlemen are exploiting it in dry areas. A seeding rate of 4 to 5 lb. per acre is ample, and the grass mixes well with lucerne. Two pounds of lucerne seed included in the mixture would produce a crop of lucerne which could be grazed during the summer with good results. Some cultivation of the area would be necessary to loosen the consolidated soil sufficiently to allow of the regeneration of the rye-grass.

### Prairie Grass (*Bromus unioloides* H.B. & K.)

In the past, the annual Prairie grass has been perhaps the most favoured of the winter grasses grown in Queensland, but with better species available, the area under this grass will no doubt be considerably lowered in the near future.

Though there is no question of the ability of Prairie grass to establish itself, of its palatability and of its feeding value, nevertheless the grass fails to stand up to the critical test of heavy stocking. Moreover, the seed heads are often attacked by a smut and pretreatment of the seed

by pickling is advised. The destruction of the inflorescence by this smut prevents the natural regeneration of the grass from seed.

### WINTER LEGUMES.

The question of pasture legumes suitable for winter grazing has not yet been fully answered, though trials over a number of years have narrowed down the field of possible successes to a mere half dozen.

Of these, lucerne takes pride of place as the legume best suited to the winter conditions over an extensive area, though it must be remembered that, while some winter production will always be obtained, the chief growth of this legume is made during the warmer months of the year. Lucerne definitely should be included in all winter pasture sowings in Queensland.

White Clover (*Trifolium repens*) is naturalised in many of the paspalum pastures of Queensland, and in certain seasons is particularly prominent. When the pasture is kept well grazed the white clover is small leaved and forms a close mat. It is usually considered that one year in every four is a good clover year, the paspalum at other times being completely dominant. The common White Clover, as well as the New Zealand certified type, does well in winter pasture mixtures on the coast from the border to Bundaberg. Stock are very fond of the clover in its young stages, but do not touch it after it has come into flower.

Red Clover (*Trifolium pratense*) is known also as Cowgrass. It is used in winter pasture mixtures, from which it has spread into paspalum pastures in moist southern districts. Stock do not appear to relish red clover, but in good seasons a bulky growth suitable for conversion into hay may be obtained.

Burr Trefoil, Burr Clover, or Burr Medic (*Medicago denticulata*) is an annual legume which has become naturalised in Queensland and occurs abundantly on downs country and on alluvial flats during winter and early spring, dying off with the advent of hot weather. In favourable seasons it produces a large quantity of feed which, if eaten green to any large extent, is likely to cause bloating. However, stock usually prefer this legume when it is dying off and they are especially fond of the ripe burrs which are shed in great numbers as the plant matures. From these burrs containing the seeds Burr Trefoil comes again in the autumn. The plant is not favoured in sheep country because of its burrs clinging to wool, but for general grazing purposes it is useful in as much as it is able to establish and spread in native pastures.

English Trefoil or Black Medic (*Medicago lupulina*) is somewhat similar to Burr Trefoil, but has not a spiny pod. It is much less abundant, being found chiefly in the coldest part of the State—the southern Darling Downs and the Granite Belt about Stanthorpe—in such localities its spread should be encouraged.

Subterranean Clover (*Trifolium subterraneum*) has failed to repeat in Queensland the wonderful success it has had in the Southern States, but trials are still in progress which may eventually reveal a set of strain, soil, climatic, and cultural conditions appropriate to its success.

## ESTABLISHING PERMANENT PASTURES.

### Soil Fertility.

In laying down permanent pasture it must be borne in mind that the pasture is expected to produce heavily over a period of years, and consequently some initial steps must be taken to ensure that the land is capable of supporting a productive pasture. With regard to softwood scrub lands it is well known that rich soils underlie such scrubs and the fertility of these soils is further improved by the practice of burning the unmarketable timber after felling. Moreover, such soils are, by their very nature, fairly well supplied with moisture. These factors of high soil fertility and abundant moisture enable fairly long-lived stands of pasture to be established by seeding the pasture on the burn, the seedlings establishing quite satisfactorily in the ashes. However, after the first few years of flush growth have been achieved the decline in soil fertility becomes reflected in a lowering of productivity of pasturage, and measures must be taken to restore some of the lost soil nutrients. In the case of mineral elements, particularly phosphates, this can be done by topdressing, but the application of artificial nitrogen manures is very expensive and the pasture should be broken up preparatory to building up the soil nitrate content by fallowing and/or green manuring. Unfortunately, a good deal of grassed scrub land is too rough to allow of ploughing being carried out, and here the stump-jump pasture renovator is proving useful in breaking up the soil sufficiently to allow air and moisture to penetrate and encourage the action of nitrate-producing bacteria.

Though there is every justification for the immediate sowing of pasture on freshly-burnt scrub lands, under no circumstances can the planting of raw forest and native pasture soils or worn out cultivation lands with permanent grass be recommended. The fertility of such soils must first be built up to the standard required by the particular pasture to be sown, and this is best effected by ploughing in green manure crops and by liming and applying artificial fertilizers if necessary. Green manure crops such as wheat and field peas, oats and tares, cow-peas, &c., will provide a certain amount of grazing before they are allowed to develop a good growth prior to ploughing under. Dressings of lime may be required to sweeten some soils, and under Queensland coastal conditions an application of 2 tons per acre of pulverised limestone may be necessary. Experiments indicate that many permanent pastures can be kept productive only by repeated applications of fertilizers.

### Preparation of Seed-bed.

As indicated above, a long period of preparation of the land is essential for good results. Where a green manure crop precedes pasture in the rotation it should be ploughed in at least six weeks before the pasture is to be sown in order to allow ample time for the rotting down of the green material. Frequent workings of the area with harrows should be made to work the soil down to a fine tilth and to destroy weed seedlings. A fine tilth must be obtained prior to seeding, as most pasture seeds are very small and will not establish readily under rough conditions. Rolling the land prior to seeding makes a compact seed-bed in which both germination and establishment are encouraged.

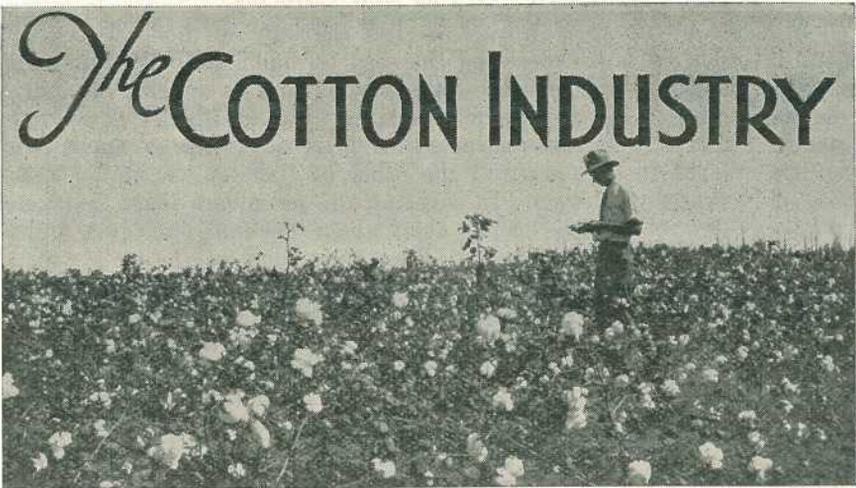
### Methods of Sowing and Covering.

In most of the agricultural districts the only method of seeding pastures employed is broadcasting the seed by hand and covering with harrows. This method is quite satisfactory, and is indeed the only practicable method of sowing such seeds as those of Rhodes grass and Molasses grass. When sowing mixtures it is advisable to make two seedings, one of the grasses and the other of "shotty" seeds such as those of lucerne and clovers. In covering the seeds care must be taken that they are not buried deeper than about one-half inch. A light rolling or harrowing is sufficient. Except on some of the soils which cake on rolling, a light rolling after sowing is useful in compacting the soil about the seeds, but if the soil is somewhat dry, a harrowing should precede the rolling. A grain drill with a grass seed attachment is suitable for sowing grass seeds, but the seed must be sown shallow.

### SEED QUALITY.

The first consideration in purchasing some pasture plant seeds is the source of the seed. So far as our chief grass seeds are concerned, these are produced locally for the most part. The bulk of the Rhodes grass seed comes from the Burnett district, and Paspalum seed from the Queensland coast and the New South Wales North coast. No great differences in the characters of the plants produced from different lines of seed are observed in the case of Rhodes grass, Paspalum, Molasses grass, or Blue Panic grass, and no special strains are available. With certain other plants, however, the source of the seed is an important consideration. Take, for instance, Perennial Rye-grass. Trials in Queensland demonstrated the superiority of certain New Zealand strains over other commercial lines, in so far as longevity is concerned. Many lines of so-called Perennial Rye-grass seed contain a large proportion of seeds of annual and other short-lived types of rye-grass, whereas much of the New Zealand seed carries a guarantee that such seed has been obtained from long-lived pastures, from pastures sown down with approved seed, or from pastures which are of a sufficiently high standard as indicated by Government Research Station field tests. Similarly, certified lines of seed of *Phalaris tuberosa*, Cocksfoot, Perennial Prairie grass, and White Clover are available and should be used when sowing winter pastures.

So far as purity and germination of seeds are concerned, the legislation dealing with the sale of seeds in Queensland is designed to afford the buyer every protection. Regulations prescribe the maximum proportion of foreign matter allowed in the various kinds of seeds, and the vendor is required to specify on an invoice the kinds of seeds, and declare the percentage of foreign ingredients to be within the prescribed limits. The Regulations set out the minimum percentage germination which vended seed must reach. Free examination of samples of seed purchased by farmers for their own use is carried out by the Department of Agriculture and Stock, and in any case of complaints regarding purity or germination, the buyer should at once send a sample of the seed, together with full particulars, to the Department.



## CULTIVATION OF COTTON.

By R. W. PETERS, Cotton Experimentalist.

**T**HE cultivation operations have an important influence on the yields which are obtained from a cotton crop, and also on the costs of production. Careful attention should be paid, therefore, to the factors bearing on each operation, and it is the purpose of this discussion to touch upon the various points one should study when cultivating a cotton crop.

### Harrow Before Planting.

One of the most important factors is to harrow the seed bed into a good tilth after the planting rain, before sowing the crop. This not only assists in the establishment of favourable conditions for obtaining a good strike, but greatly retards germination of the weed and grass seeds. Where this is accomplished the cotton seedlings do not have to compete for the surface moisture, and thus have every chance of becoming established even if a dry period follows the planting rain. This elimination of early competition with other growths of seedlings undoubtedly is of great assistance to the young cotton crop. It is strongly recommended, therefore, where sowing in the dry soil has been practiced, that following the first rain afterwards a good cross harrowing be given before the cotton seeds start germinating, so that no damage will be done to the cotton, yet the young weed and grass seedlings will be destroyed.

### Cultivate Early.

As soon as the rows are well defined, with the cotton seedlings around two inches in height, a thorough cultivation should be given as close to the rows as possible without covering the seedlings with soil. Where the work is done with a riding two-horse one-row machine, of the carriage rather than horse-steered type, the inner tynes, or teeth, as they are often termed, can be set within a few inches on either side of the row if the soil fenders are used to protect the plants from too much soil being moved against them. In most seasons this cultivation should establish a good mulch and check the start of weed or grass growth sufficiently

to enable the cotton seedlings to become well established. If showery conditions are experienced when the plants are around 4 to 5 inches tall, the most economical way to prevent grass and weed growth and re-establish the surface mulch, is to harrow across the rows with a spike tooth harrow with the teeth set at a slightly backward angle, so that they will not go in too deeply. This method will not only cheapen the cost of cultivation, but will tend to thin out the stand somewhat, which will be beneficial if a 15 to 20 lb. rate of sowing has been used. This method is only suitable, however, for land that is fairly free of surface trash, for considerable damage may be done by sticks catching on the teeth.

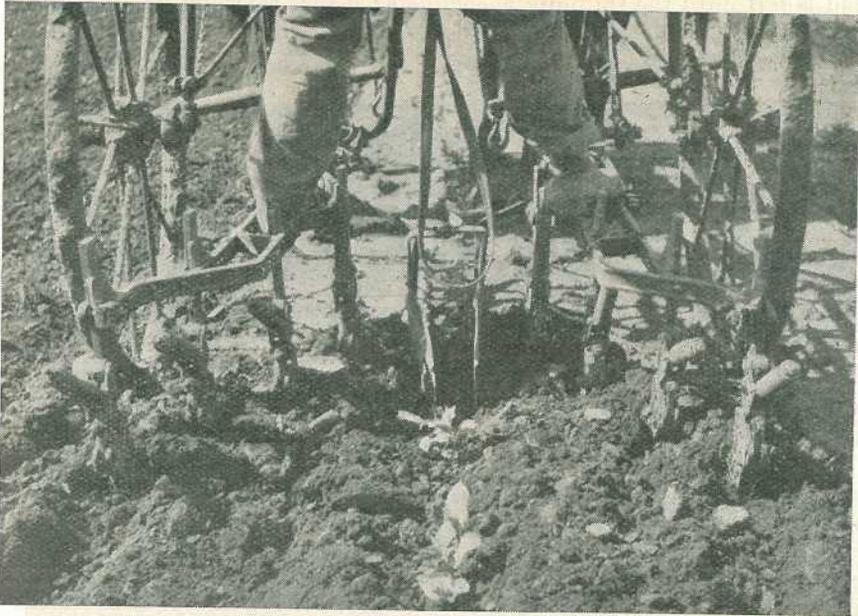


PLATE 188.

The first cultivation should be made when the seedlings are around 2 inches in height. Tines with fenders are the best equipment for this operation, as a good mulch is established close to the plants without damaging them.

#### Later Cultivations.

In many seasons it will not be necessary to cultivate more than once after the seedlings appear, before the plants are thinned. In some seasons, however, such showery conditions are experienced, especially in the wetter districts, that on old cultivations summer grass seedlings become established around the plants in the rows to such an extent that cross harrowing will not remove them. Where this occurs it is advisable, prior to thinning, to use the disc cultivators with the discs set to throw the soil from the plants to a depth of around three inches. This operation will cut away the grass and weed growth, and leave only a narrow strip of plants, weeds, and grass. With the crop "barred off" in this condition one stroke of the hoe will frequently remove the grass and weed growth, as well as any cotton plants it is desired to chop out, thus speeding up the work and reducing the cost of cleaning and thinning the field. As soon as the thinning is completed the field should be

cultivated by a tyne equipped machine with the inner tynes set to throw the soil around the plants, thus establishing a good mulch to reduce evaporation and brace the plants which are of a spindly type in places, due to the crowding where the seed has fallen in bunches. This moving of the soil back around the plants can be performed to better advantage with the 3-inch tynes, if the bolt which holds the tyne on is loosened enough to insert a piece of  $\frac{1}{4}$ -inch thick leather between the back of the tyne and the standard, so that the tyne will have a set which will enable it to function somewhat like a small mouldboard plough. In the case of large acreages the "barring off" cultivator should work just ahead of the thinners, and the covering up machine right behind them, for if the field is left until the thinning is completed before covering up, considerable drying out of the soil around the plants will result if hot windy weather occurs.



PLATE 189.

Illustrating the set of a disc cultivator for use in a weedy or grassy field prior to thinning. The discs cut away the soil, leaving a narrow strip of row which can be cleaned with mostly one stroke of the hoe. After the thinning the discs should be reversed and the soil thrown back to the plants. Weedy growth can also be controlled later in the season in the same way, when the plants are of the height in the illustration.

#### Cultivations After Thinning.

Generally speaking, not more than three or four cultivations should be required to control weed growth after the covering up operation following thinning. At each of these operations the fenders should not be used, for the soil should be worked to the plants to smother weed growth and also to brace them, which will be of advantage during any high winds occurring when the soil is wet.

In some districts, however, such wet conditions may be experienced that crops under 2 ft. in height on old cultivations may be nearly choked out with summer grass before the ground dries out enough to allow of teams going on the land. Where this occurs the situation can be greatly

improved by working close to the row of cotton with a walking plough set just shallow enough to throw the grass away from the cotton, and yet not cut the roots of the latter. This not only reduces the competition with the grass, but also aerates the soil sufficiently to restore it to the proper condition for promoting the growth of the cotton. When the ploughed out grass has died another ploughing should be made to throw it back towards the row. Each season a good number of growers with small acreages of cotton on the old cultivations plough out weed-infested crops to plant later to maize or cow feed, when treatment such as has just been described, would save the cotton sufficiently to enable it to produce a better return than would be obtained from the other late sown crops.



PLATE 190.

A well cultivated field of young cotton. The surface soil is in splendid condition to absorb rainfall. It is advisable, however, on a slope like this not to run the rows down hill. If they are across the slope on an angle that gives them a drop of 4 inches in every 100 ft. of their length, and the soil is ridged up 3 to 4 inches high around the plants, less washing of soil occurs and better penetration of heavy rainfall is obtained.

Although a field may be clean, it is advisable, as long as it is possible to get a machine through the crop, to cultivate after each beating storm. After the plants are too tall for a riding machine the walking scuffler should be used, for very tall cotton can be worked if long traces are used with a spreader right behind the horse. If the ends of the spreader are wrapped with hessian, practically no damage is done even to the brittle branches, except where they have fallen across the "middles." This late breaking-up of the set surface caused by the beating mid-season storms, is important, for many of the older cotton cultivations tend to set very hard. Investigations carried out at the Cotton Research Station on fairly level country have demonstrated that only 34 per cent. of even soaking rains may penetrate the first six inches of cultivations which have had nine successive crops of cotton, while severe thunderstorms mostly run off into the low places in the field, causing very irregular

growth of plant. It is suggested that every grower practice this late cultivation particularly in fields on slopes. If the rows run across the slope, by ridging the soil well up around the plants and then practising late cultivation with the walking-scuffler, undoubtedly greater benefit will be obtained from the mid-seasonal storms than where the hard set surface is left for the water to rush off.

### Clean Cultivation Helps to Prevent Insect Attacks.

The maintenance of clean cultivation in the cotton fields not only assists in the development of the plants, but also helps to prevent attacks from insect pests such as the cutworm and the corn-ear worm. The cutworm in the cotton districts away from the coast, mostly over-winters in the soil in the pupæ stage. With the advent of spring the moths emerge and lay under tender weed growth in loose soil. After the eggs hatch the young cutworms tend to spread outwards from the hatching place, feeding on the leaves of young growths of such plants as pigweed, bull-head, and cotton seedlings. The fallowed seed beds for the cotton crops thus make ideal breeding places in spring unless weed growth is eliminated not only in the field, but around the headlands. Fortunately the danger of cutworm attacks generally passes with the occurrence of hot humid conditions, so the maintenance of clean cultivation early in the season helps to confine cutworm troubles mostly to invasions from outside weed centres. These can be dealt with effectively by means of poison baits and furrows surrounding the field of cotton.

The moth of the corn-ear worm sometimes lays eggs early in the season on weed growth in the cotton fields, but the most damage is generally done in this respect after the danger of cutworms is past. Heavy laying of eggs of the corn-ear worm may occur on growths of pigweed in cotton crops during November and December, which makes it necessary that clean cultivation be maintained as long as it is possible to get the machines down the rows without seriously damaging the cotton plants.

### Cultivator Equipment.

It is recommended that wherever the area of row cultivation on a farm will stand the overhead expense of a riding cultivator, one of the carriage steered type be purchased. More efficient work can be done with this type of machine than with either the rigid pole steered riding combination cultivator-planter, or the scuffler, and, of course, a greater acreage is covered per day than with the latter. There are several "makes" of this type of machine on the market, all of which enable the driver to steer the machine so accurately, if a well-gaited team is used, that the inner cultivating "teeth" may be set within a few inches of either side of the row. By the use of such cultivators and cross harrowing in the early stages, practically all hoe work is ordinarily eliminated except the thinning, and, prior to boll opening, the destroying of any tall-growing weeds, the seed of which would become entangled in the open cotton and lower the value of the lint.

These machines may be fitted with sets of discs for use when the field is grassy, or when it is desired to ridge up well at the "laying by" of the crop, as the last general cultivation is called; they may also be equipped with sets of tines for general cultivation.

Most of the standards or shanks on which the tines are bolted can also be fitted with other attachments, such as 6 or 8 in. sweeps or "duck-feet" as they are sometimes named. These cultivators can thus be equipped suitably for any kind of average farm crop row cultivation, and it is recommended that greater attention be paid to this important factor. Frequently machines are observed with the wrong equipment-discs being used when tines would do more efficient work; also tines are often used when sweeps or a combination of sweeps and tines would be much better. Tines are best suited for establishing a mulch, while sweeps are better weed eradicators unless the soil is of a heavy nature and too damp, in which case the tines will do better work, but should be followed up with sweeps if much weed growth is present, for the tines miss or slip off many of the weed roots. No one set of equipment will do all the operations through the season satisfactorily, especially if the crop is being grown on an old weed infested cultivation. Growers with large areas of cotton should particularly study this aspect of cultivation in order to reduce their costs of production by increasing the efficiency of each operation.

### Conclusion.

The degree of efficiency of the operations connected with the cultivation of a cotton crop plays an important part in the returns that are obtained and the costs of production thereof. Much of the crop in recent years has been grown on comparatively new cultivations accompanied by relatively simple cultivation problems. With each season of cropping to cotton or other row crops, the increased growth of grasses and weeds necessitates that greater attention be paid to the points that have been discussed, to obtain the fullest efficiency in each cultivation given the cotton crop.

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## THINNING AND SPACING OF COTTON.

By W. G. WELLS, Director of Cotton Culture.

**R**EPORTS that have been published in different countries presenting the results obtained in spacing tests of cotton all tend to indicate that, while the cotton plant has remarkable ability to adjust itself to environmental conditions, the order of merit of various spacings on any particular soil fluctuates markedly according to climatic conditions. It is advisable, therefore, that cotton growers should ascertain which spacing offers the greatest "factor of safety" to obtain a profitable crop under any of the ordinary climatic conditions likely to be encountered. A spacing that will produce excellent yields under favourable conditions, but poor returns under adverse conditions, is not suitable for sound farming practices, although the average results obtained from it over a series of years might compare favourably with all other spacings. Wide yearly fluctuation of production is the "curse" of all farming, for it complicates the actual marketing operations, and causes serious variations in prices.

### Queensland Conditions.

It will be appreciated that spacings suitable for other countries may not be suitable for Queensland. Here, dry conditions usually are experienced in the late winter and early spring, and frequently the crop has to be planted on the bare minimum of favourable surface moisture. Early growth is generally slow until the thunderstorms start,

when rapid development of plant often occurs, particularly on many of the fertile alluvial clay loams of high nitrate content. Usually good production of flowers accompanies this growth, and where no serious losses result from insect attacks or severe climatic conditions, a profitable return may be expected. Severe corn ear worm attacks are often experienced, however, and where this occurs, if good rainfall follows soon, a rapid growth of plant generally develops which is accompanied by further loss of crop caused by insect attacks and physiological shedding. Extremely dry conditions may occur instead of wet ones, so it is apparent that the best spacing is one that offers the greatest chances of producing a profitable return under a range of conditions, although it may not allow of the production of the greatest possible crop a soil is capable of yielding.

### Spacing Results Obtained in Queensland.

In the earlier periods of cotton growing in this State the practice was to space the plants wide apart, frequently on the square system. At the start of the present period of cotton growing most growers tried various row widths with the plants mostly around 2 ft. apart. As the growers increased the size of individual acreage the tendency arose, in an effort to reduce expenses, to plant lightly and not to thin. Two schools of thought thus developed, and in most seasons prior to 1925-26 sufficient growers could not be induced to conduct experiments to allow of the studying of the merits of different spacings over a comprehensive range of soils and climatic conditions.

Starting with that season, comparisons of 12 and 24 inch single spaced plants, thinned at different heights, were carried out with grower co-operators. Generally speaking, the results obtained, while varying according to soil and climatic conditions, indicated that thinning when the plants are 5 to 8 inches high tends to produce better yields than do later thinnings. In most of the experiments there was also a tendency for heavier bolls to be produced on the earliest thinned plants, although in some instances, the 14-16 inch height of thinning produced the heaviest bolls but the lowest total yield per acre—the lighter crop allowing of more favourable conditions for the bolls matured.

In the 1925-26 season climatic conditions prohibited the experiments being planted until mid-November, but excellent rainfall was experienced after that which developed a good crop until mid-January, when a prolonged dry spell set in that lasted long enough to destroy the late middle and top crops of squares. In six out of nine experiments the 12 inch spacing thinned when 6 inches tall, outyielded 24 inch spacings at all heights. In the remaining three experiments, total yields of each were higher than those of the other six, and 24 inches, thinned when 6 inches tall, was ahead. The results would indicate that with a light crop the most plants per acre gave the best results, and where a good yield was obtained the wider spaced plants fruited heavier. No experiments were brought through with farmers in the 1926-27 season, but in the 1927-28 season, which experienced excellent climatic conditions and good yields were generally obtained, the results were conflicting from the limited number of tests completed. The climatic conditions in the 1928-29 season were most unfavourable for cotton. With the exception of a few small areas, planting was not accomplished until mid and late November. Erratic rainfall was experienced after that, some

districts receiving scanty amounts, while others were delayed. Many areas, particularly the Upper Burnett, Callide and Wowan districts, produced only a late top crop which was badly damaged by killing frosts at the end of April. The results obtained in the experiments were most unsatisfactory and of little value, although the few experiments completed mostly indicated 24 inch spaced when 6 inches high was ahead. No co-operative field spacing investigations were conducted in 1929-30, while the unfavourable climatic conditions in 1930-31 and 1931-32 prevented evidence being obtained from experiments, mostly crop failures being experienced in both years.

#### Results in 1932-33.

In 1932-33 it was deemed advisable to test 6 inch spacing owing to the increasing tendency for growers with large areas to sow lightly and not thin the irregularly spaced stand obtained. Accordingly, single plants spaced 6, 15, and 24 inches apart were tried, and in three out of the four experiments carried out on cultivated soil in the Callide Valley, the 15 inch spacing was ahead. In an experiment in the new scrub burn of softwood, 2 ft. single spaced outyielded the unthinned hills spaced 2 ft. apart, by 80 lb. seed cotton per acre, the value of which would considerably exceed the cost of thinning.

#### Results in 1933-34.

With the cotton crops getting off nicely in the 1933-34 season following the wettest winter and spring conditions the cotton growers had experienced, greater interest was shown in spacing tests. In fourteen experiments completed that season—the 6 inch single spaced plants outyielded the 15 and 24 inch spacings by slight to appreciable amounts in nine experiments, with the 24 inch single spacing ahead in four, and the 15 inch in one test. Growth of plant was very slow and restricted throughout the season, the exceptional rainfall in the winter and early spring apparently leaching out the nitrates and compacting the soils to such an extent that there was no stimulation of rank growth of plant even in showery periods at mid-season, very few crops reaching 4 feet in height. Under the circumstances the closer spaced plants with fewer bolls per plant but greater boll producing area per acre yielded the best.

#### Results in 1934-35.

The spacing tests prior to this season had mostly been in Durango, the variety of the largest acreage. In the 1934-35 season it was deemed advisable to study the effect of 6, 15, and 24 inch single plant spacings in Indio Acala, the variety which appeared to have possibilities of replacing Durango on the alluvial soils; and Lone Star, which is the main variety for the soils of harder texture and low nitrate content. The season mostly favoured good growth of plant until mid-season, but from then on very dry conditions ruled in most districts, which severely checked further plant development. Only plants of moderate height—3 to 4 feet—were generally produced under such conditions, so that there was little tendency for rank vegetative growth. In seven experiments in Indio Acala, the 6 inch spacing was ahead once, 15 inch spacing 5 times, and 24 inch once, with the 6 inch spacing tending to have the tallest and most crowded appearing plants. In four experiments in Lone Star, the 15 inch was ahead or equal to the other two spacings, with 24 inch ahead of 6 inch in three experiments, and only slightly

behind in the other test, in which very low yields were obtained. In a similar test in the Cliett variety on brigalow soil, 15 inch was again superior, but in an experiment on a black heavy soil of the alluvial plain type, 6 inch was ahead in Durango, although 15 inch spacing had given the best results in previous years.

#### Results of Spacing Tests at Experiment Stations.

In 1923-24, which was a comparatively dry season, in a row and plant spacing experiment at Home Hill, consisting of 6, 12, 18, and 24 inch spacing in  $3\frac{1}{2}$ , 4,  $4\frac{1}{2}$ , and 5 feet row widths, 24 inch spacing was ahead in all row widths, with 24 inch by  $4\frac{1}{2}$  feet the best.



PLATE 191.

A cultivated clean field speeds up the rate of thinning, thereby reducing the cost of this important operation. These plants average 6 inches tall, which experiments have demonstrated is the best height for thinning.

In the 1924-25 season this experiment was carried out at three Experiment Stations, Home Hill, Monal Creek, and Biloela. Under very wet mid-seasonal conditions at Home Hill, 6 inch spacing in  $3\frac{1}{2}$  feet rows yielded the best. At Monal Creek 6 inch spacing was ahead in each row width except  $3\frac{1}{2}$  feet, where 12 inch spacing was the highest yielding treatment of the experiment, 6 inch by 4 feet being next in order. Rather irregular results were obtained at Biloela under a long dry period occurring at the critical stage of crop development. The highest yields were, in descending order, 24 inches in  $3\frac{1}{2}$  feet rows, and 18 inches in both  $3\frac{1}{2}$  and 4 feet rows. There was no general trend, however, in each row spacing, so the results may not be reliable, particularly as the experiment was on new cultivation out of the virgin condition.

In the 1925-26 season the investigations were discontinued, except at the Cotton Research Station, Biloela, in the Callide Valley, where the research work has been centred since then. In a combined height of thinning and plant spacing experiment in rows  $4\frac{1}{2}$  feet apart, 24

inch spacing thinned when 4 to 6 inches tall, yielded the heaviest. Under the dry conditions the heaviest yielding treatments tended to produce the lightest bolls.

The experiment was repeated in the 1926-27 season, but, unfortunately, an insufficient number of plants were obtained in each of the 15 inch spacings to make the results indicative of that spacing. The 24 inch spacing was ahead, however, showing even the irregular closer spacing was detrimental. In the 24 inch spacing the plants thinned when 4 to 6 inches tall outyielded the later thinnings.

In the 1927-28 season, which was the best that has ever been experienced at the Research Station, spacings of 12, 24, and 32 inches thinned when the plants were 4 to 6 inches high, were tried in rows 4, 4½, and 5 feet apart. Plant growth was smaller than that of many of the previous seasons, being mostly around 4 to 4½ feet in height. Under the ideal conditions 12 inch spacing in 4 feet rows was significantly ahead of all other combinations. The 12 inch spaced plants significantly outyielded the 24 and 32 inch spacings in each row width, while the 24 inch spacing outyielded 32 inches.

The merits of planting on the square so that cross cultivation could be practised was studied in an experiment in which 1, 2, and 3 plants were left in hills spaced 3½ feet apart in row widths of 4½ feet. Three plants per hill outyielded the other two treatments. A similar result was obtained in the 1924-25 season at the Monal Creek Demonstration Farm under wet conditions in the first half of the season, and relatively dry ones in the latter half. Such rank growth of vegetative branches occurred in all treatments that cultivating had to be stopped before it was advisable. In a wet season the system has disadvantages, therefore, and the use of it may tend to develop serious weed and grass growth within a few years.

In a 24 inch spacing thinned when the plants were 6-8, 10-12, and 14-16 inches in height, the 6-8 inch height of thinning yielded the highest, but a slightly greater number of plants may have caused this.

#### 1928-29 Season.

Adverse seasonal conditions delayed plantings until the 8th November, when irregular experimental stands were obtained following 90 points of rain. A prolonged hot, dry period throughout January checked plant growth seriously, and a late April frost completed a disastrous season. Many of the experiments yielded results, therefore, of little value. The plant and row spacing experiment of the previous season was repeated, but the irregular rate of germination spreading over three weeks seriously affected the results. The 12 inch spacing in the rows 4 feet apart produced the greatest number of flowers, but no significant differences were obtained between the yields of any spacings.

The height of thinning experiment in 24 inch spacing was repeated, and was likewise affected by the irregular germination, as well as a loss of terminals through a hailstorm. Daily flower counts on 120 plants in each treatment indicated, however, a marked superiority for the 6-8 inch thinning. The total flowers for the period of observation expressed in percentages resulted as follows:—6-8 inches—100 per cent., 10-12 inches—91.5 per cent., and 14-16 inches—77.8 per cent. Individual plant data collected from 60 plants in each treatment indicated that the earliest thinning gave these advantages:—A few more bolls per plant;

a slightly larger percentage matured by time of early frost; slightly more seed cotton than in the 10-12 inch treatment, and significantly more than in the 14-16 inch thinning; a higher percentage of 5 locked bolls of the total number of bolls borne per plant; and a higher percentage of 5 locked bolls in the bolls harvested.

#### 1929-30 Season.

Damage from a severe corn ear worm migration affected the results obtained from all the row and plant spacing experiments so seriously that no significant differences were obtained. Generally speaking, however, the unthinned and closer spaced treatments in rows  $4\frac{1}{2}$  feet apart reacted more severely to dry conditions during the first half of the season than did single plants spaced 2 or 3 feet apart. Also in rank growing areas where run off water collected, the unthinned sections tended to make a tall spindly plant carrying very little fruit. In the latter part of the season late rains caused the formation of a light crop of bolls, and with abnormally late frosts a picking was obtained from the unthinned sections considerably in excess of what appeared possible during most of the season. With wet weather in mid-season a very rank growth would have probably developed in the spindly unthinned sections. The bolls of the unthinned plants were generally smaller than those of the 2 feet single spaced plants. Two feet spaced bunches of plants did not appear to be superior to unthinned cotton. The two feet single spaced plants had a good scattering of bolls throughout the plant and could have grown 1 to  $1\frac{1}{2}$  feet taller without excessive crowding. The 3 feet spaced plants were of too coarse a type and would have made rank growth had wet mid-seasonal conditions been experienced. Examinations of the rooting systems indicated that no thinning and spacing out to bunches every 2 feet markedly reduced the number and diameter of the large lateral roots, which would explain the lack of resistance of these treatments to dry conditions.

An experiment comparing 2 feet single spacing in rows  $4\frac{1}{2}$  feet apart and  $3\frac{1}{2}$  feet single plants in the same row widths, but cross cultivated, on newly broken up cultivation out of the virgin condition, failed to demonstrate any significant differences in yields. The same result was obtained in the 1, 2, and 3 plant per hill spaced  $3\frac{1}{2}$  feet apart in  $4\frac{1}{2}$  feet row widths. The dry conditions definitely checked the treatments with more than one plant per hill, so that the one plant treatment was able to produce more cotton per plant and thus make up for the smaller population.

#### 1930-31 and 1931-32 Seasons.

Planting rains did not occur until mid-January in 1930-31, and drought conditions ruled in 1931-32, so that no results in thinning and spacing tests can be reported for these seasons.

#### 1932-33 Season.

The only spacing investigation conducted at the Station in this season was testing the merits of thinning with an oscillating blade type of machine as compared to chopping out to one plant every 2 feet. The machine leaves bunches of plants of varying numbers, and 76 per cent. of the stand was spaced 12 inches apart or less. Under the somewhat dry, hot conditions of the season, competition reduced the yields of the machine thinned by 138 lb. seed cotton per acre. The length and strength of the fibre of the machine thinned was also significantly reduced.

**1933-34 Season.**

The wettest winter experienced in the district for sixty years ensured a complete restoration of subsoil moisture which had been deficient during the three previous severely dry seasons. Good timely planting rains enabled the crop to get off nicely, and frequent showers and cool temperatures enabled the plants to make slow, steady, satisfactory development. Dry conditions during January checked progress somewhat, but good rains followed, which renewed plant growth and formed a nice top crop. Under the unusual conditions small plants were produced all over the Station and surrounding district, and excellent yields were mostly obtained.

Plant spacing tests were carried out in Indio Acala cotton on both two year and nine year old cultivations, with the following results:—

## SPACING TEST AND INDIO ACALA.

Unthinned.	1 foot Singles.	1 foot Bunches.	2 feet Bunches.	2 feet 2 Plants.	2 feet Singles.	Mean.
TWO-YEAR-OLD CULTIVATION.						
YIELD LB. SEED COTTON PER ACRE.						
1,156	1,302	1,227	1,244	1,177	1,097	1,200
NINE-YEAR-OLD CULTIVATION.						
908	1,150	1,101	1,024	1,087	1,037	1,051

In both experiments 1 foot single spacing substantially outyielded the other spacings, being 146 lb. ahead of unthinned on the two year old cultivation, and 242 lb. ahead on the nine year old. Chopping out to bunches a hoe width spaced either 1 or 2 feet apart was better than 1 or 2 plants 2 feet apart on the new cultivation, but not on the older one.

In the newer cultivation the unthinned treatment produced the shortest and weakest fibre, the three 2 feet spacings the longest, and the two 1 foot spacings the strongest. In the older cultivation 1 foot singles produced the best fibre considering length, strength, body, and drag. The fibre of the unthinned was of better general quality than in the unthinned on the newer cultivation, but still tended to be weak.

A plant spacing test was also conducted in the Mebane variety—a ranker growing, more drought resistant type than Indio Acala. Single plant spacings of 6, 12, and 24 inches in rows 4½ feet apart on both two and nine year old cultivation, produced no significant differences in yields, although 12 inch spacing was slightly ahead in both tests. Plant examinations indicated the following significant differences:—On the newer cultivation the 12 and 24 inch spacings had heavier 4 and 5 locked bolls than did the 6 inch, and required fewer bolls to produce a pound of seed cotton. On the older cultivations the 12 inch produced the lowest percentage of diseased bolls, but there was no difference in the mean weights of the 4 and 5 locked bolls, and only a slight tendency for the 24 inch to require fewer bolls to produce a pound of seed cotton. The machine thinning test was carried out in the Durango variety on both five and nine year old cultivations. On the older cultivation the bolls of the machine thinned plants were smaller, but the greater number of plants per acre made the yields about the same—1,005 lb. seed cotton for machine thinning as compared to 983 lb. for the hoe spaced 2 feet

single plants. The lint of the machine thinned was, however, of a lower grade and more wasty. On the five year old cultivation there was a significant difference in favour of the hoe thinned—1,121 lb. seed cotton as compared to 848, the difference mostly being contributed by the first picking.

#### 1934-35 Season.

The climatic conditions of this season were in decided contrast to those of the previous crop. Just sufficient rain was received to allow of plantings being made in mid-October. Exceptional rainfall occurring in mid-November forced rapid growth, however, but by mid-January all crops were heavily laden. Distress conditions mostly ruled after that, which checked further growth and caused shedding of the late middle and top crops.

The plant spacing experiment in Indio Acala was repeated with the following results:—

#### SPACING TEST AND INDIO ACALA.

Unthinned.	1 foot Singles.	1 foot Bunches.	2 feet Bunches.	2 feet 2 Plant's.	2 feet Singles.	Mean.
THREE-YEAR-OLD CULTIVATION.						
YIELD LB. SEED COTTON PER ACRE.						
856	929	808	906	947	840	882.5
TEN-YEAR-OLD CULTIVATION.						
674	723	761	661	713	653	697.5

No statistically significant differences were obtained in either experiment—the severe late seasonal conditions levelling all treatment effects appreciably. With the small plants the 2 feet single spacing did not produce sufficient boll carrying structure, while in the closer spacings competition for moisture was too great. Two plants every 2 feet and one plant every foot did the best in the newer cultivation where the open texture of the soil trapped more of the mid-seasonal storms, which were of a hard beating nature, resulting in much run off. One plant per foot was also second best in the older cultivation where the mean yield of the experiment was 185 lb. seed cotton per acre less.

The effect of spacing single plants 12 and 24 inches apart, and 2 plants every 24 inches—the two plants being separated by 4 to 6 inches—was tried in the Cliett variety on three and ten year old cultivations. The yields indicated that the two plants per 24 inches spacing produced the best under the stress conditions on both cultivations. On old country the 12 inch spacing produced better than 24 inch singles, but the opposite was true on the newer cultivation, the yields being nearly exactly reversed. Durango was tested similarly on five year old cultivation, and the two plants per 24 inches spacing again led.

Tests of the lint obtained from all five experiments failed to demonstrate any significant treatment effect on the grade and quality of the fibre in any experiment, all being somewhat affected by the adverse conditions.

### Conclusions.

The results obtained over the eleven seasons are not consistent and in several seasons an insufficient number of experiments were completed to allow of sound generalisations being made. The data obtained, however, would indicate, in a general way, that the following conclusions would appear to be warranted:—

1. The climatic, soil and cultural conditions affect the yields obtained from any spacing. As these are variable factors the relative order of merit of spacings likewise varies, which makes it necessary for each grower to test out likely spacings over a series of years, if the best spacing for his soils is to be ascertained.
2. Insect attacks cause a rank bushy growth in all spacings on fertile soils, if wet conditions are experienced following the attacks. Such growth tends to level the yields of all spacings.
3. In seasons experiencing wet conditions during the early and mid-growing periods, twelve to fifteen inch single plant spacings appear to be the best suited for fertile alluvial soils in the main cotton districts.
4. Dry periods tend to check plants of these spacings, however, so 20 to 24 inch single spacings are recommended for both the less fertile and less moisture retaining soils, particularly in the drier districts.
5. Wider spacings than 24 inches do not appear to improve yields and in wet seasons the vegetative growth that develops prevents proper cultivation being practised.
6. Unthinned, and bunches or hoe widths of plants spaced 12 or 24 inches apart—react severely to dry periods, have smaller bolls, produce shorter, weaker and more wasty lint, and have not outyielded 12 inch single spacing in the experiments. In dry seasons 24 inch singles have outyielded 24 inch unthinned plantings in the scrub burns, and also machine thinned bunches of plants spaced at varying distances of 12 inches and less on cultivated soils.
7. In wet seasons there is a tendency for a greater percentage of partially and totally diseased bolls to exist in the unthinned and closely spaced bunches, particularly on fertile alluvial soils.
8. Thinning when the plants are 4 to 8 inches tall generally assists in obtaining better yields and bigger bolls than do later thinnings. It is also easier to thin cotton at this height.
9. Undoubtedly it pays to thin cotton sufficiently to reduce competition during stress periods for increased yields of better quality may be anticipated over a series of years. Each grower will have to ascertain what spacing is the most reliable for his soils and the variety he is growing.

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**S**EPTEMBER rains were over average throughout the southern agricultural areas, and have been followed by heavier storm rains during October. Some damage by hail was experienced in fruit, vegetable, and wheat lands, but apart from individual losses, the benefits derived more than compensate, as the favourable spring is reflected in increased butter production and the healthy condition of all summer crops.

As fodder reserves have been considerably depleted it behoves farmers to take full advantage of the good growing conditions by conserving fodder as hay or silage. Only in this way can winter production be maintained and stock carried through in thrifty condition. It is not generally realised that large quantities of hay and chaff are annually imported into Queensland even in good seasons, all of which trade could reasonably be secured by local growers.

#### **Wheat.**

This year harvesting will be later than usual owing to the generally late seeding and the recent heavy rains which delay the maturity of the crop. A wide variation of conditions exist over the chief wheat areas. In the east, from Toowoomba to Warwick, production will be low as many crops were fed off during the dry spell, to meet urgent requirements.

As the majority of wheatgrowers in this area are also dairymen or sheepowners, the crops were thus put to a useful purpose. In the Dalby district, production should be a record owing to the increased area sown, much of it being first or second year cultivation, and also to the more favourable mid-season rains. The Pittsworth district promises average returns, while at Bongeen, Irongate, and Yarranlea some excellent yields are in prospect from extensive areas. In the Maranoa prospects are also sound owing to the over average rains from July onwards.

Further rain is not required as it will be detrimental to crops. At the time of writing rust is not in evidence, but a spell of warm humid weather with further rain will certainly favour its development.

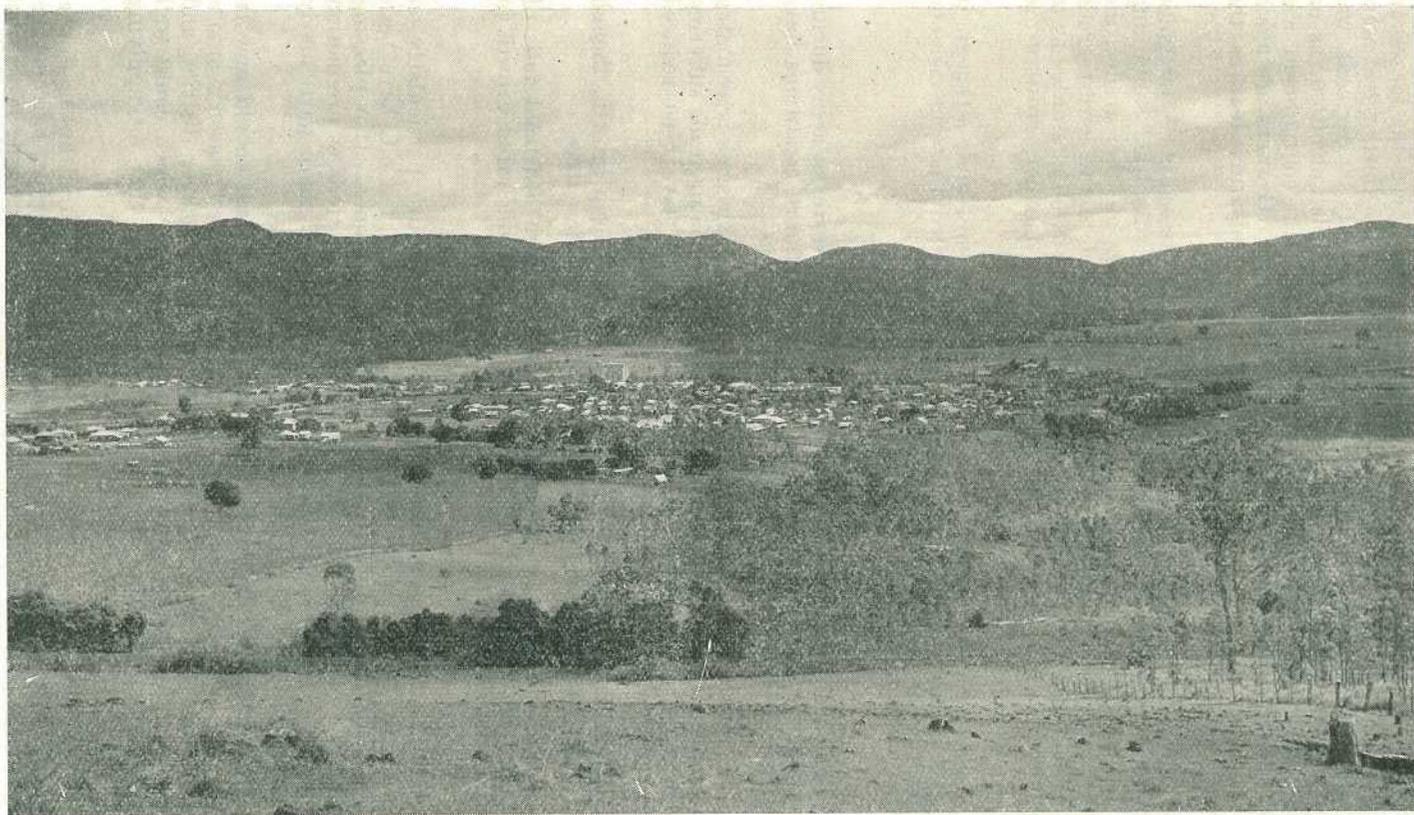


PLATE 192.

Atherton, the centre of a progressive agricultural district in North Queensland.

### **Tobacco.**

The September auction sale of Dalgety and Co. was the largest of its kind yet held in Queensland as approximately 155 tons of leaf were submitted to the buyers. Of this quantity, eventually 90 per cent. was sold at good value, especially considering the article submitted, as on inspection it was found that fully 40 per cent. of the consignment was either badly graded or consisted of immature leaf. Growers are again warned against the advisability of submitting immature leaf as the buyers will not even make a bid for these lines.

Another point which cannot be too strongly stressed is the irregular grading and baling of the leaf. When a bale is submitted containing mostly fair quality leaf together with a percentage of other grades, the buyer immediately places a valuation on it equal to the lowest grade in the bale as, until the bale is fully opened, there is no guarantee as to the percentage of the respective grades. In this manner, growers are losing pounds in their annual returns.

New season's operations are now in full swing and, although it is yet too early to make an estimate, it is expected that the acreage planted will be an increase on last season.

### **Sugar.**

Beneficial rains were experienced in the far Northern areas during early October, and combined with warm temperatures, conditions have been favourable for rapid growth of the young crop.

The continuance of dry conditions in the Burdekin area is assuming serious proportions, both the growing crop and the mature cane suffering considerably. The estimates for the 1935 harvest have been reduced very materially due to the unfavourable conditions.

In Mackay, dry weather is seriously affecting crop growth, though light rains have been experienced within the past few days.

The Southern areas have received light though beneficial falls of rain, and the warm days of late October are ensuring rapid growth in the young crop.

### **General.**

An increased acreage has been sown to early maize, particularly on the Eastern Downs, where wheat lands, previously fed off, have been ploughed and sown to maize, sudan grass, and sorghums. It is pleasing to note the increased interest now being taken in fodder production although its conservation for farm use as hay, and more particularly silage, is still at a low level.

Canary seed crops which were generally late sown should now be in excellent condition and return heavy yields. New season's onions have been reaching the market, chiefly from the Lockyer district, and have generally realised good prices. This is a crop which could well receive greater attention from local growers with a view to supplying a greater proportion of the State's requirements.

The success of the early potato crop is now assured owing to the excellent spring rains. Increased plantings are reported from the Toogoolawah district, while Downs plantings were later owing to seasonal conditions.



PLATE 193.  
Dairy Cattle on Atherton Tableland.

In the Townsville district dry conditions still prevail although the far north coast has received ample rains. The Townsville average for the past nine months is very much below normal, resulting in grass and water becoming scarce throughout the district. Some maize for green feed is being grown under irrigation, but other summer crops await seasonal rains.

#### Mat Grass Control.

Owing to the spread of this grass and the resultant decrease in carrying capacity of dairy lands, a trial has been designed by the Pasture Improvement Committee, in order to ascertain the cheapest and most practicable method of replacing mat grass with more productive species.

Spraying with weedicides, ploughing alone, and ploughing followed by the planting of paspalum and smothering grasses such as kikuyu will be experimented with. Topdressing with fertilizers also presents possibilities and will be included in the experiment.

#### Peanut Industry.

The present position is regarded as satisfactory as the bulk of the 1935 crop has been contracted for and the surplus from the previous crop disposed of.

The intake of the 1935 crop has been a record, 4,345 tons being received from 500 growers. The activities of the Pool Board have established the industry and are appreciated by both growers, manufacturers, and consumers generally as, although the Board receives all grades, its payments have surpassed those given by outside buyers.

Growers are advised to sow an increased acreage as if the present trade expansion continues a record production will be needed to meet Australia's requirements, which are about two-thirds Virginia Bunch and one-third Red Spanish.

#### SERVICEABLE HOME-MADE BRUSH.

A serviceable and cheap home-made brush can be made from a bunch of horse-hair, a short length of copper pipe, and a piece of wire. The accompanying illustration shows how the brush is made. Such brushes are extremely useful for countless jobs on the farm and in the milking shed.

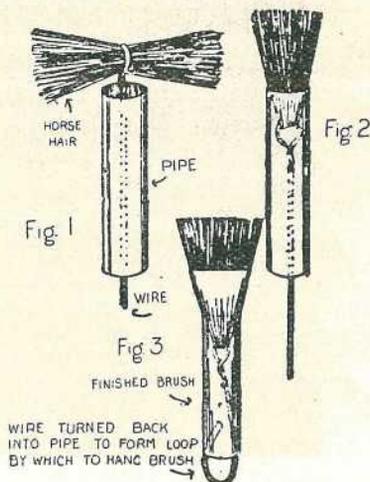
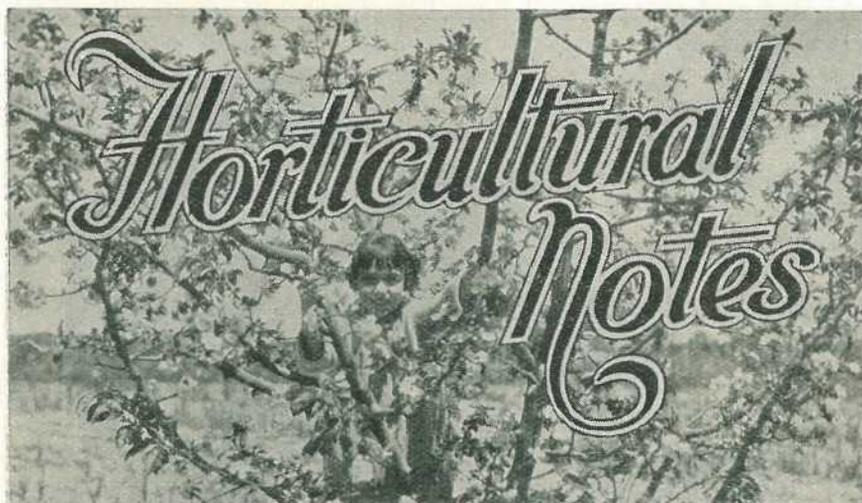


PLATE 194.



## PACKING BANANAS FOR MARKET.

By JAS. H. GREGORY, Instructor in Fruit Packing.

(Continued from page 484, Vol. XLIV., Part 4—October, 1935.)

**I**F care has been taken during all the operations of removing the bunches from the plant, transporting to the shed, and dehanding, little damage should have been sustained by the fruit. Careless handling will assist in introducing all manner of troubles. Plates 195 and 196 show illustrations of hands affected through bad handling, practically all of which could have been avoided.

It is a good plan while handling the bunch to gently rub the hand over the flower ends of the bananas in order to remove the dried flowerettes attached thereto, for if these are left on they make the pack appear untidy and unsightly; they should be removed before dehanding.

### GRADE STANDARDS.

As with other commodities placed on the open market, certain rules of quality have to be observed. The family of the banana grower is amply protected by laws governing weights and measures and standards of quality for foodstuffs and other things, and if such conditions are fair to growers, it is only right that commodities produced by the growers should also come under the same principle. To ensure this, grade standards have been framed as follows:—

Cased Cavendish bananas shall be divided into four grades—"Sixes," "Sevens," "Eights," and "Nines":—

- "Sixes" shall mean sound fruit 6 inches to  $6\frac{1}{2}$  inches in length, with a minimum girth of 4 inches.
- "Sevens" shall mean sound fruit  $6\frac{1}{2}$  inches to  $7\frac{1}{2}$  inches in length, with a minimum girth of 4 inches.
- "Eights" shall mean sound fruit  $7\frac{1}{2}$  inches to  $8\frac{1}{2}$  inches in length, with a minimum girth of  $4\frac{1}{4}$  inches.
- "Nines" shall mean sound fruit  $8\frac{1}{2}$  inches and upwards in length, with a minimum girth of  $4\frac{3}{4}$  inches.

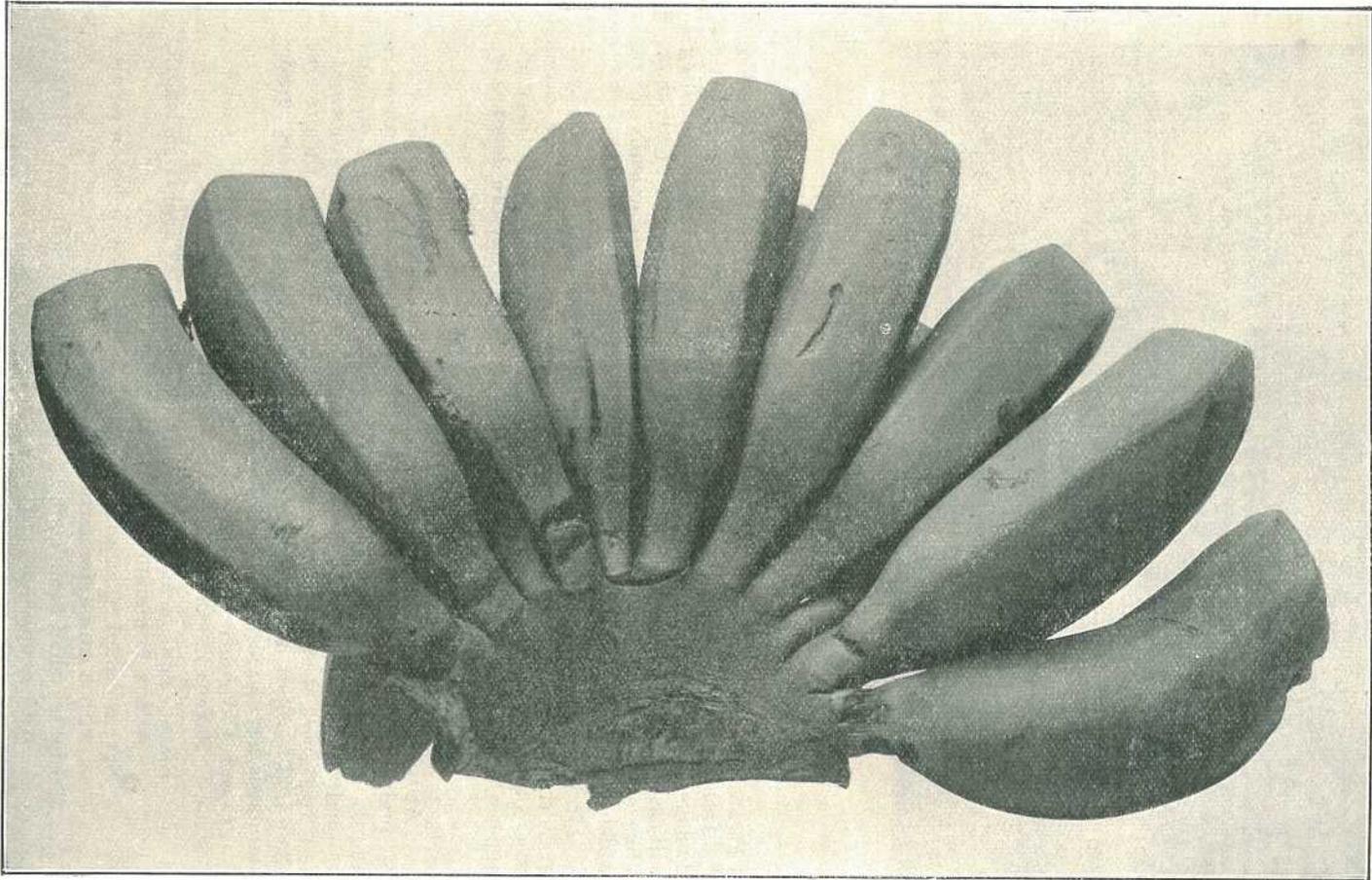


PLATE 195.  
SHOWING DAMAGE THROUGH CARELESS HANDLING, WHICH RESULTS IN BLACK-END,

All measurements for length are to be taken on the outside of the curve, from the junction of the fruit at the stem end to the apex of the fruit. The girth is measured around the middle of the banana. (Plate 197.)

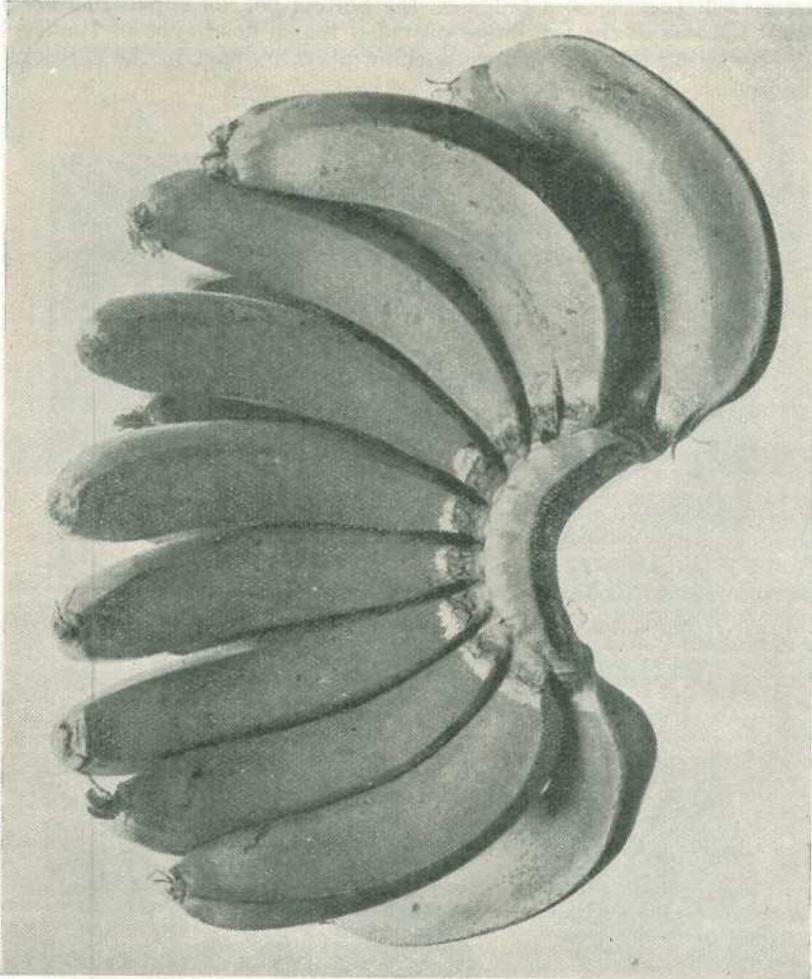


PLATE 196.  
SHOWING DAMAGE TO STEM CONNECTION THROUGH CARELESS HANDLING.

These sizes should be adhered to strictly when packing. A good plan is to select a good average-sized fruit of the grade to be packed, and pack as far as possible all fruits that match this sample. When the packing of each case is complete, select the smallest fruit that can be seen in the case and mark on the end of the box the grade standard to which this particular fruit conforms. While packing, eliminate all inferior fruits such as those damaged by bad handling or insects or affected by cigar end, and also twin bananas, immature bananas, and those with damaged shanks. Some striking examples of types which should not be packed are shown in the illustration (Plate 198). Here again care should be the watchword, as the inclusion of only a small quantity of this type of fruit would spoil the chance of receiving top market prices.

**BULGE.**

An oft-debated question is what is the correct bulge to place on the finished pack. Packing so as to obtain a bulge of from 1 to  $1\frac{1}{2}$  inches on the lid when nailed will prove most satisfactory. An examination of the case will then show a bulge on the bottom boards approximately two-thirds the size of the top bulge provided that a good type of timber is used. Sweating the fruit before packing plays its part in the correct bulge to use.

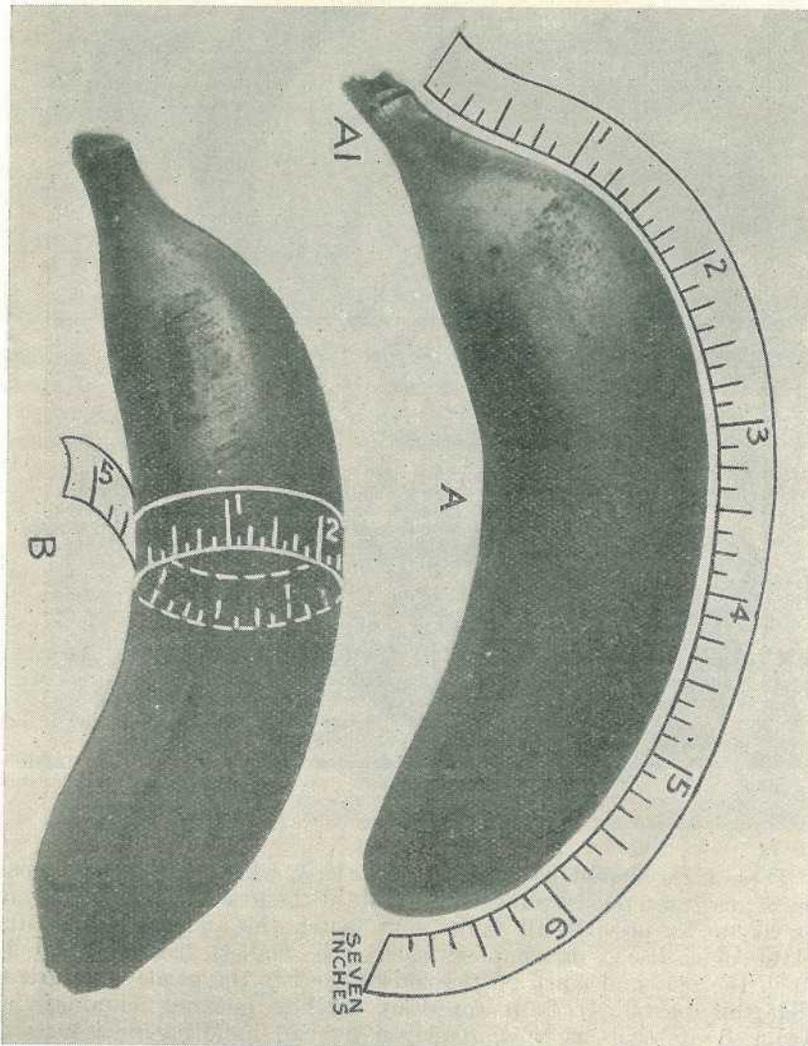


PLATE 197.

**METHOD OF MEASURING THE LENGTH AND GIRTH OF A BANANA.**

- A.—The length of the fruit is taken from the raised girdle (AI) to the centre of the end;  
 B.—The middle of the banana is where the measurement for the girth is taken.

**SWEATING.**

Observations made with freshly picked fruit and fruit sweated for thirty hours showed interesting characteristics. Cases were packed with a bulge of from  $1\frac{1}{2}$  to 2 inches with both sweated and unsweated fruit and the lids nailed on. An inspection twenty-four hours later

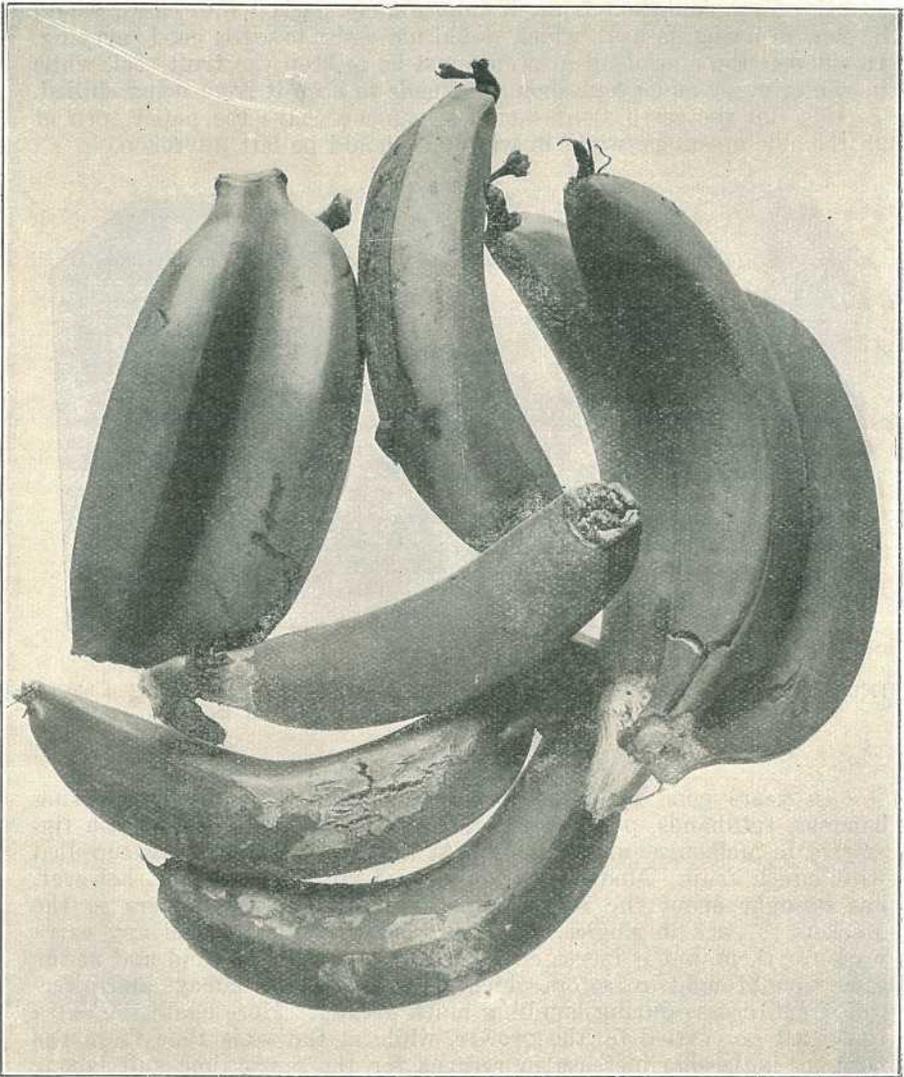


PLATE 198.

SHOWING DAMAGED FRUIT UNFIT FOR PACKING.

showed that the freshly-cut fruit was badly lid-bruised, some specimens being slightly squashed and split; ten specimens were so damaged as to be unmarketable. The sweated fruit, however, showed no markings from the lid pressure bad enough to spoil the fruit for market.

The sweating tends to toughen the fruit and it stands up better to pressure. The above test was made in July with normally warm weather prevailing. Hot weather conditions when handling would of necessity mean a reduction in the period of sweating. During hot weather, fruit picked one day should be packed the next, being spread out during the intervening night to permit its becoming thoroughly cooled. Hot plantation fruit, if immediately packed into cases, would be slow in losing its heat, which would not assist towards good carrying. In summer the aim of all growers must be to keep the fruit cool, while in winter every endeavour should be made to keep it from being chilled. To this end the cased fruit should in summer have the paper torn at all the side openings, while in winter it should be left unbroken.

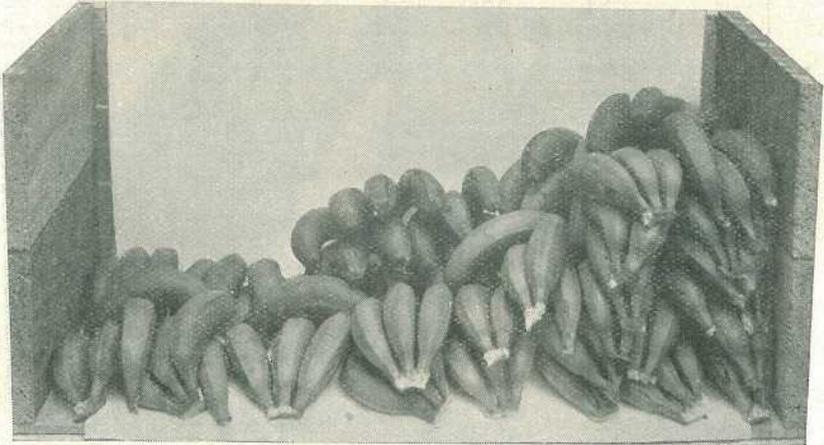


PLATE 199.

INCORRECT WAY OF PACKING.—One layer of fruit should be completed before commencing to place the next layer on top of it.

### PACKING.

In years gone by, many types of packing were used in casing bananas, full-hands, part-hands, and fours being quite common on the market in Melbourne and Sydney. At that time Brisbane was supplied with bunch fruit. Modern marketing and ripening practice, however, has brought about the recommendation from the wholesalers in the Markets to pack in singles. This, of course, did not entail any extra work for them, but it increased the growers' work three-fold and at the same time brought in factors which made the risk of damage and infection from disease during handling much greater. Here again the extra risk must be carried by the grower, while at the same time there has been no noticeable increase in returns for the extra time and labour involved. Observations made of the ripened fruit in various packs has shown that singles are much more seriously affected by Squirter and Black-end than hands or part-hands. (*Bulletin No. 64, C. S. & I. R.*). As this state of affairs might not always continue, many of the different packs that can be used are included in this description of packing.

No matter what particular pack is used by the grower, every care must be taken during all operations. All packing must be completed layer by layer until the case is full. The part-hand packed case

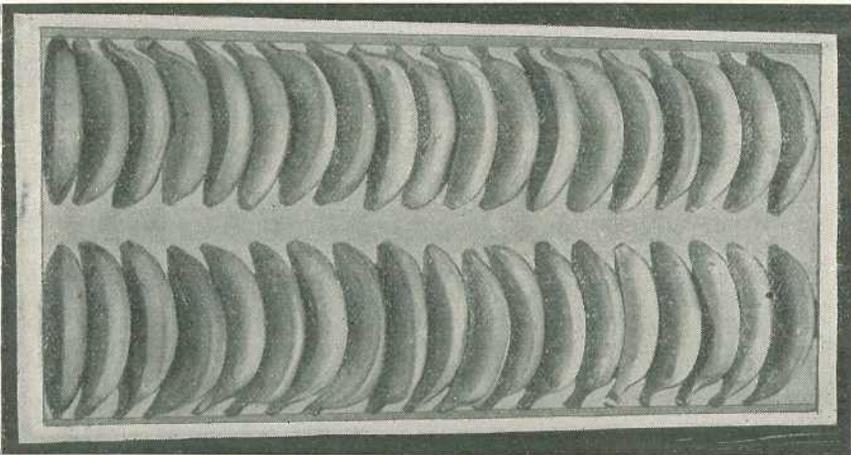


PLATE 200.

METHOD OF PLACING FIRST LAYER OF "SIXES," "SEVENS," AND SMALL "EIGHTS."

illustrated (Plate 199), is an example of how *not* to do it; here it will be noted that there is only one completed layer, three other layers being placed on top of this in various stages of completion. Packs done in this manner, whether in singles, twos, or part-hands, must inevitably be unsatisfactory. A good foundation is the secret of good packing, so the importance of finishing each layer so as to make it a good foundation for the next layer cannot be too greatly stressed. The correct pack to use for fruit is governed, of course, by the type of bunch being cut. A close study of the illustrations of the respective packs will guide the packer over many pitfalls.

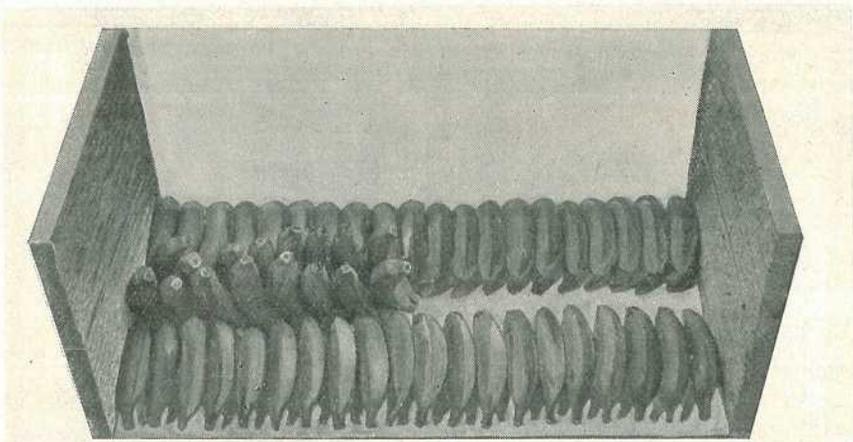


PLATE 201.

METHOD OF PLACING SECOND LAYER.—Fruit should be placed in the spaces of the first layer, concave downwards.

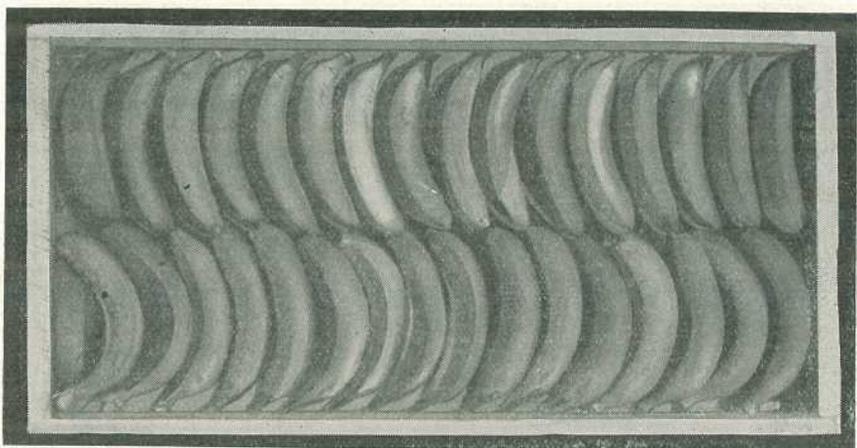


PLATE 202.  
METHOD OF PLACING FIRST LAYER OF CURVED "EIGHTS."

#### Single Packs.

There are various ways of packing bananas in singles, the best of which are shown. The pack most commonly used is done as follows:—

A layer of fruit in two lines is placed along the bottom of the case, each banana being placed on its side (Plate 200), with the shank end of the fruit touching the wood of the side boards of the box. The layer is completed from end to end, the fruit being kept compact and firm in order to form a good foundation for the succeeding layers. The second layer is placed upon this, concave downwards (Plate 201), the fruit being placed in the spaces between the fruit of the first layer. The third layer is placed in the spaces of the second layer, and the case

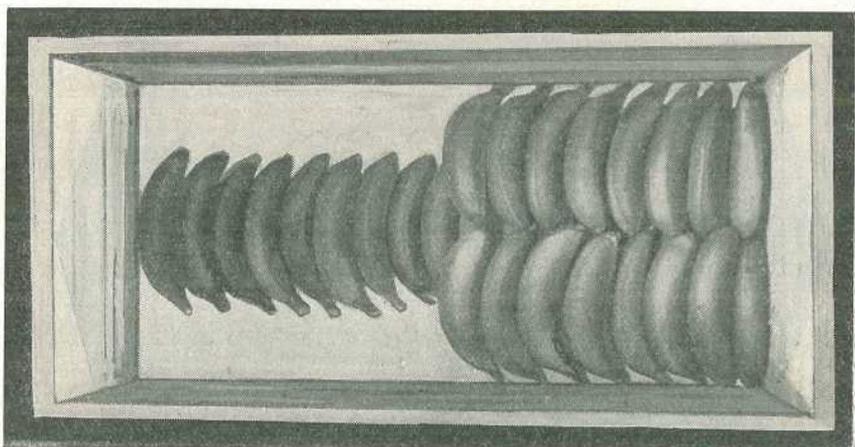


PLATE 203.  
METHOD OF PLACING FIRST LAYER OF LARGE "EIGHTS"  
AND OF "NINES."

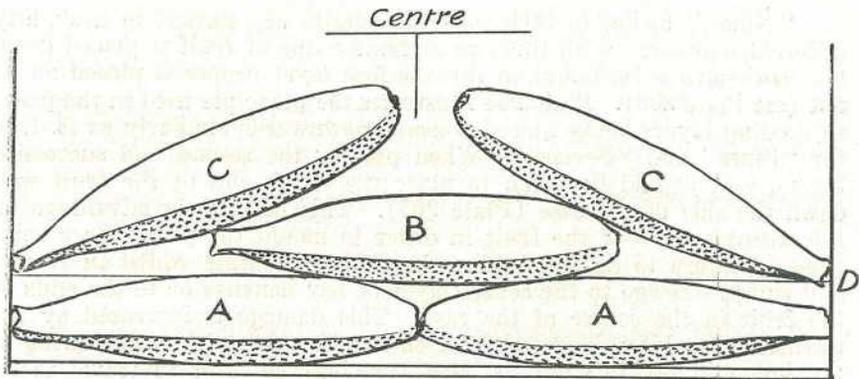


PLATE 204.

END VIEW, SHOWING THE PRINCIPLE USED WHEN PLACING THE SINGLE LAYER DOWN THE CENTRE OF THE CASE TO ENABLE "NINES" TO BE PLACED ACROSS THE CASE.

- A.—Two bananas placed across the case just fit.  
 B.—Represents the line of fruit placed down the centre of the case.  
 C.—The first layer placed in position. Note the extra length gained by lifting the centre of the layer with B.  
 D.—Represents the bottom of the case.

finished accordingly layer by layer, placing each layer in the spaces of the layer beneath. Where a quantity of fruit is at hand, it is advisable to keep, as far as possible, to a type of fruit that will fit evenly one upon the other. If a curved type is being packed, all straight fruit should be used as fillers or key bananas, or, if a sufficient quantity of such fruit is available, it should be packed in a separate case. Packers will find it easier to do good packing if they have ten to twenty cases to do than if they have only five or six. The packing of "Sixes," "Sevens," and small "Eights," is commenced in the manner described above.

"Eights," if they are a curved type of fruit, should have the first layer placed in the form of an "S" (see Plate 202).

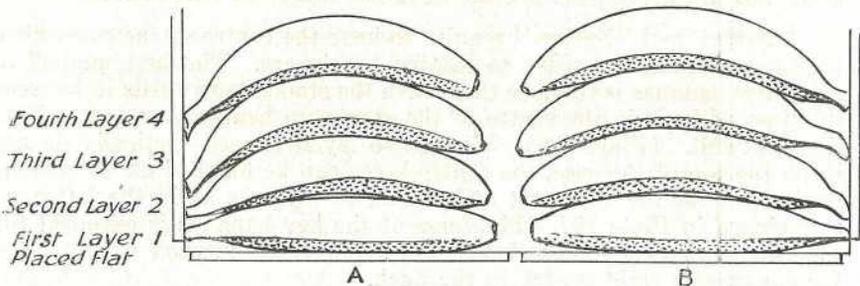


PLATE 205.

CASE WITH END REMOVED, SHOWING CORRECT AND INCORRECT METHOD OF PLACING FRUIT.

- A.—Correct method, with shanks of fruit placed well down the side of the box.  
 B.—Incorrect method, showing layers of fruit packed without placing the shanks well down the side of the box.

"Nines," owing to their extreme length, are started in a slightly different manner. With this size of fruit a line of fruit is placed down the centre of the case, and on this the first layer proper is placed on its flat (see Plate 203). Plate 204 illustrates the principle used in the pack, succeeding layers being placed concave downwards similarly as is done for "Sixes" and "Sevens." When placing the second and successive layers, care should be taken to place the shank end of the fruit well down the side of the case (Plate 205). This takes most advantage of the natural curve of the fruit in order to mould the pack into a solid mass. Failure to do this allows the fruit to vibrate whilst in transit and causes damage to the centre layer of key bananas or to the ends of the fruit in the centre of the case. This damage is increased by the method of stacking the cased fruit on its side whilst in transit owing to the bulge in the lids and bottoms, causing the fruit to travel to its destination in a vertical position.

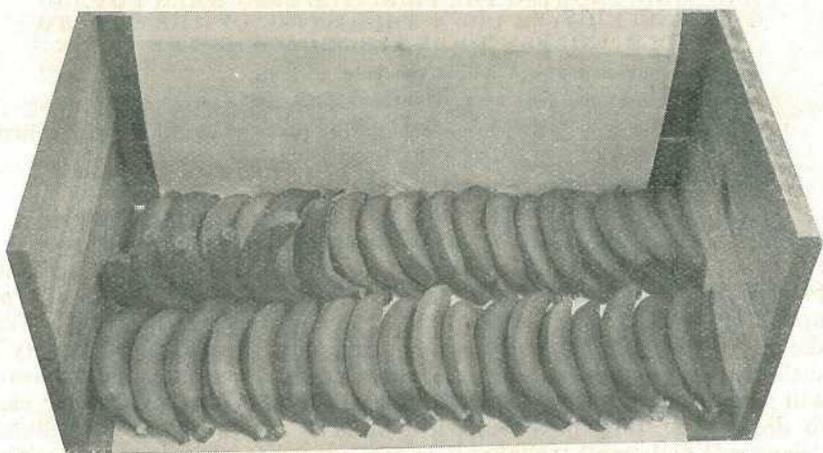


PLATE 206.  
SHOWING PLACING OF CENTRE BANANAS.

Straight types of fruit are packed on the same principle as curved fruit, but using the pack for the next size larger of curved fruit.

"Sixes" and "Sevens" require to have the centre of the cases filled with key bananas in order to tighten the layers. The best method of using key bananas is to place them with the stalks downwards in between the lines of fruit in the centre of the case, care being taken not to bend the stalk end. (Plate 206) Where two layers placed vertically do not reach the top of the case, the centre layer can be finished off by placing the balance of the key fruit end to end in the case as in the left-hand case shown in Plate 207. Tightness of the key bananas is essential for success. Experiment has shown that the vertical method is the better for ensuring a tight centre to the pack.

#### Single Alternate Layer Pack.

Another type of single packing which is used is the alternate layer pack. This is started in the same manner as other single packs, with the first layer of fruit placed on its flat. The second layer is then placed upon the first layer (Plate 208) but the curve of the fruit is reversed.

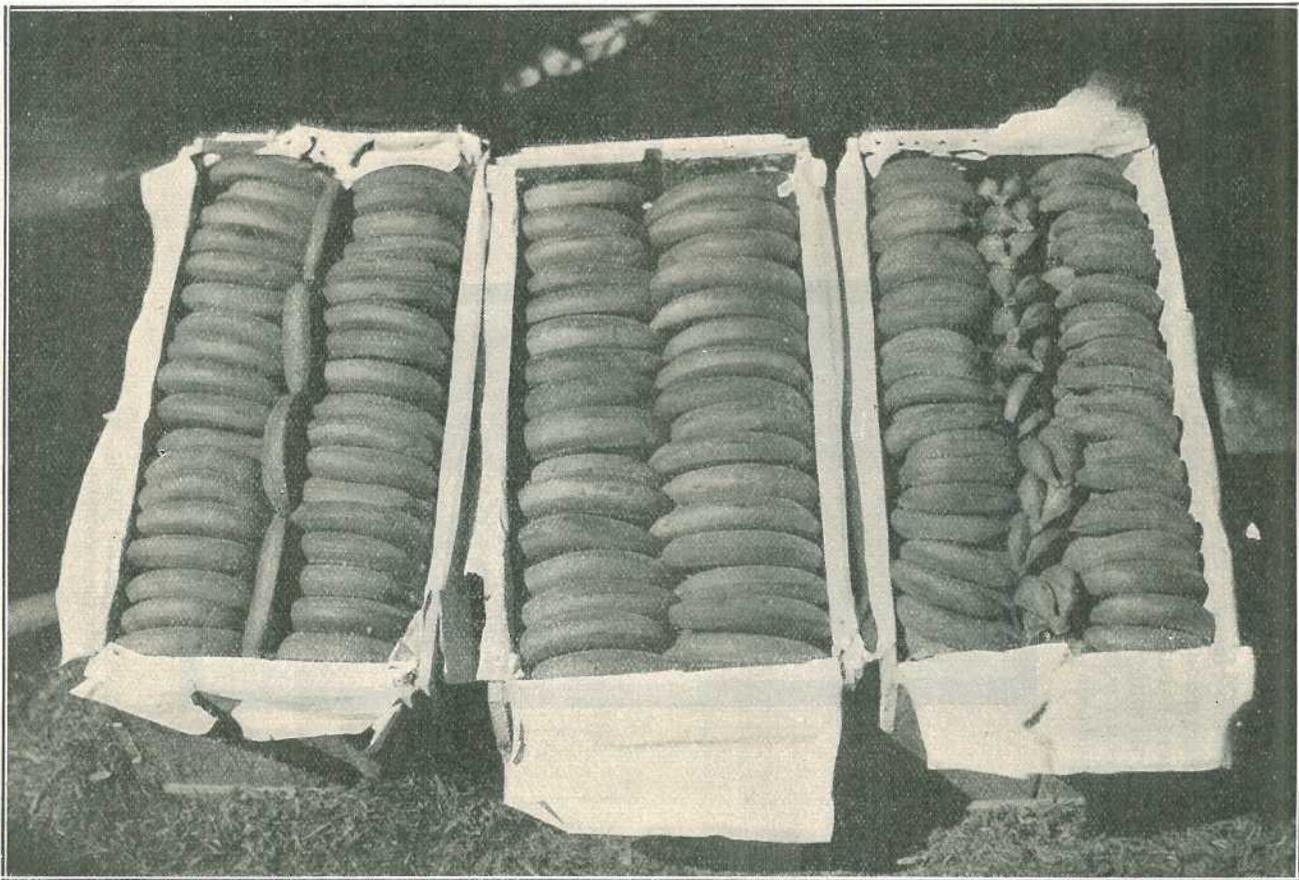


PLATE 207.  
THREE CASES OF BANANAS OPENED IN MELBOURNE.  
Note the placing of the centre bananas.

With care, each layer rests in the cracks between the fruit of the layer it rests upon. The pack is finished by reversing each alternate layer. This pack, being very solid, does not need to come as high in the case as the ordinary single pack.

Some Brisbane ripeners have raised objections to this pack that it does not contain enough fruit. However, a comparative investigation shows that there is but little difference either way in well-packed cases. The fruit ripens quite satisfactorily, and as the pack is quite easy to do, it has features to commend it to the beginner. Consignments sent to Southern Agents have proved satisfactory.

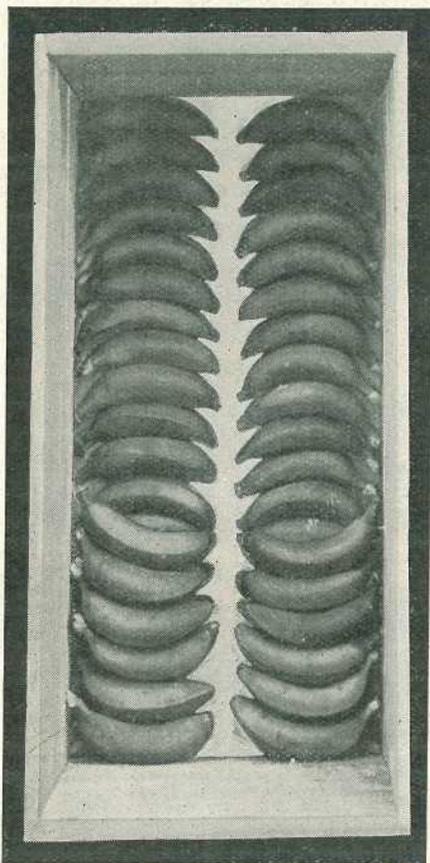


PLATE 208.

SINGLE ALTERNATE LAYER PACK.—Compare the completed first layer with the incomplete second layer.

#### **Vertical Two Pack.**

When bunches of good even fruit are obtainable, one of the easiest and best packs to use is the vertical two. This pack is started in the same manner as the single pack, a layer of singles being placed on the bottom of the case. Suitable twos are then taken from the hands (see illustration of fruit suited for the purpose, Plates 209 and 210) and

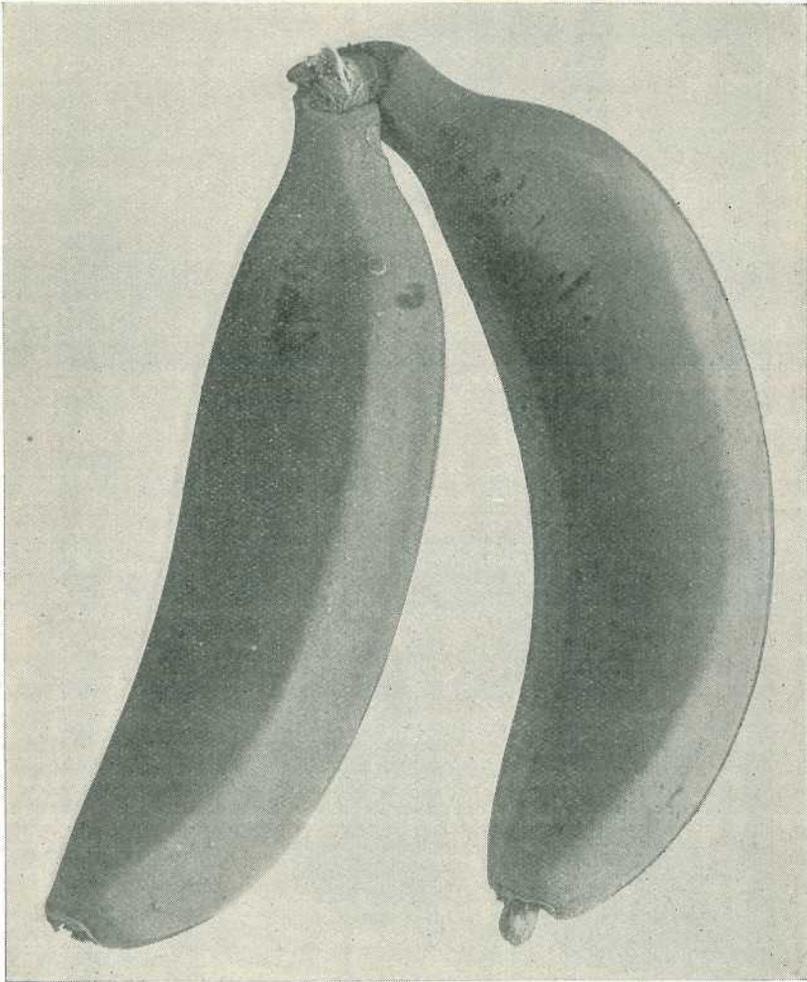


PLATE 209.

SUITABLE TYPE OF TWO FOR THE VERTICAL TWO PACK.

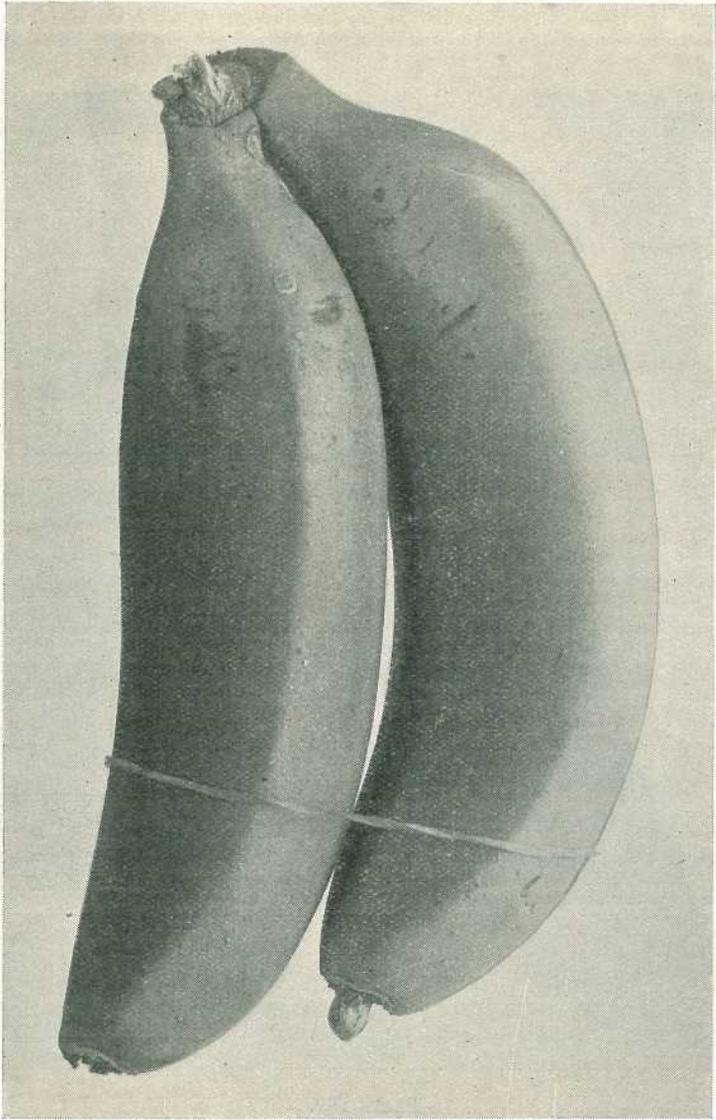


PLATE 210.  
SHOWING HOW THE BANANAS ILLUSTRATED IN PLATE 208 PRESS  
TOGETHER IN THE VERTICAL TWO PACK.

placed in the spaces between the fruit of the bottom layer. The whole success of this pack depends upon the use of fruit, in twos, that will press firmly together without causing a pressure at the stalk end. The cases open at the side with the fruit showing in quite attractive straight lines (see Plate 211). Bananas in twos unsuited for this pack (Plates 212 and 213) can be placed on one side for use as key bananas or for placing in odd corners. Plate 214 shows the possible effect of using unsuitable types of twos.

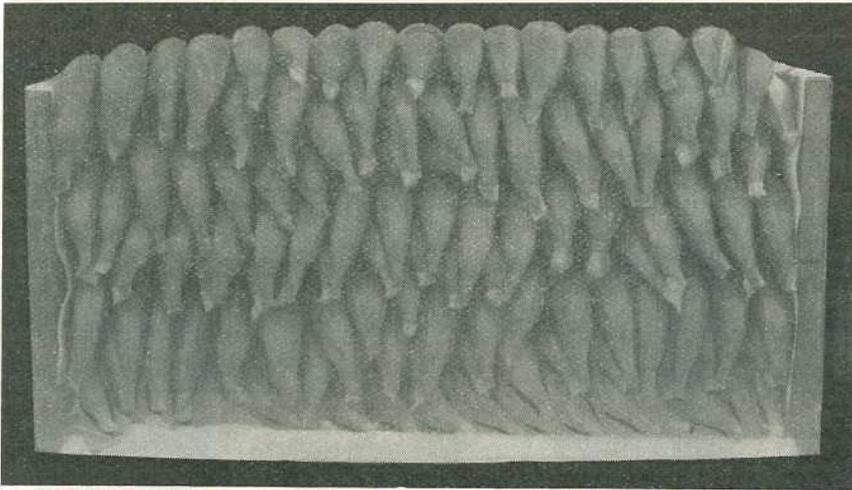


PLATE 211.

FINISHED CASE OF VERTICAL TWO PACK WITH SIDE REMOVED.

#### **Part-Hand Pack.**

Good even fruit is necessary for this pack and for the full-hand pack. The first layer consists of good even part-hands firmly placed in the case (Plate 215). Carefully selected clusters are then placed layer by layer upon this (Plate 216) until the case is finished (Plate 217). Any uneven clusters can be broken up and the fruit used to peg or fill any spaces created through the unevenness of the part-hands used.

The secret of success in all of these packs is care by the packer to complete one layer before starting the next. Plates 199 and 216 explain what is meant.

#### **Full-Hand Pack.**

This method of packing is not popular with agents, although it would assist in lessening many difficulties, such as Squirter and Black-end, encountered in transporting bananas. The main reason for its unpopularity is apparently that there is not so much fruit contained in the case as when singles are packed. Plate 218 shows a well-packed case of hands.



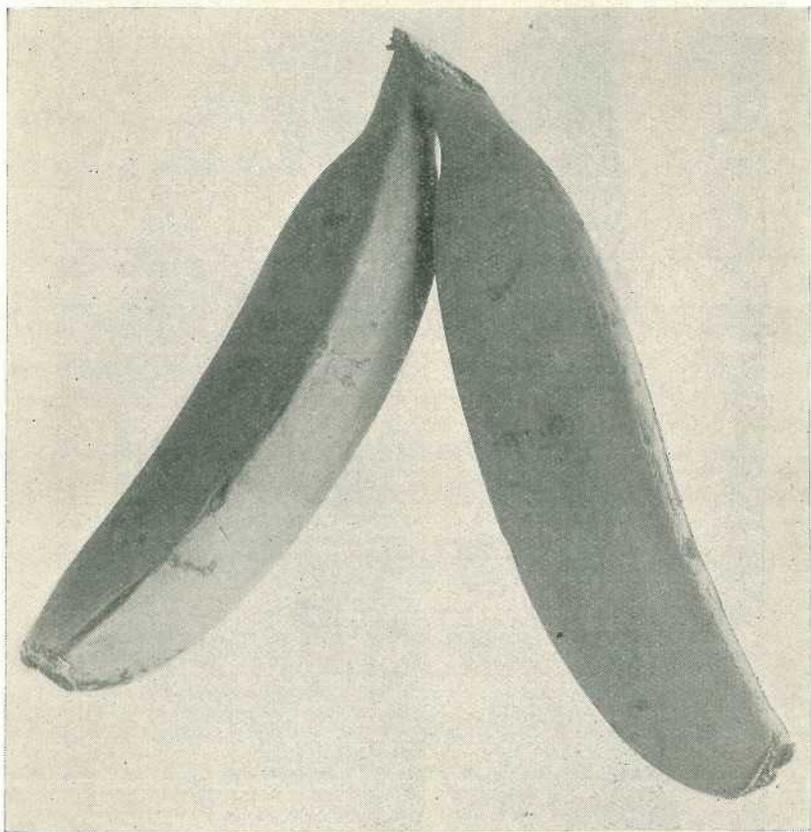


PLATE 213.  
UNSUITABLE FRUIT FOR VERTICAL TWO PACK.

FRUIT—THIS TYPE OF FRUIT SHOULD BE USED FOR PACKING IN THE VERTICAL TWO PACK.  
THE FRUIT OF AFRICA IN THE MARKET OF AFRICA  
L. 213

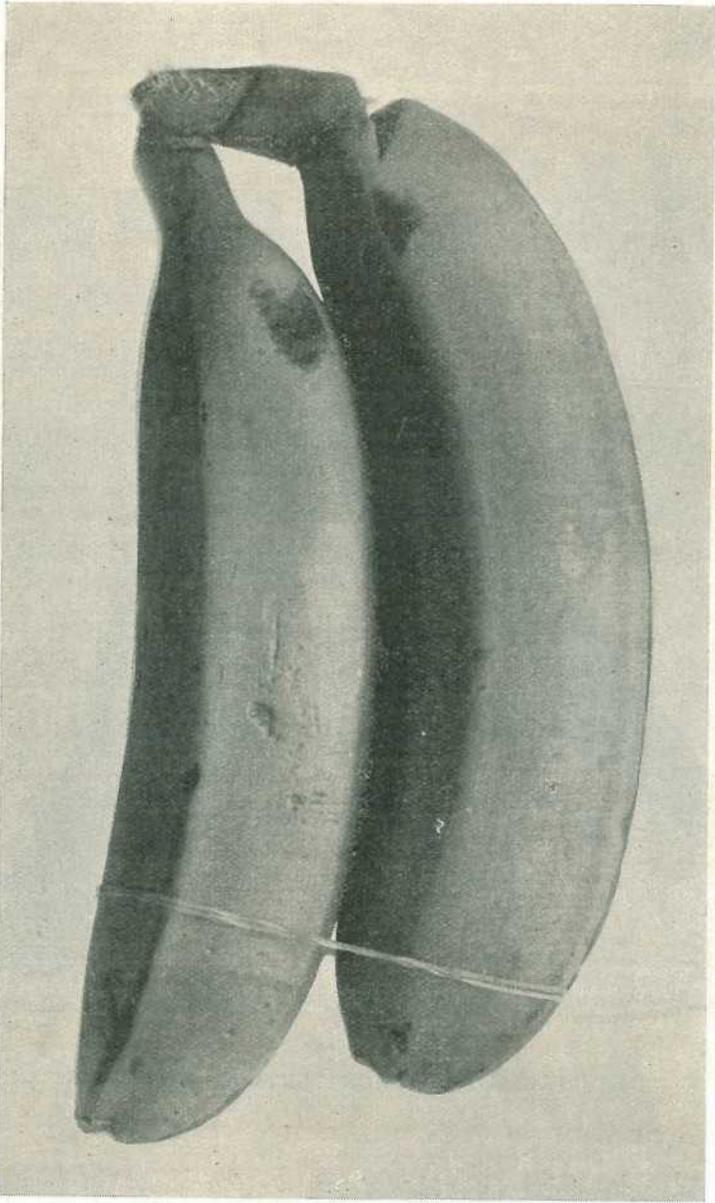


PLATE 214.

THE RESULT OF APPLICATION OF PRESSURE ON UNSUITABLE FRUIT.—This type of fruit should be used as key bananas or for packing as singles.

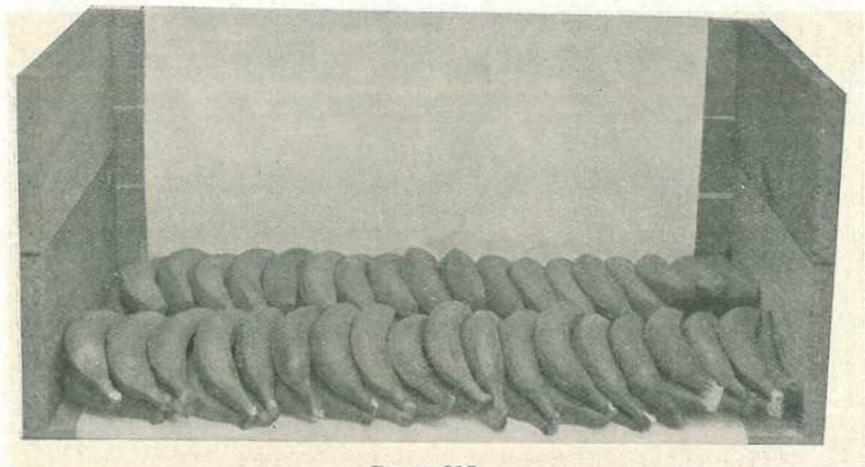


PLATE 215.  
FIRST LAYER OF PART-HAND PACK.

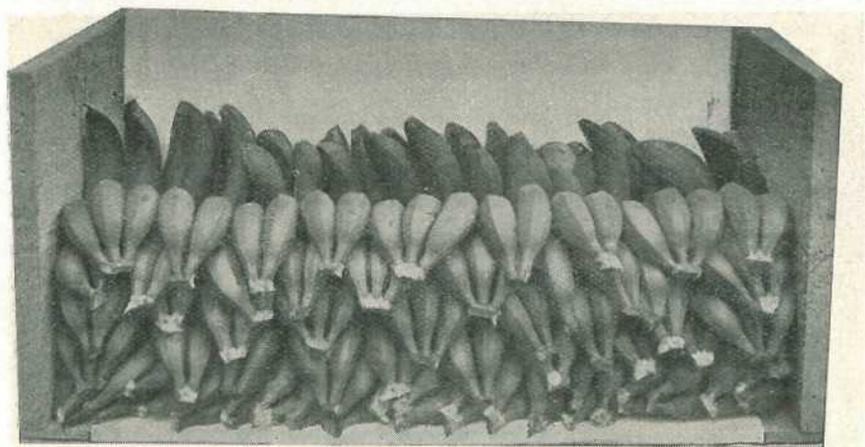


PLATE 216.  
PARTLY COMPLETED PACK OF PART-HANDS.—Note that each layer is complete.

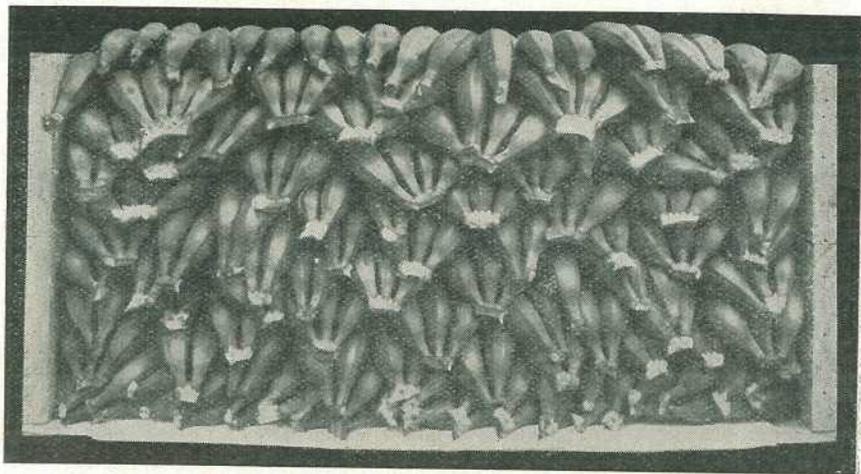


PLATE 217.  
COMPLETE PART-HAND PACK OPENED AT SIDE.

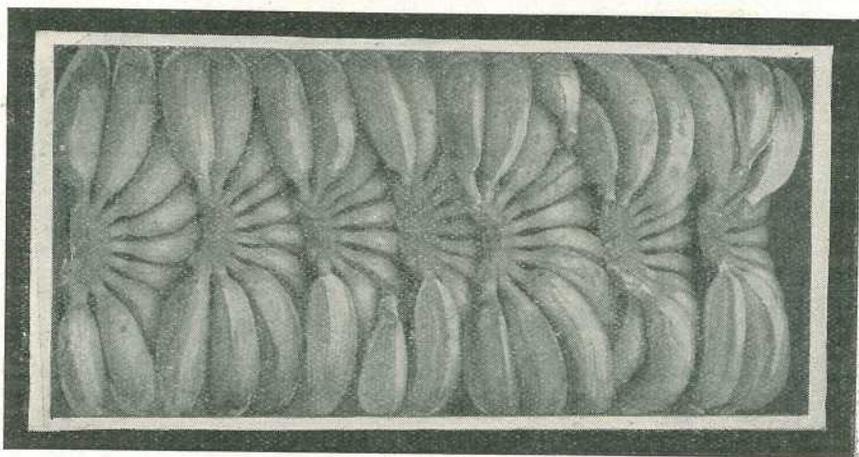


PLATE 218.  
A COMPLETE CASE OF FULL HANDS BEFORE PLACING THE LID  
IN POSITION.

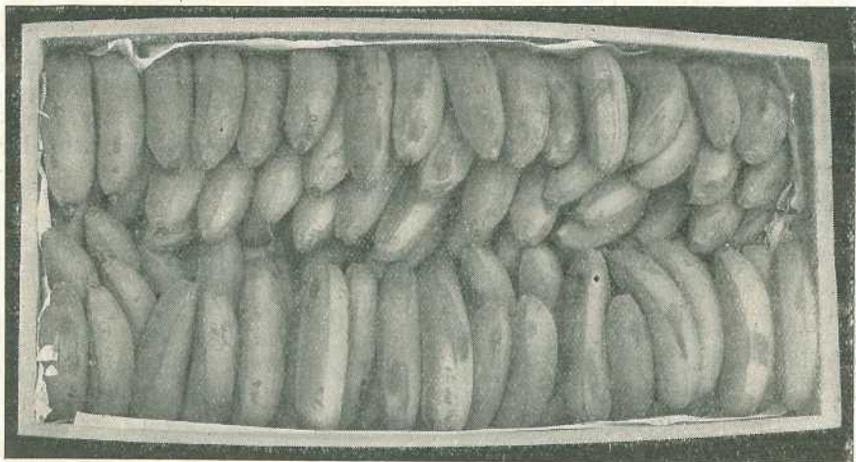


PLATE 219.

FULL-HAND PACK WITH SIDE REMOVED.—The poor appearance of the packed fruit is possibly the chief reason for the unpopularity of full-hand packing so far as the Agents are concerned.

The method of packing is to nail one board along the centre of the bottom of the case and place the first layer in the case as firmly as possible. The second layer is placed upon this (the flower end of the fruit in both layers being placed to the centre of the box), and all spaces filled or "pegged" with single bananas. The top is then nailed on and the case turned over, the bottom layer being filled in with singles in the same manner as the top layer. It is not satisfactory to endeavour to peg the first layer from the inside of the case. Plate 219 shows a case opened at the side, at the same time illustrating one reason why hand-packing is not popular with the merchants; the pack is not so attractive from the side of the case as it is when viewed from the top or bottom.

[TO BE CONTINUED.]

## THE AVOCADO.

By H. BARNES, Director of Fruit Culture.\*

**T**HE Avocado, in a horticultural sense, is a comparatively new fruit in this State. In other parts of the world, because of its nutritious qualities, it has been described as "The Fruit Sensation of Modern Agriculture." It is at times miscalled "Avocado Pear," but the term "pear" is misleading in so far that the fruit resembles a pear only in the shape of some varieties. Generally speaking, the native home of the Avocado is tropical America, and in parts of that region it takes the place of meat in the dietary of the people. The Avocado is related botanically to the Laurel family, and two distinct species are generally recognised, which for practical purposes may be known as the Guatemalan and the Mexican species. It is easy to distinguish varieties

\* In a broadcast talk from Radio Stations 4QG, Brisbane, and 4RK, Rockhampton.

of these species. The Guatemalan is considered the hardier grower, whilst the fruit possesses a thick skin which renders it less susceptible to attack by fruit fly. These advantages make the Guatemalan species attractive under Queensland conditions, and as a consequence orchardists should give it preference. Mexican Avocados possess a thin membranous skin, and the leaves of the trees—which are usually smaller than those of the Guatemalan varieties—when crushed have a strong aromatic odour resembling that of aniseed.



PLATE 220.

An Eight-year-old Grafted Avocado.

Under average coastal conditions Avocado trees are pretty evergreens. They attain a height of up to 30 feet. The fruits of some varieties are pear-shaped, whilst others are quite round and about the size of an orange. The fleshy edible portion inside the skin is up to

1 inch in thickness and surrounds a single large seed. The flesh when ripe is of the consistency and colour of butter and possesses a peculiarly rich nutty flavour. It contains an average of 20 per cent. of fat, and is probably the highest of all fruits in nutritive value. It may be eaten fresh or as a salad with the addition of condiments such as salt, pepper, or vinegar. Usually the Avocado demands an acquired taste, as owing to its rich fat content it is at first trial disagreeable to many palates. As a matter of fact, the only fruit comparable with the Avocado is the Olive, and, similarly to the Olive, most people are prepared to admit that, once a taste is acquired, the flavour of the Avocado is delicious. The fruit is now largely grown in the United States of America, where there is an enormous demand for it. American horticulturists stated a few years ago that it was one of the greatest undeveloped sources of food which the Tropics have to offer. Since a study of the analysis of the fruit proved this statement to be true, its cultivation in Queensland can quite safely be undertaken with the assurance that the venture will be financially successful. There are several young orchards of Avocados in this State, and the growers have no difficulty in disposing of their crops, in some instances for 1s. to 1s. 6d. per fruit. Of course with increased production it cannot be expected nor is it desirable that the price remain so high. Nevertheless until production becomes excessive, returns will be quite profitable.

The Avocado is easily grown from seed, but as seedlings cannot be relied upon to come true to type, budding and grafting are resorted to. When being planted the seed should be covered with an inch or two of soil and kept moist. The time occupied in germination varies considerably; shoots sometimes appear in two or three weeks, but in other instances they may take two or three months. Generally speaking, however, about a month is the average time in warm weather. The seedlings grow very rapidly, and when they are from five-sixteenths to three-eighths of an inch in diameter they may be budded by the ordinary "T" method. The best time for budding is in the spring, twelve months after planting. The stocks will then be in vigorous growth and the operation will be easy to perform. Budwood should be selected from terminals just prior to the spring whilst the stock trees are still dormant, and the budsticks stored in damp sand until they are required. The grafted plants will be ready for transplanting to the orchard during the following winter.

When selecting the site for an Avocado orchard, preference should be given to a level site, or if such is not available, then to one with an easy gentle slope to the north-east, and well protected from strong winds. Although the trees are mostly evergreen, some varieties are inclined to throw their foliage at flowering time and make new leaves immediately. However, once they are established light frosts will not injure them, though heavy frosts tend to do damage. The land should be thoroughly ploughed and broken up prior to planting in order that the young trees may quickly establish themselves. If planted on the square system the trees may be set 25 feet apart, which will permit of seventy being planted to an acre. Planting closer than 25 feet is not advisable, as the trees are vigorous growers and occupy a lot of room in a few years after planting. Budded or grafted trees bear in the third or fourth year, and seedlings usually in the fifth or sixth year.

Many varieties of Avocados have been introduced into Queensland during the past twelve years, chiefly by the Queensland Acclimatisation Society, whose gardens are situated at Lawnton. The Department of Agriculture has also introduced a number. These have been tried out in trial orchards and the best selected, while those which were found to be unsuitable to our conditions were discarded. Intending planters would do well to concentrate on the proved varieties. It has been

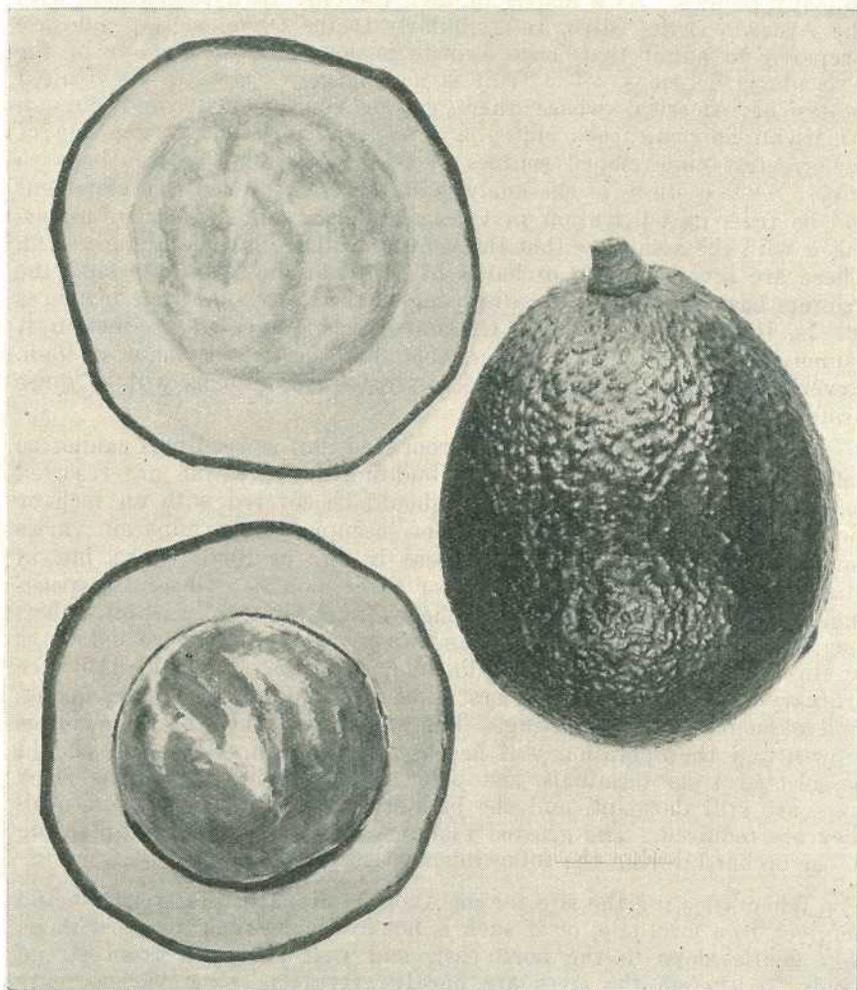


PLATE 221.

Avocado Fruit, and Fruit Cut transversely showing Seed in Lower Section.

found, for instance, that some varieties thrive for a few years and then commence to die back; others persist in producing extremely heavy crops of fruit at an early age and decay prematurely as a result; whilst still others are subject to affections known as sun-blotch and transmit this susceptibility to seedlings. Further, as has been previously stated, thin-skinned varieties are subject to fruit-fly infestation. It is essential, therefore, to obtain only those which have been

proved to be suitable varieties. The following varieties, which are all growing at the Queensland Acclimatisation Society's Gardens, are recommended:—"Fuerte Hybrid," "Blakeman," "Grande," "Goodwood," "Justice," "Pankey," and "Spinke," whilst a variety known as "Robinson" has proved itself exceptionally good and is the largest fruiting.

A good loamy soil is best for growing Avocados. The main essential is that the soil is well-drained, since stagnant water at the roots is fatal to the tree. Soils similar to those on the Blackall Range and Tamborine Mountain have proved themselves to be particularly suitable, and the rate of growth of the trees at both these places is remarkable. One tree seen recently on the South Coast made the phenomenal growth of 9 feet in a year, whilst a five-year-old seedling tree on Tamborine Mountain is over 20 feet high and has just carried a heavy crop of fruit.

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## SOME TROPICAL FRUITS.

### 3. THE VI APPLE OR HOG PLUM.

By S. E. STEPHENS, Northern Instructor in Fruit Culture.

**A** RELATIVE of the fruit discussed last month (the Cashew) the Vi apple is totally different in appearance both of tree and fruit. The tree is symmetrical in habit of growth, the branches radiating from a straight, smooth-barked trunk. The foliage is clustered towards the ends of the stiff branchlets and is composed of compound leaves, the leaflets being numerous. The tree is semi-deciduous.

The fruit is borne in clusters, on stalks up to about 3 inches long. It is oval to obovate in shape, 2 to 3 inches long, yellow in colour, and russeted. The skin is thin and the yellow flesh is somewhat of the consistency of a scarcely ripened pear. The seed is covered with woody fibres which extend into and cling to the flesh. The flavour is distinctive and sub-acid, and when acquired is quite pleasing in so far as good varieties are concerned. Like most tropical fruits, however, it has been largely propagated from seed, consequently many trees met with are very inferior, and a taste of the fruit from one of these inferior trees would prejudice a person against them for all time.

The fruit is used principally as a dessert or for jam and jelly making. The jelly made therefrom is of good flavour, colour, and consistency.

This fruit is a native of Polynesia and has now become fairly widely distributed in tropical countries. It requires a tropical climate and thrives best on deep, rich, scrub lands. It will grow fairly well, however, on comparatively poor soils, but does not attain to the same size or prolificness reached under more suitable conditions.

In North Queensland the tree is represented by a limited number of specimens, mostly growing in the Cardwell and Murray River districts. In these areas the trees crop well, ripening their fruit between May and July.

As regards pests, only two have been noticed to cause much loss. The fruit fly frequently infests a good many of the early ripened fruit, but the cooler weather steadies their attack during the later part of the

season. Flying foxes decimate the crop rapidly as soon as they discover the ripe fruit. One or two of these trees should make a good decoy for foxes. The foliage is usually sparse when the fruit is ripening, consequently the foxes can be easily located and shot.

This fruit tree appears to bear a different name in each country in which it is grown. Whilst "Vi Apple" and "Hog Plum" are the names commonly used in Queensland, it is known in Ceylon as "Ambarella," in Jamaica as "Jew Plumb," and in some other countries as "Otaheite Apple." This last name is also frequently applied to another fruit, the Malay Apple (*Eugenia malaccensis*). The botanical name is *Spondias cytherea*. *Spondias dulcis* is a botanical synonym.

The tree is usually regarded elsewhere as being somewhat difficult to raise from seed, and propagation by budding or grafting on the mango is sometimes resorted to. In North Queensland this does not seem to be the case, the writer having observed a number of seedlings raised without any particular attention. Vegetative propagation is desirable, however, when it is desired to perpetuate or multiply a particularly good tree.

## THE FRUIT GROWING INDUSTRY IN THE NORTH.

*The Director of Fruit Culture (Mr. H. Barnes) has received the following reports on their respective districts for the three months ended 30th September, 1935, from the Instructors in Fruit Culture at Cairns and Bowen.*

### Cairns District.

**W**EATHER during the quarter has been very dry. Earlier in the period some cold periods were experienced, and the heaviest frost for some years was recorded in the Herberton area. The rainfall at Cairns was 334 points on twenty wet days, as against 401 points on twenty-eight wet days for the same period of 1934.

Gathering of the main citrus crop has been completed in the chief citrus districts—Cardwell and Murray River. Several wet days in July hastened the maturing of oranges, and resulted in the falling of several thousand cases of fruit. Throughout the North trees carried a light second crop, which is now maturing and which in the Cairns District is already being harvested.

Prospects for the pineapple crop in the Cairns district appear to be fairly good; although, owing to degeneration of the plants, lack of cultural attention, and sometimes to unsuitable soils, the likelihood of much good-sized fruit is remote.

Bananas have been very scarce throughout the Northern Division and have not been of the best quality. Plantations on the Atherton Tableland were severely frosted at the end of July, and production from that area will not be renewed for some months. During the dry weather in the latter part of the quarter, many plantations of sugar bananas around Cairns suffered considerable damage from Panama disease.

Mangoes have blossomed heavily; the coincidence of fine weather with the blossoming period resulted in a good setting of fruit.

Papaws have been in fairly short supply, but recently good crops approaching maturity have been noticed in the orchards.

Granadillas ripened a crop of good fruit which found a ready sale.

Litchi trees in the Cairns and Mossman districts show promise of a good crop of fruit during the coming season.

Various other tropical fruits have blossomed during the quarter and are carrying fair crops.

Tomatoes in the Cardwell district are healthy and show good promise. The crop is now being gathered and shipped to southern markets. Good crops were produced during the quarter in the Cairns district and were disposed of on the local market. The crop is now practically finished.

#### Bowen District.

Weather conditions throughout the quarter have been dry in the Bowen district and up to Townsville. Five wet days were recorded at the Bowen Post Office for 107 points of rain. Only 14.62 inches of rain have been recorded since the 1st January, 1935. Somewhat heavier falls of rain have occurred in some localities, but the season can be classed as exceptionally dry. This continued dry weather has had a very retarding effect on tomatoes, cucumbers, and fruits generally. Early areas of tomatoes went off quickly, and the later plantings have produced only with the aid of irrigation.

With regard to tomatoes, somewhat of a transitional policy has been adopted during this season in that new varieties have been tried to replace the old "Buckeye" types which had to be discarded on account of their liability to black spot. "Mahona" or "Marhio," "Break o' Day," and some "Pritchard," were grown. The globe types have been retained and generally did well, although tending to run small. "Mahona" and "Break o' Day" produced a lot of "catface" fruit. By careful selection of fruit from these varieties an improvement may be brought about in the direction of obtaining a good blemish-free fruit. The quantity of tomatoes exported for the quarter is less than last season.

The area under pineapples can be said to be remaining stationary. This crop has also been affected by the continued dry weather, and good early rains are necessary to start the plants off well for the summer crops. The small consignments which have been forwarded during the quarter have been of good quality.

Mango trees generally are setting fruit nicely, and with favourable weather conditions good returns will result. An increase in the number of good class trees coming into bearing is noted.

Cucumbers have not generally been up to the standard, and even this measure of success has only been obtained by continual watering.

Small lots of egg fruit, chillies and capsicums, and rock melons, have been sent to the South during the quarter. All were of good quality.

Banana plants at Bowen and north to Townsville are being kept alive and producing only by continual watering. North of Mackay they have been a little more fortunate in the rainfall, and areas look better.

## MARKETING NOTES.

By JAS. H. GREGORY, Instructor in Fruit Packing.

**T**HE difficult season so far as marketing is concerned is now rapidly approaching. The last of the old season's fruits—apples, citrus, and strawberries—will have their kingdom assailed by the new season's stone and pome fruits, with mangoes reappearing on the market after a long absence.

### Apples.

Many lines of Sturmers, becoming harder to handle as the year goes by, are now going "sleepy" as a result of over-storing. It is hard to understand why people keep this variety in storage after the beginning of September. Granny Smith, Democrat, and Yates are now the only good varieties available. Prices have remained firm, up to 13s. per case being received for good fruit.

### Citrus.

Orange supplies have been maintained, with a good demand for good-sized lines. Small fruit is still a problem. A long-sighted policy of pure fruit-juice extraction and sale could still be of benefit in relieving the market of over-supplies of small fruit. Good lines of Valencias are realising from 6s. up to 9s. per case.

With mandarins, quality fruit is hard to get, so prices would not be a good indication of actual values. Brisbane prices ranged from 6s. to 12s., with a few specials higher.

Uncured lemons are not popular. It is sound advice to pick and cure lemons when the fruit is just changing colour. Previous months' prices have been maintained, viz., 6s. to 10s. per case on the Brisbane market.

Grape fruit rates have been maintained, Marsh Seedless realising the best prices.

### Passion Fruit.

Good passions have sold exceptionally well, up to 16s. per case being obtained. With increasing supplies prices will ease. With this fruit it is advisable when packing to separate smooth-skinned fruit from "crinkly" fruit, as this will enhance the value of the whole line.

### Papaws.

With warmer weather approaching, the market has improved for good lines of papaws. Brisbane senders would do well to leave the fruit on the trees a little longer, as green fruit has not been ripening up satisfactorily. Up to 5s. has been obtained for good lines in bushel cases. With the advent of the warm weather trouble from fungal spotting should be much less in evidence.

### Mangoes.

Growers sending South should concentrate on supplying only the best types of fibreless fruit to the Melbourne and Sydney markets. Wrapping the fruit and layering it with woodwool is of great assistance in promoting better transport, as placing the fruit in cases without using packing greatly increases the amount of bruising and waste. Half-bushel cases are preferable to bushel cases, as they give greater

protection to the fruit. Only the best types and varieties are worth planting commercially. Prices in Brisbane for early fruit have been from 8s. to 10s.

#### Bananas.

No great change has taken place in banana prices during the last month. Growers sending South should now take more care in cutting. Owing to the warmer weather, fruit showing a tendency to ripeness should be marketed locally.

#### Pineapples.

A similar warning as a result of the approach of warm weather is given to pineapple growers—over-maturity of fruit is to be avoided. During the last month prices have been maintained. When sending fruit to the Southern States the use of woodwool for packing is recommended. Prices in the Southern markets have firmed.

#### General.

As soon as supplies are available in Australia, experiments with various types of chemical fruit wraps are contemplated in an endeavour to ascertain whether any definite control of the spotting in transit of tropical fruits can be obtained.

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### BANANA NOTES.

By J. H. MITCHELL, Agent, Banana Industry Protection Board, Yandina.

*In submitting the following notes to the Director of Fruit Culture (Mr. H. Barnes), Mr. Mitchell points out that there is nothing really new in them, but in the course of his inspectional duties he has found a lack of knowledge even among old growers regarding the factors governing successful banana growing. And in the case of inexperienced growers they may desire to know whether the suckers or "bits" are good, bad, or indifferent, and whether they are planted correctly or incorrectly.*

**F**ACTORS which have an important influence in the production of quality fruit and general welfare of plantations are—Preparation of soil; digging holes for planting; correct types of bits and suckers; and method of planting.

These essential tasks are very often not given the amount of attention to which their value entitles them, consequently, although strict attention is paid later to cultural and desuckering methods, the ultimate result is unsatisfactory.

#### Preparation of Soil.

Plantations located on forest country composed generally of soil that has become more or less hard on the surface through exposure to the elements and usually carrying heavy timber and crops of undergrowth, mostly blady grass, demand, for best results, that the soil be broken up before planting.

The preparation of a reasonable depth of soft friable soil for the roots of the plant to travel and vegetate in, is a basic principle of horticulture, and the banana being recognised as a gross feeder demands

the maximum amount of cultivated soil within reason. Given inducement, banana roots will not only travel great distances just below the surface, but will penetrate into the lower or subsoil, thus ensuring stability and greater resistance to adverse conditions.

As on banana hillsides ploughing is rarely possible, the soil should be grubbed or picked to a minimum depth of 6 inches and left in as rough a condition as possible, allowing access to air and sunshine. When finally broken up into a fine tilth through the action of the elements, its physical features will have altered materially with beneficial results to the crop, and if fertilizing is resorted to, results will be more satisfactory still. The selection of tools for breaking up the land is governed by the class of country—e.g., in very stony country, which, incidentally, experience has shown to be best adapted to banana growing, a pick is the most suitable tool and in plainer tracts, a single blade three-pronged grubbing tool answers the purpose.

### Digging Holes for Planting.

In numerous instances through lack of time or capital, the planter after burning off, decides to plant up and do the breaking up at a later date. This practice is quite in order provided the planter prepares sufficient root room for the growing plant before planting, to minimise the risk of injuring tender roots during breaking-up operations, which should then be commenced as soon as possible after planting is completed.

To prepare a site for a banana plant the soil should be removed from a space at least 2 feet in diameter to a depth of approximately 10 to 12 inches. The walls of the hole should be as straight as possible and towards the bottom should be disturbed as far back as the digging tool will allow. A mattock, or as it is commonly called, a grubber, with a digging blade made about 12 inches long by 2½ inches wide answers the purpose for hole sinking generally, but in particular instances, a pick or bar is necessary.

The frequent practice of preparing a hole for the reception of the plant, approximately 15 inches in diameter at the top, tapering down to a mere nothing at the bottom, into which the sucker is figuratively rammed, is a very bad procedure, as it tends to stunt the plant from the start and definitely forces it to come to the surface. Growers and intending growers cannot be too strongly urged to give this, one of the most important stages of banana culture, the correct treatment.

### Grade Standard of Bits and Suckers.

The selection of young plants to lay down the prepared plantation is important. If the grower intends to use plants from his own area or to secure them elsewhere, he should have a knowledge of what is required to produce strong virile plants, capable of producing fruit that will "make the grade," and should allow none but these to be planted in his plantation.

Diseased plants are prohibited because of supervision by inspectors and the vigilance of the planters, but it is certain that quantities of inferior low grade plants are dug and replanted every banana season, to the detriment of the industry as a whole and certain unfortunate growers in particular. This condition of affairs could be overcome to a marked degree if the buyer, seller, and user of banana plants had a

fair knowledge of what constitutes a standard bit or sucker. The following grade standards for banana plants were issued in a regulation in the "Government Gazette" of 16th June, 1934:—

(1) *Suckers*.—A sucker is the off-shoot from the corm of a mature plant, from a planting not less than twelve months old, provided that the corm of such sucker shall be not less than 3 inches in any diameter below the point of commencement of development of the pseudostem.

(2) *Bits*.—A bit is a portion of a mature corm of a banana plant, provided that such bit shall consist of a well developed undamaged "eye" protruding not less than  $\frac{1}{2}$  inch above the surface of the corm to which it is attached, the eye to be not less than  $1\frac{1}{2}$  inches from any edge, width of surface to be at least 4 inches, and depth behind eye at least 3 inches.

#### Method of Planting.

A fixed rule for nature cannot be laid down, especially in the case of bananas, as the topography of sites, especially in parts of Queensland, ranges from miniature quarries to plain grassy swards, but a fair working basis is suggested amenable to circumstances.

If planted too deeply, the formation of a secondary corm above the original is often the result and as this takes time, it often throws the calculations of the planter astray. On the other hand, if planted too shallow, the corm has a tendency to rise above the ground level, causing loss of vigour through lost root action and a proneness to toppling over when carrying a bunch.

A fair working basis is to place the sucker in a hole, which, if filled level with the surrounding soil makes the unison of the corm and pseudostem approximately 6 inches below the surface. It should be noted that the side of the sucker furthest away from the parent plant usually produces the correct follower, and a sucker should be placed accordingly and covered in the initial stage with not more than 2 inches of soil, leaving the remaining 4 inches to be subsequently filled in by erosion and mechanical process as the plant develops.

A bit should be planted differently to a sucker. In the case of a bit, the protruding eye should be planted facing *down* at the same depth as recommended for suckers, and receive the same treatment in its initial and subsequent stages.

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#### A USEFUL TANK STAND.

A suitable stand for a tank can be made by filling a ring of corrugated iron with sand. The ring should, of course, be well riveted, and it is also desirable to strengthen it further by means of hoops of fencing wire twitched up hard against the iron.

The greatest pressure on the floor of the tank will be about its centre, and it is advisable, therefore, to give the sand filling a slight crown at the centre so that the tank, when full, will settle with a level floor. The life of the floor of the tank, and also of the ring of galvanised iron, will be greatly extended if the surfaces coming in contact with the sand are given a wash of cement.



### SHEARING AND SHEARERS.

*With reference to the article which appeared under this heading in the September (1935) number of the "Queensland Agricultural Journal," Mr. T. J. Peard, Manager of the Wolseley Department of Buzacotts (Australia) Limited, writes:—*

**B**EING the premier wool producing country of the world it is really appropriate that machinery for shearing sheep was invented by an Australian, and first came into general use in Australia.

The inventor, Frederick Yorke Wolseley, the son of a clergyman, was born at Kingstown, in the county of Dublin, and was a member of the same family of the late Lord Wolseley, whose name figures so memorably in the annals of recent British history.

He arrived in Australia in 1854 and spent the greater part of his life on stations on the Murray, in Echuca and Deniliquin districts. Most of his experience was gained through the association and guidance of John Phillips, which lasted until 1859 when the latter established the firm of Phillips and Company, and bought back for £70,000 the property known as Warbreccan, near Deniliquin. This property had been previously sold for £18,000 to the pastoral firm of Phillips and Graves, of which John Phillips was a partner. Mr. Phillips had been managing Thule, Cobran, and Tenteran stations, from which he resigned on the repurchase of Warbreccan. Mr. Wolseley was then appointed manager of the properties named, and it was during his term in this position that he first conceived the idea of shearing sheep by mechanical means.

Some time later Mr. Wolseley returned to the home of his birth and did not come back to Australia until 1874, when he again became interested in the pastoral industry, spending much time and money on the invention on which he was still working.

In 1876 he purchased Euroka Station, near Walgett, where he continued his experiments with a view to perfecting his patent, and in 1886 he considered it sufficiently satisfactory for practical use. In 1877 the patent was granted him for his original rope-driven machine.

After very careful study and trial he adopted the friction drive machine and demonstrated this important improvement before a group of citizens in Goldsbrough Mort Wool Stores in Circular Quay, Sydney, in 1887.



PLATE 222.

**WOLSELEY SHEEP-SHEARING MACHINE DEMONSTRATION.**

The demonstration was made before a group of citizens in Goldsbrough Mort Wool Sales, Circular Quay, Sydney, in 1887. The inventor, Frederick Yorke Wolseley, is standing second from the left, resting on a walking-stick.

Although the machinery of to-day is as nearly perfect as mechanical ingenuity can make it (ball bearings having replaced the old type metal, and other vast improvements incorporated as the years rolled on), the same principle of friction drive evolved by Wolseley during the 'eighties of last century is incorporated in all standard machinery of to-day.

Mr. Carew's reference to shearers' tallies as published are interesting and to which may be added the following:—In 1922 at Mahrigong, Corfield, E. R. Vernon broke the North Queensland shearing record by shearing 305 sheep in 7 hours 48 minutes, which compares more than favourably with Howe's record of 336 in 9½ hours, especially considering the advantages in favour of the latter. Vernon and nine other shearers averaged 245 for the day.

**TO UNREEL BARBED WIRE.**

Run an iron rod through the roll of wire and over each end of the rod slip a small jam tin with a hole in the centre of the bottom. Then loop a trace chain over the end of the rod at each side and attach a swingle-bar to the middle of the chain. The free end of the wire is fastened to a post and a horse hooked to the swingle-bar on the wire and the roll pulled along. The wire not only comes out straight, but most of the slack is taken up and there is very little straining to do.

## Development of the Shearing Machine.

IN a recent issue of the *American Sheep Breeder* is an article entitled "Shearing Through the Ages," from the pen of E. S. Bartlett, a noted exponent of the art.

We don't know, Mr. Bartlett remarks, just how long ago it was that man domesticated the sheep, but historians say it was, without doubt, in the neighbourhood of 10,000 years B.C. It is known, however, that by the time of David, as recorded in 1st Samuel, sheep were run in rather large flocks and that shearing time was an important event marked by a general gathering together of the sheep and by feasting. The herders came to the shearing place with their bands; shearers, no doubt, noted for their skill, were on hand, and the harvest festival of the sheepmen was celebrated.

This brings us to about 3,000 years ago, the starting point for this history of sheep shearing. It is quite likely that at about this time in history sheep shearing began. During the centuries between the time that man first became a shepherd and the time of David, it is probable that the wool of the sheep was pulled, either from the live animal or from the skin after slaughtering.

### Shears from Damascus.

Our reason for assuming that the shearing of sheep began about 3,000 years ago is that it was then Damascus had become famous for the products of its looms as well as for its wonderful steel blades. What is more reasonable to suppose than that the raw material for fine woollen fabrics produced in Damascus came from the flocks in the country around Mount Carmel, and that the Damascus workers in metals supplied the shears with which these sheep were shorn? At the present time in Palestine there is offered for sale to tourists supposedly antique sheep shears. Those shears [familiar to many members of the Australian Light Horse who were on active service in Palestine during the great war—Ed.] have narrow blades about 8 inches long and curiously-formed handles. They are no doubt close copies of the shears used hundreds of years ago.

In more recent times, the writer continues, when sheep raising had become well founded in England and the modern breeds were being established, that country had also developed a cutlery industry that was sending its products all over the world. Hand shears are an important item in the list of edged tools that has made English cutlery famous, so we can feel sure that the shearers of Old England were well equipped for their work.

If the sheep shears now offered to tourists in Palestine are accurate copies of antiques, there has been a change since early times in the way in which the two blades are joined. Present-day hand sheep shears have the two blades connected by a single or double bow spring at the base of the handle. The blades do not cross one another as in the regular every-day shears or scissors. The antique sheep shears had the two blades joined by a pin, which allowed one blade to cut by the other exactly as ordinary household shears do. On examining a pair of sheep shears one is impressed with the design. The manner of joining the blades and the curve of the cutting edges makes the blades come together from base to point with an almost uniform cutting angle.

For hundreds of years sheep were shorn with hand shears, but with the mechanical developments that began early in the nineteenth century, some inventors turned their attention to sheep shears that could be operated by power.

#### First Mechanical Shearer.

At the time Elias Howe was developing the sewing machine in a little New Hampshire village another New England Yankee was working with some success, and in the same town, on a sheep-shearing machine. The work this man did attracted the attention of an Englishman by the name of Wolseley, who was working along the same lines in Australia. It was known that Wolseley came to America to study what was being done by our Yankee inventors, and claims are made that the information he secured had much to do with his success later in making a practical shearing machine.

In connection with the development of the shearing machine, it is interesting to note the truth of the old adage, "Necessity is the mother of invention." In a very few years after the introduction of sheep into Australia their numbers became so great that the problem of shearing them with the labour available had to be solved.

Wolseley saw the need of mechanically-operated shears that would shear closer to the skin than was possible with hand shears, and that would allow a smaller number of shearers to remove the wool from the vast number of sheep found in Australia at that time. He worked persistently between 1860 and 1870, and succeeded in producing a satisfactory sheep-shearing machine.

When the shearing-machine is compared with some of our present-day intricate mechanical devices, it may seem to be an extremely simple contrivance. On the other hand, when we stop to consider that the means of transmitting power to the handpiece through a flexible shaft, the design of the comb and cutter, and the means of applying tension to the cutter, worked out by Wolseley, are with slight modifications still in use, we are impressed with the really great things he accomplished.

It is to be regretted that there is no record of the manner in which Wolseley worked out the different problems that confronted him. It would be very interesting to know the steps taken in developing the comb and cutter, as well as how the correct tool for sharpening them was devised.

But to go back to where we left off with the shearing machine coming into general use in Australia. The development of the shearing machine did not revolutionise sheep-shearing methods. The shearing machine had no such far-reaching effect on the wool-raising industry as the invention of the grain binder, which was developed at about the same time, had on the production of wheat. Each sheep must be handled and shorn individually with the machine, the same as it is when hand shears are used, and the size and shape of a sheep's body limits the width of the swath that can be cut with the machine.

The shearing machine, however, because it cuts closer to the skin than can be done with hand shears, has added millions of pounds of wool to the world's supply since it came into general use. It has also made possible the shearing of the sheep in the thinly-populated countries where sheep are run in great numbers by a much smaller number of shearers than would have been required if it had not been invented.

So long as sheep were raised only in small flocks on the farms in the Eastern United States the need of shearing machines was not so great as in a country like Australia. As soon, however, as the flocks in the range country increased in numbers the same conditions that made the shearing machine necessary in Australia developed in America, and the Wolseley machines, which were being manufactured in England, were brought to that country.



### SCIENCE IN FARMING—SUGGESTIONS FOR HOME STUDY.

A VERY useful set of notes on the scientific principles involved in horticulture and agriculture has been prepared by D. A. Herbert, D. Sc.—How do plants feed? What is the action of various manures? What is the cause and the nature of various plant diseases? Such questions as these are answered as well as many others which are of interest to the practical farmer.

Dr. Herbert's notes are obtainable from the Department of Tutorial Classes within the University of Queensland, corner of Edward and Ann streets, Brisbane. There are twenty-one papers, and they will be posted, one each week for twenty-one weeks, for the sum of 8s. 6d. For this sum farmers may buy the notes and borrow books on the subject as well. Several books on the subject are available, and may be changed from time to time during the twenty-one weeks period.

It is worth mentioning that the Department of Tutorial Classes has similar sets of notes or talks on a variety of subjects. A very wide range of subjects is embraced, and some of these might be of interest to farmers, their wives, or to members of their families. For example, there is a very useful series on food and diet. Human biology is another subject dealt with.

For those interested in social subjects there are series in world history, Australian economics, psychology, &c., on books and literature there are several series. For younger members of the family, who may want to develop their capacities for self expression, there are sets of notes on elocution and on composition and writing.

On all the foregoing subjects there are helpful text-books of information, and these may be borrowed and changed without additional cost.

Anyone at all interested would do well to write to the Director of Tutorial Classes, corner Edward and Ann streets, and ask for a leaflet of information.

A very useful lending library, from which books may be obtained either through the Post Office or Railway Department, is also available at the same address.

## Some Australian Shearing Records.

IN 1924 a team of five shearers at Glenburgh, W.A., on the Gasgoyne, shore an average of 1,102 sheep per day for the team for a week of five days or a fraction over 220 sheep per man per day. The highest tally of 276 was cut by W. Gray on August 20th.

The same team at Dalgety Downs station during the same season shore 1,173 sheep in one day of eight hours or an average of 234 per man the highest individual tally being W. Gray's of 286.

The first notable shearer, and probably his tally stands to-day for blade shearing, was Jack Howe, who at Alice Downs in the Blackall district in Queensland shore 321 with the blades, and the same year or the year following he shore 276 with machines at Barcaldine Downs, thus winning Messrs. Coleman & Sons' two gold medals for the fastest machine shearer and blade shearer in Australia.

The next tally of importance and which is probably still one of the highest, if not the highest in Australia, was Dan Cooper's performance at Bundooran in Queensland, when he shore 316 sheep, no lambs, in eight hours ten minutes winning a gold medal from the Moffat Virtue Machinery Company in 1910.

Previous to 1909 the best tally with the machines was that of Jimmy Power, who shore 315 at Bareny. It is not known what the hours or the class of sheep were, however. Perhaps the fastest shearer who was ever in Queensland was Harry Livingstone, who was highly skilled with the machine, and had a perfect style, but his highest tally was never made public. At any rate we have never heard of a shed after he had learnt to shear that he was not able to ring.

One year at Gordon Downs I put a team of guns together in which Harry Livingstone was included, and I am perfectly safe in saying he cut from 10 to 20 sheep per day more than any other shearer in the shed. However, while at his zenith, he abandoned shearing, having been appointed representative of the Wolseley Shearing Machine Co., in Central Queensland.

It has often been reported, and it is authentic, that another blade shearer in Jack Howe's time was quite equal to the champion, but not in fast shearing sheep. It has frequently been said that Alf Bligh was Jack Howe's master in rough sheep with the (bright swords) shears.

Tom Shea was another good blade shearer. He was known as the handsome shearer. It was often commented on that he never worried whether he had a driver on his blades or not.

Another of Queensland's best shearers was the late Joe Herricks, who has been a champion for many years. He afterwards came to Western Australia, his highest tally in 1927 at Landor being 274, and I am inclined to think in that year he was the best man in Western Australia, in rough, heavily woolled sheep, despite his years.

A Western Australian writer puts forward the claim that there is as good a class of machine shearer in the west as they have in any other State. Of a particular record he says:—

“The sheep shorn averaged 11 lb. wool and therefore the following figures showing the daily tallies of the eight shearers for two weeks are interesting.

“Commencing on September 3rd, the team shored 1,509, 1,708, 1,577, 1,748, 1,698, 927 (Saturday, half day). Total for week, 9,167.

“Resuming on the second week the same team clipped 1,189 on September 10th, losing one hour through engine trouble, 1,432, 1,740, 2,800, 1,806, 803 (Saturday, half day). Total for week, 8,770.

“The highest individual tally was 250 and two men obtained this figure. The shearers’ highest daily averages were:—A. Williams, 213; R. Sawallish, 242; Vol. Day, 242; F. Lehmann, 234; L. Saltmarsh, 216; George Bence, 222; C. Fleming, 226; and H. Munro, 205; total 1,800, and average 225.

#### Highest Tallies.

“Therefore it can be assumed that 321 is the highest tally with blades, in an 8½-hour day, shorn by Jack Howe at Alice Downs in Queensland in 1892, the highest tally with machines being 316, shorn by Dan Cooper at Bundooran in Queensland in 1910.

“At Three Rivers, in Western Australia, Harry Finlay shored 301 and Bob Sawallish at Dalgety Downs, W. A., shored 304, these tallies being cut in 1928.

“I claim to hold the record for a day’s tally cut at any individual shed. At Brookong in the Riverina in 1902, where approximately 170,000 sheep were shorn on three occasions, the daily tally was over 10,000 sheep, the highest being 10,361.”

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#### ESTIMATING ANIMAL'S AGE.

It is usual to count all of the horn beyond the first groove or ring as representing three years’ of age; then add one year to the age for each ring present towards the base of the horn. The rings are best noted on the concave side of the horn. The growth of the horn is as follows:—Two small, hard, rounded buttons or points emerge from the skin when the calf is eight or ten days old. At three weeks a little flexible horn has appeared. At five or six months the horn commences to curve and assumes the shape it will eventually have. Up to this time and during the first year the horn is covered with an epidermic prolongation of the skin, similar to that seen on a foal’s hoof at birth. This covering dries and scales off by the twelfth or fifteenth month, and the horn has then its permanent natural, shining, tough surface. In the second year the horns start a fresh growth and a small groove is seen encircling it between the substance secreted the first year and that developed in the second. A second ring appears during the third year. These two grooves or furrows around the horn are not well marked, and all traces of them disappear as the animal becomes older. From three years on the growth of the horn is marked by a groove that is much deeper and so distinct that it shows as a plain elevation or ring of horny substance, which forms an accurate basis for estimating the age of the animal. The teeth should also be taken into account when estimating an animal’s age.

## Northern Sugar Experiment Station, Meringa.

### OFFICIAL OPENING.

THE official opening ceremony of the new Sugar Experiment Station at Meringa was performed by the Honourable the Minister for Agriculture (Mr. F. W. Bulcock) on the afternoon of Friday, 13th September, 1935. The Experiment Stations Advisory Board and visiting delegates to the International Sugar Technologists' Conference were present, in addition to a large gathering of local farmers and prominent townspeople.

In a brief address of welcome, Dr. H. W. Kerr (Director of the Bureau of Sugar Experiment Stations) said that the day was a happy one for the Advisory Board and officers of the Bureau staff, as it marked the realisation of a long cherished hope that one day all sugar experimental work in North Queensland would be concentrated at one station. Meringa, he suggested, was admirably suited for this purpose.

Dr. Kerr said it was most appropriate that the Minister should be with them on this occasion, for Mr. Bulcock was largely responsible for the consummation of the plan, and he knew that the Minister would at all times continue to manifest a sincere interest in the activities of the Station, and to lend his keenest co-operation. He had therefore very much pleasure in inviting the Minister to address the gathering and to declare the Station officially opened.

The Minister said it was indeed a pleasing occasion to those who were associated in any way with the sugar industry. This Experiment Station was urgently needed. Up to eighteen months ago, the development of the cultural and plant breeding work had been carried out at South Johnstone, while entomological studies were made at Meringa. The possibilities of any further material advance in our knowledge regarding cultural treatments of the alluvial lands of the Johnstone River were remote, while the red schist soils of the Meringa area demanded intensive study. Moreover, the establishment of one central, highly equipped station, would make for economy in operation and improved efficiency.

In all their endeavours, continued the Minister, they had the ardent support of the Sugar Advisory Board; and it would be admitted that they had co-operated to make the Meringa Station not only the outstanding station in the North, but in Queensland generally. He thought that the establishment of this Station would make a very definite contribution to the welfare of the sugar industry—not only in Queensland but in a very much wider sphere. The knowledge that was obtained here would be of value to sugar growers and experimentists in other parts of the world. They appreciated to the full the value of co-operation, continued the Minister. There was probably no other industry in Australia that would profit to so great an extent by virtue of co-operation and mutual support of those engaged in it, as the sugar industry. One thing they required above all was the co-operation of the Government. Under the financial readjustment plan which had been effected when the Sugar Experiment Stations Act was recently amended, the Government contributed £7,000 annually towards the cost of maintaining

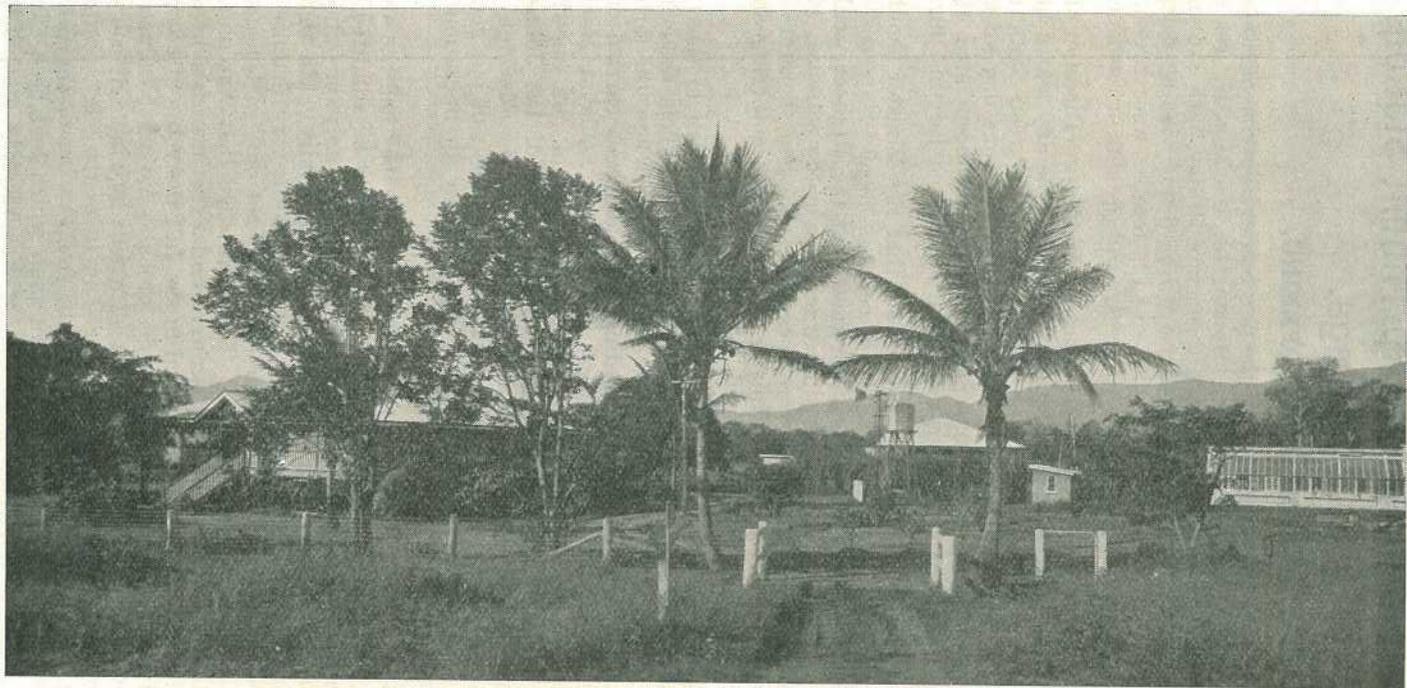


PLATE 223.  
General View of the Northern Experiment Station, Meringa.

the Experiment Stations. The balance of the money was found by the industry. Whenever anything untoward had developed, the industry had always discharged its obligations in the best possible manner—by bearing its fair share of the financial costs. The Advisory Board, which was constituted of industry representatives, was therefore charged with a very definite responsibility and he could say that they had discharged it admirably.

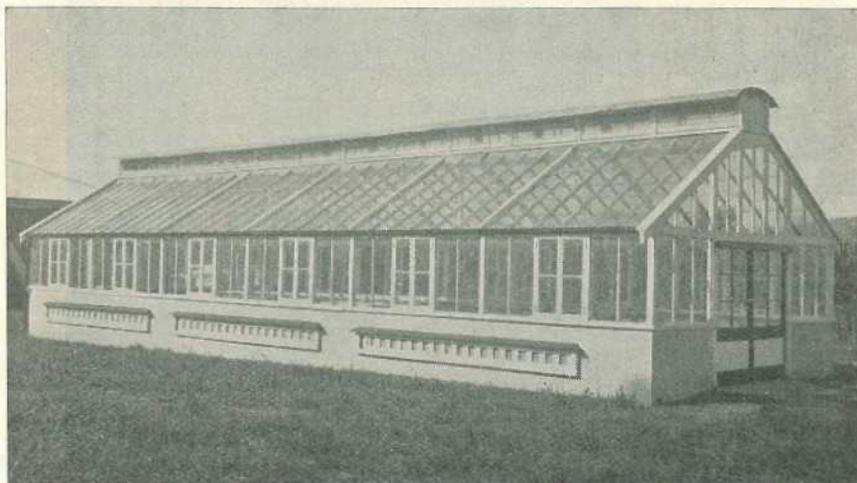


PLATE 224.  
The Glasshouse used in Seedling Work.

The Advisory Board consisted of two millers' representatives, one from the north and one from the south, and two growers' representatives, also from the northern and southern cane districts respectively. It was provided that one of the millers' representatives should be nominated by the Queensland Society of Sugar Cane Technologists.

A fact that pleased the Minister was the thorough manner in which the Board carried out its policy—"second best" was not good enough, the best and only the best was their policy. This applied not only on the investigational side of the work, but also on the question of manning their staff and recruiting of their officers. Only that morning the Board had made an important decision regarding the appointment of a University trainee. The Board was certainly making an excellent contribution to the wellbeing of the sugar industry.

Referring to recent advances in knowledge, the Minister stated that such advancement could never have resulted had it not been for those who made a scientific study of the problems confronting them. For that reason, he was particularly pleased to welcome the visiting technologists who were present that afternoon, at the forging of a new link in the chain of sugar knowledge, a link which, adjustable with those links at Bundaberg, Mackay, and Brisbane, was likely to provide the knowledge so essential to the progress of the industry.

The Minister paid a tribute to the excellent work of the staff of the Experiment Stations, and remarked that first-class brains were wanted to tackle the problems which confronted them. They sent their



PLATE 225.  
A Block of New Seedlings at Meringa.

officers overseas for training whenever practicable, and in addition, when they found a man with outstanding qualities they endeavoured to give him every opportunity to develop. They could all feel assured that the domestic harmony within the organisation would allow the best results to be accomplished. They were well aware of the many problems



PLATE 226.

Exterior View of Pond and Cage Constructed for the Reception of a Colony of the Giant Toad *Bufo marinus* introduced from Hawaii.

which they had to face and were not victims of the illusion that the sugar industry was a cornucopia from which wealth might be poured at will. However, the sugar industry on the experimental side was one which he thought was more efficient than any other agricultural industry in Australia. The price of the preservation of the industry was the maintenance of the very highest standards of efficiency, and if they did not practise that efficiency in and out of season, the price of sugar would be much greater than it is at the present time.

Mr. Bulcock made a trenchant attack on those organisations which, fortified with a colossal ignorance, were prepared to come forward and criticise the sugar industry. Presumably they derived some satisfaction from their criticisms and perhaps it was not for him to deny them their pleasure; but he would like to say that the Queensland sugar industry was not the wealthy industry they in their ignorance believed it to be. The income of the average sugar farmer was generally little better than that of the average artisan, and the risks associated with the industry were such that it was a hazardous occupation indeed.

Mr. Bulcock, concluding his address, said that he was particularly delighted, as Minister for Agriculture, at having the opportunity of opening the Station at Meringa. Two years ago he visited South

Johnstone and Meringa, and decided that the centre of activities should be transferred to Meringa. Wonderful progress had been made since that time, and this Station, he thought, would make a very definite contribution to the economic preservation of the industry in North Queensland. He was sorry that the Station was not in "full blast" that day, to allow the visitors to see the work for themselves. He assured the overseas delegates that their visit to the North and the contributions they had made to the industry would not be forgotten. So long as they had the guidance of the Advisory Board backed up by the present



PLATE 227.

Interior View of Toad Pond Showing Spray and Growth of Water Hyacinth.

Bureau staff, he felt the work would progress. They were in process of formulating a long distance research programme, and when this was carried out, research would still continue. He had infinite pleasure in declaring the Meringa Sugar Experiment Station officially opened.

A vote of thanks to the Minister was moved by Mr. Ben Courtice, growers' representative on the Experiment Stations Advisory Board, who referred appreciatively to the work which the Premier and the Minister for Agriculture had performed on behalf of the sugar industry.

### CHEAP FERTILIZERS.

In no phase of agricultural practice is the farmer so liable to exploitation as in the purchase of fertilizer, unless he adheres to the policy of purchasing only from a reputable firm, and assists that the labelling of the product is in accordance with the requirements of the Fertilizer Act. Just recently we received a sample of "cheap" fertilizer which a canegrower had purchased; on analysis it proved to be a fairly good grade of common salt, but it was, of course, quite valueless from his point of view.—H.W.K., in the "Cane Growers' Quarterly Bulletin."

## Pigs on the Atherton Tableland.

Mr. E. J. SHELTON, Senior Instructor, has supplied the subjoined report.

**A** SUCCESSFUL year and a range of prices for live pigs comparable with those paid elsewhere throughout the State were notes stressing the value of the pig raising industry and the results of a year's operations at the annual meeting of the members of the Northern Pig Board and the shareholders of the North Queensland Co-operative Bacon Association, held recently on the Atherton Tableland.

During the twelve months ended 30th June, 1935, the Northern Pig Board handled 8,543 pigs, a slight increase on previous years' figures. Of these, 7,218 were graded as first grade, 821 as second grade, 113 as third grade, and 249 for the manufacture of small goods. Generally there was an improvement in type and quality, but the supply is much below Northern requirements, and shareholders were urged to devote more time and attention to the breeding of a better type of pig, for which the Board and Association were quite prepared to find a market at top prices for all quality pigs.

The supply of live pigs to butchers in the North had to be much restricted owing to insufficient being received to allow of that branch of the trade being developed. The average price paid for first grade baconers was 4.83d. per pound, which compares favourably with the average price paid throughout the State. The year's transactions resulted in a slight profit and satisfactory sales, although, as stated above, it was demonstrated forcibly that the supply of pigs materially affects the successful and economic operation of the bacon factory, the maintenance of the local market, and ultimately the price paid to suppliers for their pigs.

With a view to further stimulating and sustaining interest in pig raising, especially in times of food shortage, a scheme was mooted for the establishment of regular pig sales at one of the principal trucking stations, Malanda being mentioned as the most suitable place, the sale yards to be in the nature of a receiving, sale, and despatch depot at which all grades of pigs could be handled and a general interchange of pigs arranged for. It was finally agreed that it be a recommendation to the Northern Pig Board to consider the establishment of pig sales at Malanda, where the farmers could bring their stock for sale or buy store pigs from other farmers.

It was decided also to make a special effort to extend the pig industry in the Tarzali and Jaggan district on the Millaa Millaa line.

Considerable discussion centred around the importance of the fresh pork trade in the North and the necessity for some form of stabilisation of prices paid for pigs supplied throughout the year. There has been a suggestion also that the Board should enter the meat trade and establish a plant for the treatment of calves and dairy cows suited to the manufacture of various meat products. The scheme contemplates the erection at Malanda of a complete plant for slaughtering, freezing, packing, and selling meat products. In line with such a scheme there has been for some time a general desire on the part of many shareholders to have the bacon factory removed from Mareeba (its present position is at

Floreat Siding, about one mile from Mareeba township) to Malanda. However, for the present no move is to be made, the expense associated with such a scheme and the difficulties being a hindrance to progress.

The Queensland Pig Industry Act was discussed, the general (but very erroneous) opinion being that grading and payment on the basis of grade would not be in the best interests of the industry. There are many aspects of this subject which will need to be more fully understood before such an important scheme as grading can be condemned, and it is safe to say that just as a properly organised system of grading and payment on basis of grade is necessary in other branches of agriculture, so it is essential in the interests of the pig industry that the farmer who is breeding choicest quality pork and bacon pigs should be recognised when payment is being made and should be paid a better price than that paid for pigs of inferior quality that are not so suited to market requirements.

It is safe to say that, once the system of grading, which has been provided for, comes into regular operation, opposition from farmers will disappear, for no farmer is going to refuse a better price for a better quality animal.

The Directors of the North Queensland Co-operative Bacon Association and members of the Northern Pig Board are Messrs. R. Campbell (Pearamon) Chairman, J. E. Foxwell (Kureen), D. Johnston (Hillerest), A. A. Knudson (Millaa Millaa), F. W. Collard (East Barron), and C. Dunlop (Mareeba) Secretary and Manager, with Mr. H. F. Sibley as Government Representative for the current year.

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### PRODUCTION OF FIRST-GRADE CREAM.

With the coming of summer the dairy farmer's difficulties increase enormously, for high temperatures and other hot weather conditions are so favourable to bacterial growth that additional precautions are essential if quality is to be maintained.

The first step towards controlling the action of bacteria in milk and cream is to prevent such organisms as have gained access to these products from multiplying to sufficient numbers to cause trouble. The only way to do this is to cool the milk or cream as much and as soon as possible. In a climate such as ours, this is one of our biggest troubles.

In the absence of water being laid on to the separating room, any of the small water-bag coolers, to cool the cream straight from the separator or the milk immediately it is drawn, are very efficacious, as every degree of temperature we bring the product below 80 deg. Fahr. will have a retarding effect on the bacterial development, and in many cases (in relation to weed taints, &c.) the aeration will improve the flavour. If a cooler is not available a lot can be done by standing the milk or cream cans in cold water, or putting wet bags round them, but it must always be remembered that fresh water is advisable each day, and the bags should be changed each day and allowed to dry. In the case of cream it should be stirred with a tinned metal stirrer two or three times each day, and not be mixed until each lot of cream is cool. Finally, it should be delivered to the factory daily, if possible.

The production of first-grade cream means:—Thorough and systematic cleanliness; keeping the temperature of the milk or cream as low as possible; delivering the cream to the factory as soon as possible.

Many people, after taking as much care as possible on the farm, allow the cream to become heated in transit to the factory, either by not having a well-shaded stand or, when they do the carting themselves, by not taking the trouble to keep the cans covered (by, say, clean wet bags). This neglect is definitely detrimental to quality, especially in the summer months.

## Donkey and Mule Breeding.

By H. J. FREEMAN.

*Mr. Freeman, of the Fruit Branch of the Department of Agriculture and Stock, visited the United States of America recently for the purpose of studying methods of fruit production and marketing in that country. Through the courtesy of the Minister for Agriculture, Hon. Frank W. Bulcock, he was commissioned to select three good quality jack donkeys on behalf of Queensland breeders, to be used in the production of draught mules for cane cultivation work.*

WHEN in conversation with Colonel Monsees, America's foremost jack and jennet breeder and owner of the Limestone Jack Farm situated at Smithtown, Missouri, he informed me of the following facts regarding the present conditions of the jack industry in America and also of the necessity for the observance of certain characteristics peculiar to this type of stock if successful mule breeding is to be accomplished.

Colonel Monsees said that the production of suitable jack stock is exactly the same task as the breeding and raising of any other kind of valuable livestock, and it can readily be understood that good jack stock is positively of vital importance for the foundation of mule breeding. At present there is a very serious shortage of jack stock in America as well as throughout the rest of the world. The mule market is particularly bare, and I witnessed a contract entered into by the Mexican Government with Colonel Monsees commissioning him to purchase 300 yearlings to two years old of specific type at the rate of 250 dollars (£50) per head. This will clearly demonstrate the present shortage so appreciably acknowledged throughout the United States of America.

From figures presented by Colonel Monsees, I ascertained that at present there are ten jacks in the United States of America to every jennet; nine out of every ten of these jacks are more or less faulty, and at present are over ten years of age. It is evident that the majority of these jacks will die within the next ten years, and from my own observations, backed up by Colonel Monsees' valuable experience, one can realise the scarcity of the young jacks so necessary to take the place of those rapidly passing into decline. It is estimated that if every jennet of breeding age were immediately bred to a suitable jack, at least fifteen years would be required to build up a sufficient supply to satisfy the present demand in America alone.

During the sixty years that Colonel Monsees has been breeding jacks two definite periods of depression have made themselves felt, and the present shortage can be attributed largely to the last lapse of depression which occurred during 1928 and 1929. It was of such a serious nature as to dishearten completely the jack breeders of America, compelling them in many instances to dispose of their stock at such prices as to make the business a disastrous venture. From 1929 onwards only the old established breeders possessed sufficient confidence to persevere in the expectation of better times ahead. Their anticipation has now proved a reality inasmuch as during the early months of this year

buyers came from Spain, South Africa, India, and Mexico in an endeavour to buy suitable jack stock and mules for those countries. The main fact behind this particular period of depression as far as the jack breeders were concerned, was the positive trend towards mechanisation of all phases of agriculture. This particular move was apparently not capable of providing the actual results that were anticipated, for farm

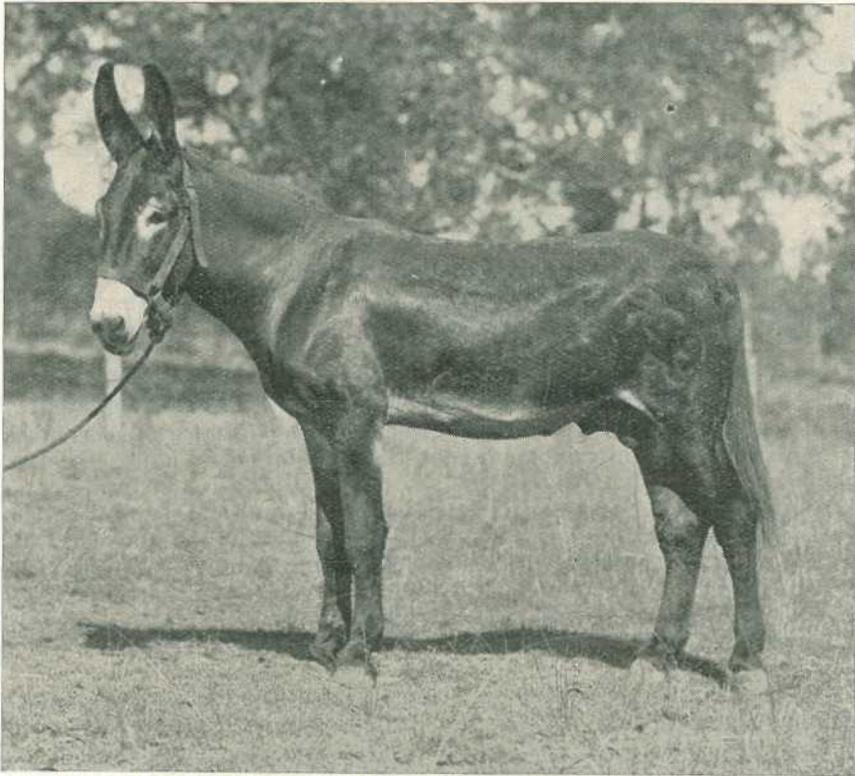


PLATE 228.

"COLLAY," the registered Jack purchased from Messrs. H. T. Hineman and Son, of Dighton, Kansas. This Jack is 15.1 standard measurement, and was foaled in 1928. He has sired many mules of excellent type, and was a noted Jack in the Mid-Western States of America. He is one of the best muscled and boned Jacks that has ever come out of America. This Jack was purchased for the Fairymead Sugar Coy., of Bundaberg.

hands as well as many stock-breeding farm owners were prevented by the disappearance of animals from earning a living, as can be very easily understood. Immediately the raising and working of horses and mules was abandoned, the market commenced to fall and finally crashed, when stock previously worth hundreds of dollars was passed in for values so low as have never been encountered before. Unfortunately, it can truthfully be recorded that many of these men who in those years decided that motive power of the latest type was apparently of vital necessity for those times, are now walking the road, and thus enlarging the army of unemployed.

### Donkey Breeding.

I was advised that the principles of the Jack Association of America have been strictly adhered to and that whenever possible one should not consider any other than registered stock. I was next advised that jennets should not be bred until they are at least three years old. They should be tried with a jack, the method being to lead him around in the

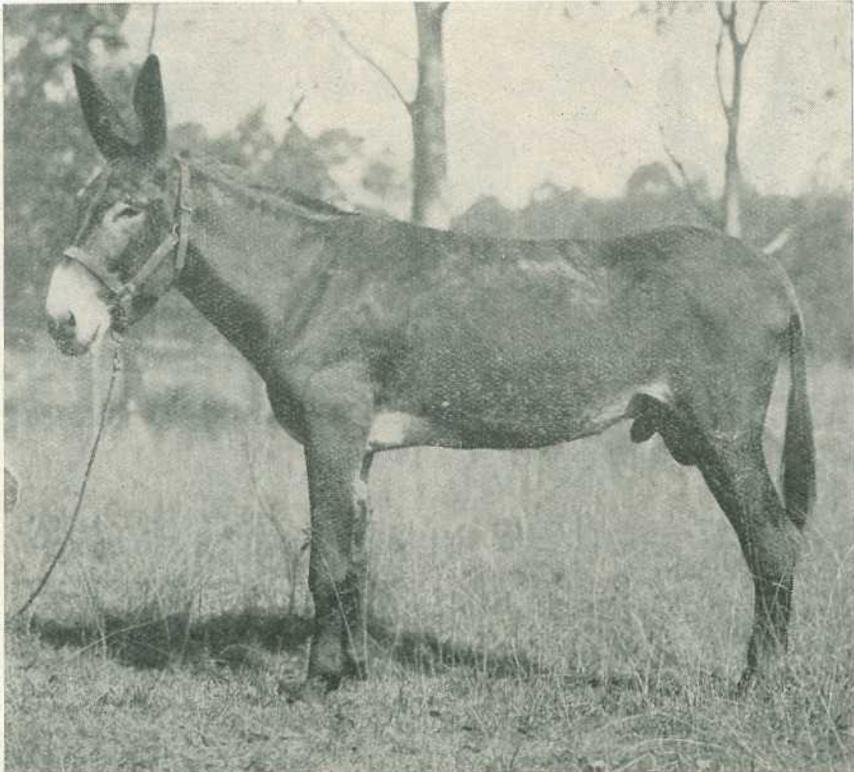


PLATE 229.

"BUSINESS," the registered Jack purchased from Colonel L. M. Monsees and Sons, of Smithton, Missouri, bred on the Limestone Valley Stud Jack Farm in that district. This Jack is 15½ hands standard measurement, and was foaled in 1929. He is a noted sire, and is renowned for the action and natural spirit of his progeny. This Jack was purchased for Messrs. P. F. King and M. Ahearn, of Home Hill.

yard or paddock within which the jennets are enclosed and if any of them are in season it will readily be noticed by that particular animal's actions. A jennet in season should be separated from other stock and put in a safe box stall and there left for a day or a night. She should be bred and kept in the stall or in a secure separate pasture away from other stock until she becomes quite normal. She should then be turned back with the jennet herd and should be again tried in from eighteen to twenty-one days. If necessary, the jennet should be bred again and handled as abovementioned. It is necessary that the jennet be handled in this manner throughout the entire season which, in America, continues from the first of April to the end of November. The practice is to observe the herd carefully, and, even though they may all appear to

be in foal, a trial should be made every ten to fourteen days so as to eliminate the risk of a poor percentage of foals. Jennets are harder to settle than mares and only by careful attention will a heavy percentage of foals be obtained. These animals carry their young for twelve months or slightly longer, and should a jennet foal late in the autumn it would not be advisable to breed her again until the next spring.



PLATE 230.

"AJACKS," the registered Jack purchased from Colonel L. M. Monsees and Sons, of Smithton, Missouri, bred on the Limestone Valley Stud Jack Farm in that district. This Jack was foaled on the 24th July, 1933, and, coming from excellent stock, should grow into a very desirable animal; being as yet a baby, he will grow considerably, and it is fully expected that he will sire mule stock that will be the most desirable.

Practice has shown that jennets should be very carefully watched at foaling time, and therefore they should be treated in such a manner as to make them content and easy to handle should they require any assistance at this particular period. As soon as the colt is foaled one should be very sure that the enveloping membranes do not cover its head and nose, for if this matter is not loosened in foaling, the colt may smother

within a few minutes after birth. To avoid infection, the navel should be painted with iodine, and all natural functions should take place within three hours after the foal is born.

If a jennet is to foal in a box stall or a barn, these quarters should be perfectly clean, being first carefully disinfected to destroy any source of infection that may possibly be present. Although this is the practice adopted by many breeders, Colonel Monsees is very much in favour of allowing the stock to foal while running on pastures, particularly so if the weather is mild and all other conditions—good grass and water—are the order of the day. It has been noted that a colt foaled about mid-day with a temperature ranging around 100 degrees, and upon land that is carrying a depth of dust due to drought conditions, will usually die within two or three hours.

Care of the jennet while suckling the colt is an important matter and necessitates hand feeding if grass is not plentiful and succulent. Three to four quarts of oats twice a day is usually sufficient if the pasture is not all that it should be. Naturally a little hay to form a roughage basis is also necessary. It is surprising how very quickly the little colts learn to feed, bran and oats seemingly being their favourite diet.

For the owner of several colts, a creep pen or stall is recommended; the principle of this is that the youngsters can go in and feed at will while the older animals are kept out by the nature of the entrance. Most breeders wean their colts when they are from seven to eight months old, except where the jennet is not in foal; in that event the foal may be allowed to run with his dam for ten or eleven months. During the weaning of the youngsters, the jack colts should be separated from the jennet colts; in separating them, it is necessary to confine them to pastures well away from jennets and mules. It is important that a quiet natured young horse colt be placed with them until they are at least twenty to twenty-four months old. The reason for this is that a jack prefers the company of his own species, and if not able to associate with jennets, prefers the company of a mule to that of a horse. Running with a young horse has the definite action of creating a better relationship between the two classes of animals and prepares the jack for the work for which he is later to be used.

#### **Mating with Mares.**

At two years of age these young jacks will commence to assert themselves and, as a consequence, will have to be separated, otherwise they are liable to maim each other by the roughness of their play. As with other classes of valuable animals, both jack and jennet colts should be well fed and cared for in a manner that all stock breeders of experience fully appreciate. One fact well worth recording is that by reason of the peculiar constitution of these animals, very little corn should be fed them; the heating effect of this grain bringing about disastrous results. Oats and bran with good hay are positive essentials for the producing of big strong stock.

During the summer when the young jack reaches twenty-four to thirty months of age he should be afforded an opportunity to serve a gentle mare definitely in season. This action should be accomplished by leading the mare slowly around the paddock and by observing carefully whether or not he is paying her the amount of attention that it is

desirous he should. Let him serve her if he will and repeat for two or three days. If this young animal is eager to perform this function he will definitely be ready for use during the next season; he should be allowed fifteen to twenty mares, being then three years of age or a little older. Another fact well worth recording is that the mare should never in any circumstances be allowed to show her dislike for the jack by attempting to kick him or any such procedure. Should this occur it is very difficult to again persuade the jack to work. For this reason it is always advisable to place any mare that one wishes to have served by the jack in a small crush specially constructed for this purpose; the plan is to arrange the sides of the crush so that a satisfactory breeching can be placed behind the mare, thus allowing the jack free access without any risk of damage to either.

Bearing in mind the recommendation previously made regarding the definite separation of the young jacks from the young jennets or mules, it can be understood that great risk would be involved if one were to let any one of these young jacks associate with either younger or older jennets or mules. If this should happen he will thereafter possess a tendency to prefer these animals and will perhaps cease to work on mares.

Jacks in service should have at least one or two acres of grass in which to exercise. A jack at four or five years of age can be used twice a day, preferably early in the morning and during the latter part of the afternoon. During the breeding season, the jack's ration could consist of oats, pressed wheat and bran, and a liberal supply of good quality hay. Lucerne in quantity is not particularly recommended inasmuch as it has a somewhat depressing affect upon the kidneys. As is the case with all animals, a jack should have an abundance of fresh water and should never be fed more than he is capable of cleaning up at one feed. Many farmers only feed twice a day, morning and evening.

In the breeding of suitable mules, the following points should be observed. *Firstly*: The desirability of this particular beast for farm work; for the mule is the simplest and sturdiest of all draft stock to raise and handle. *Secondly*: Good mules are procurable not only from registered mares but from any grade mare that possesses sufficient confirmation to make her a desirable dam. It has been proved that a mare sixteen hands and weighing twelve to fifteen hundred pounds, with a good body, neck and head, bred with a well developed jack of fifteen to fifteen and one-half hands high, will produce a mule weighing eleven to fourteen hundred pounds at three years of age. Draft mares weighing sixteen to eighteen hundred pounds and bred to similar jacks will produce mules heavier bodied and much bigger in the bone.

Colonel Monsees, through his experience, has proved that the best mules ever bred in Missouri were bred from mares of the standard trotting type and weighing about fourteen hundred pounds. The favourite jack would never measure more than fifteen to fifteen point two standard measurement. Bigger jacks than this are always faulty because of the amount of daylight they have beneath them, and the peculiar characteristic of being awkward and in every way apparently overgrown, always denoting a certain leg weakness not found in the smaller animals.

A mule colt if in a healthy condition and given a plentiful supply of feed can be weaned at seven months, but will never thrive so well if entirely separated as when paddocked or yarded with other babies of his own kind. Although under natural conditions a jack prefers a mule to a horse, the instinct of the dam predominates in the mule; as a consequence mules, whether colts or fully grown, prefer the company of horses to animals belonging to the species of the sire. A contented old mare makes an excellent stable or paddock companion for one or more mule youngsters. It is seldom that these youngsters need longer than three weeks to settle down after being taken away from their dam.

Experience has shown that the best age at which to commence working a young mule is thirty months, and then the work should be only light until the following season. With good feed, reasonable attention, and moderately heavy work, mules should continue to be valuable farm animals until they are fifteen or sixteen years of age.



PLATE 231.

## MEMORIAL TO PIONEERS OF THE SUGAR INDUSTRY.

Cairn at Ormiston, near Cleveland, unveiled by the Premier, Hon. W. Forgan Smith, L.L.D., on 1st September, 1935, in the presence of the delegates to the Fifth Triennial Congress of the International Society of Sugar Cane Technologists. The memorial is of granite from Giru and Herbert River. Its base of unworked stone, typifying the pioneer days; the column is of partly dressed stone, typifying progress; the coping stone is of polished granite, symbolising the present efficiency of the industry.

## The Wood and Water Joey.

*An extract from the Fifteenth Annual Report of the Public Service Commissioner, Mr. J. D. Story, I.S.O.*

“A wood and water joey”! The prospect of such a career for their son is not alluring to many a town father and mother, and hence their reluctance to permit the boy to take a job in the country even though he may feel the call of the land. The farmer, also, has the reputation of being a hard taskmaster, but, on the whole, he is maligned; of him there is much loose speaking, begotten of loose thinking. Though the producer may growl, he has a lot about which to growl; possibly no section is more the victim of circumstances. The public servant is sure of his fortnightly pay; the producer is not sure of a fortnightly cheque. Employees have the protection of carefully considered and strictly administered awards; the producer has to depend upon Nature and, in a large measure, upon oversea prices. Awards cannot control Nature; industrial conferences cannot influence the seasons; and oversea prices are beyond the determination of local juntas. A five-day week is not for the producer even the scriptural six-day week can be honoured only in spirit. But he has solace in his yeomanry and sturdy independence. Still, I am with the parent who does not want his son to be merely a wood and water joey for the term of his natural life. But the solution does not rest with the farmer and neither does it lie altogether with the parent; even the fairly high-salaried man with several sons and daughters to educate and launch in life cannot provide the whole of the capital with which to buy one of his sons a good farm; and he does not think it prudent to undertake the risks of large liabilities. It is urged sometimes that agricultural college trainees should be given priority privileges in Crown land ballots; but this proposal, besides being unfair in principle, would be largely useless in application. Parents with means and opportunities do not need assistance in settling their sons; but if sons of parents with little means and few opportunities are to be encouraged to leave the towns for the land, the “joey” objection—and it is a valid one—will have to be overcome. In the agricultural colleges, the instruction of the youths is partly academic and partly practical, and the lads work under direction; on the farm the training is practical, but here, too, the trainees work largely under direction. Medical, engineering, and architectural graduates of foresight, who have completed their academic courses, make arrangements, if they can, for full-time practical experience under direction before they embark entirely on their own account in their professions. In this way, these young men get intensive practical experience to supplement the academic courses; thus the gap between the academic and the practical is spanned and they are much better prepared to enter upon the wider professional life. This lead suggests a scheme of “farmlets” for landless youths who have some agricultural training and practical experience but little financial means or backing. The main activity might be pig-raising and fattening, with dairying as an adjunct. The youths, preferably, might work their farmlets, co-operatively, in groups of three or four. To the youth of grit and ambition, the farmlet would lead in time to the man-sized farm; assuming *good* land, good stock, reasonably assured prices, and fair opportunities, the young fellow should be able to make wages and a little over. He would have the satisfaction, too, of working for himself.

fending for himself, and practising that self-help which begets independence. The arrangements for the farmlets would need to be on a kind of three-party basis—the participating parties being the Government, the parents (or sponsors), and the youths. The Crown might provide (even by acquirement) suitable land at a reasonable rental, and great financial assistance on special terms for the purchase of equipment and live stock; the parent (or sponsor) and the youth between them might provide an approved amount of capital to supplement the assistance from the Crown and as a guarantee of good faith. In the early stages of the scheme and in view of its special nature, the Meat Industry Board and the factories might see their way to co-operate in the marketing of the farmlet products to the best advantage. It should be possible to evolve a workable scheme on the lines indicated. Certainly it would be experimental, but a beginning might be made in a modest way; in due course, the practical application of the scheme might suggest something better. But a primary production State should be prepared to take a little risk in so important a primary production matter. A gap is there; it should be filled in. The farmlet would also be a link between Gatton College and the full-sized farm. The proposals contain the elements of education, productive employment, and manly self-reliance. In bush talk, the authorities might take a sporting chance on the lads and—give them a go.

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### POINTS IN MAIZE PLANTING.

The maize drill is the most satisfactory machine for sowing the seed and fertilizer, but to ensure regularity in the drop particular attention should be given to the plates in relation to the size and uniformity of the grains.

The width of the rows and thickness of sowing in the rows depends on the soil and climate, the variety, and whether the crop is for grain or for green fodder. Rows vary from three feet to four feet six inches apart, and grains are dropped singly every 12 inches or at the rate of two to four grains in hills two to three and a-half feet apart. Under most conditions furrow planting is preferable to surface planting. The average yields obtained in experiments at Hawkesbury Agricultural College on alluvial soils over a period of eight years show an increase of eight bushels 20 lb. in favour of furrow planting.

The depth to plant the grain depends on the soil moisture, the time of sowing and the kind of soil. For example, in early spring, particularly in clay loam soils, seed must not be sown deeply as it may rot in the cold soil. In the late spring and summer, when moisture is not present to such a degree, deeper planting is necessary. It is advisable only to sow when soil moisture conditions are right, and to sow at a safe uniform depth to ensure a thorough germination and a quick vigorous growth of the young seedlings, so that they can rapidly outgrow young weeds. The depth of planting does not affect the depth of rooting, as thought by many farmers.

When germination has been faulty as a result of rain setting the ground just after sowing, faulty seed, or other cause, it is better to resow, if length of season permits, rather than to replant the missing hills or grains. On small areas, if there is any doubt that germination will be satisfactory, the seeding should be heavy, and the surplus and weakest plants thinned out when six to twelve inches in height.

## The 1935 Brisbane Exhibition Championship Awards.

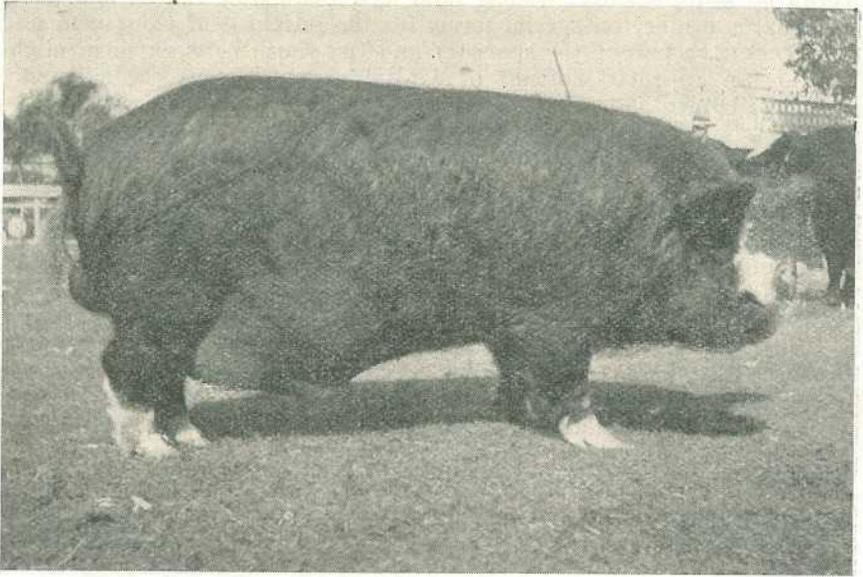


PLATE 232.

Mr. Mat. Porter's Berkshire Boar, "Grafton Trump," Winner of Championship and Boar and Progeny Prize.

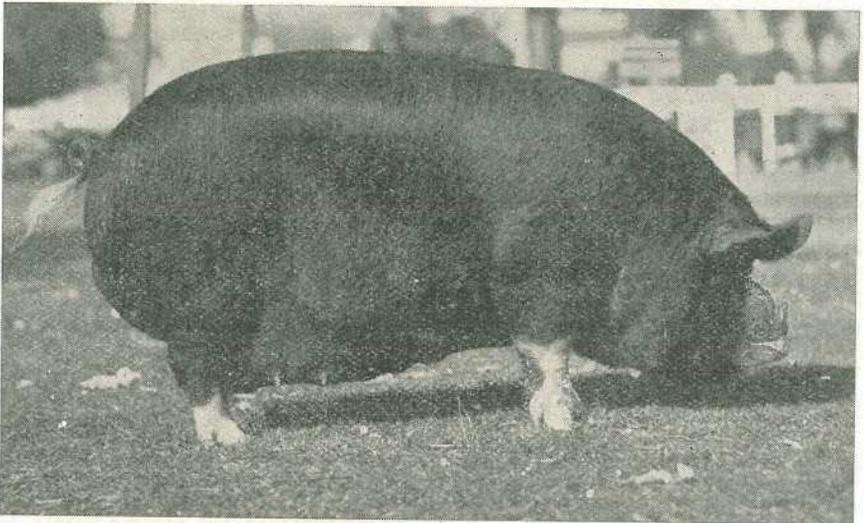


PLATE 233.

Mr. F. Bach's "Lenton Patience" (imp.), Champion Berkshire Sow.

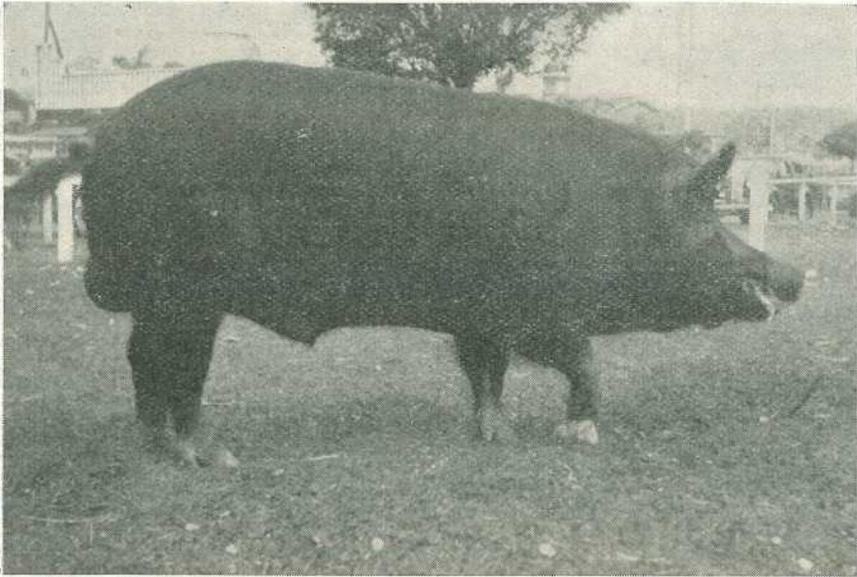


PLATE 234.

Wide Bay Stud Piggery's "Zilvale Skipper," Champion Tamworth Boar.

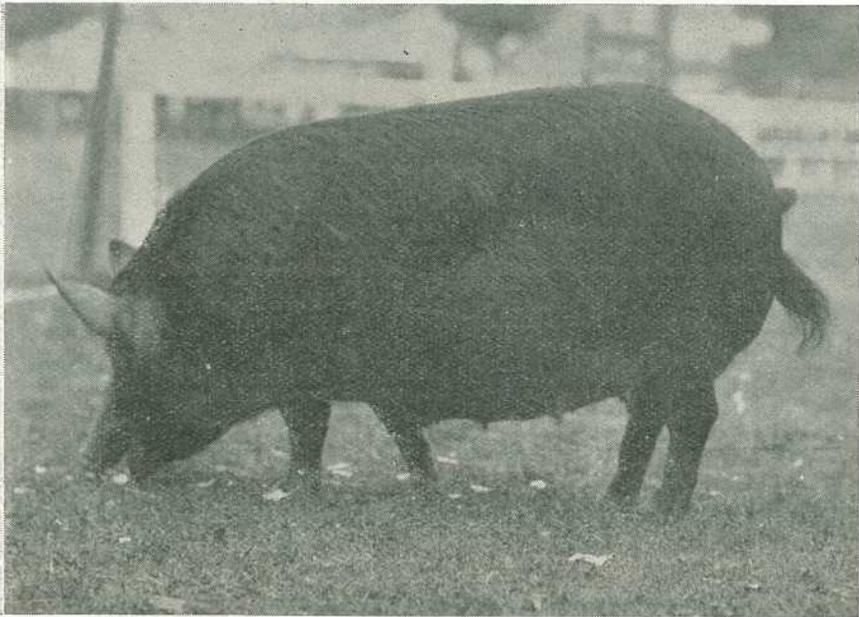


PLATE 235.

Champion Tamworth Sow, "Wattledale Ruby 2nd," Exhibited by the Wide Bay Stud Piggery, Gympie.

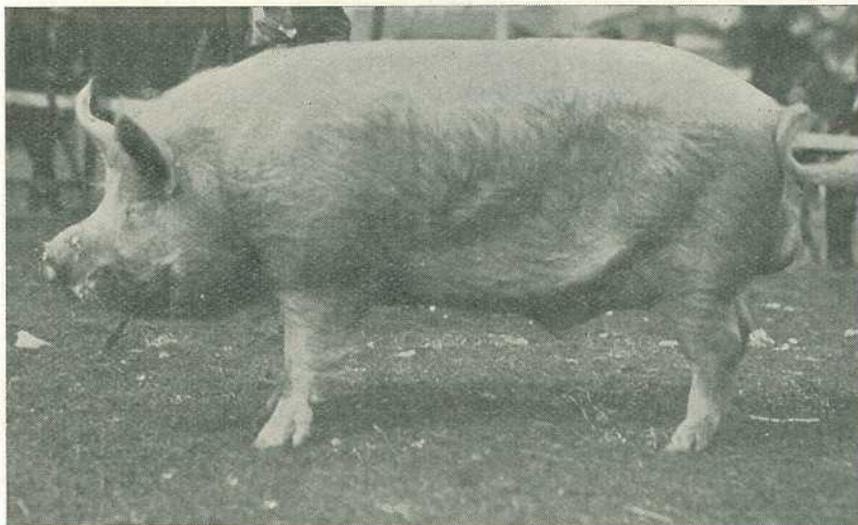


PLATE 236.

Champion Large White Boar—Mr. J. A. Heading's "Gatton David."

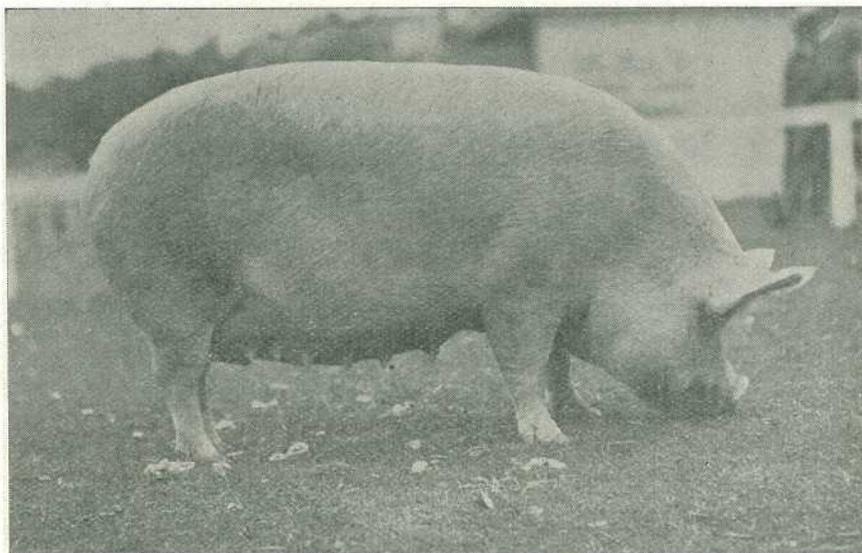


PLATE 237.

Champion Large White Sow—Mr. J. A. Heading's "Pine Terrace Pear" (imp.).

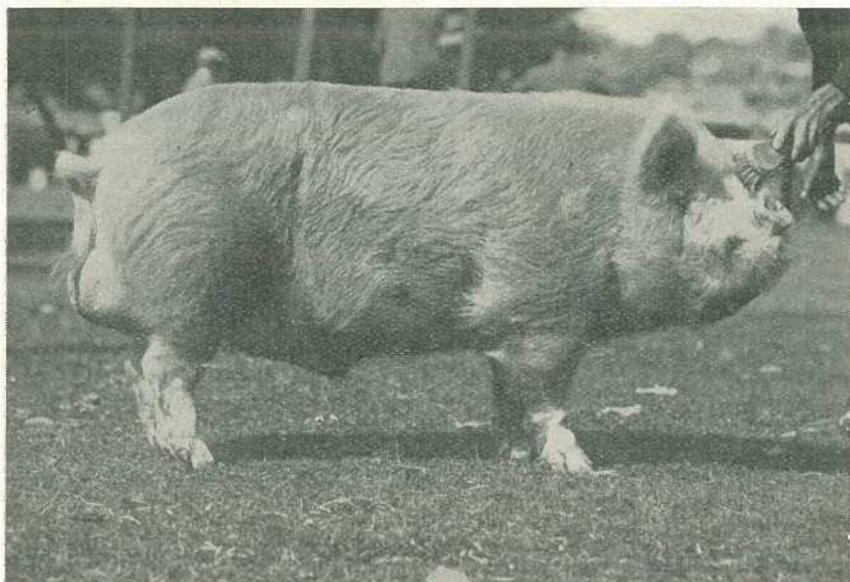


PLATE 238.  
Champion Middle White Boar—Mr. J. J. Slack's "Norfolk Defiance 3rd."

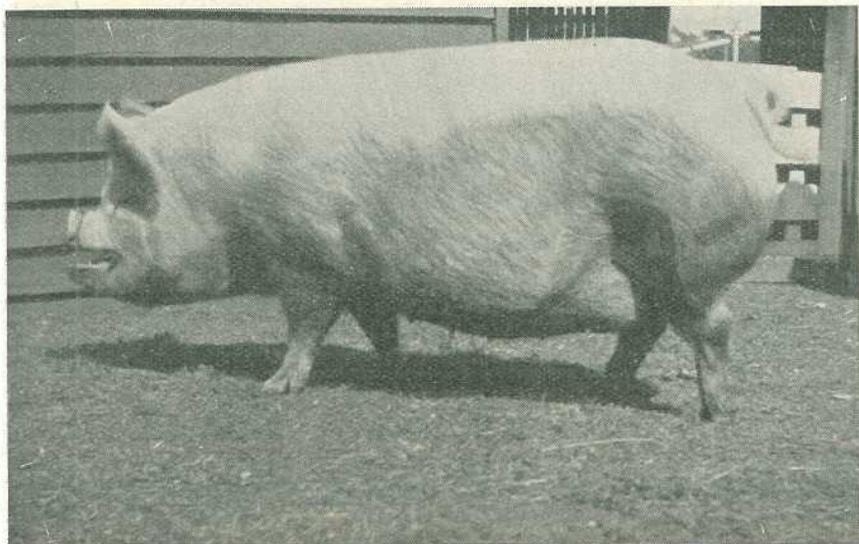


PLATE 239.  
Champion Middle White Sow—Mr. J. J. Slack's "Dinmore Persellen 2nd."

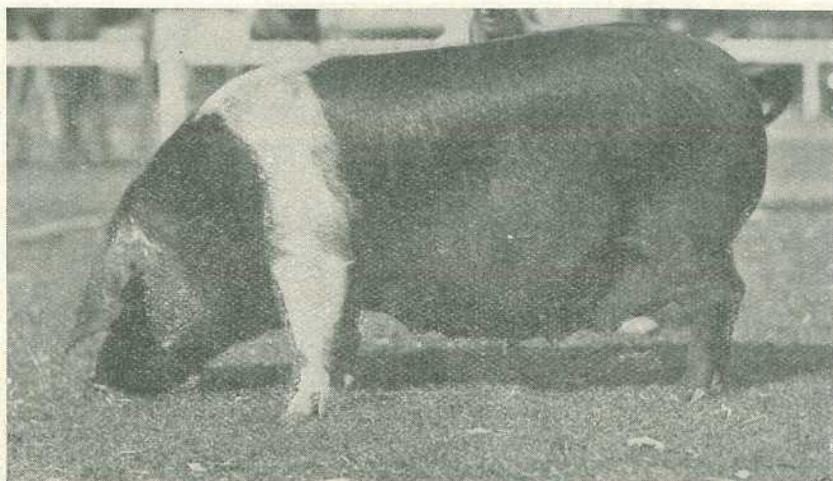


PLATE 240.  
Mr. R. Turpin's Champion Wessex Saddleback Sow, "Maidenbeach Ringouzel" (imp.).



PLATE 241.  
J. Barkle's Berkshire Sow, "Cawdor Pride," Winner of Sow and Litter Class.

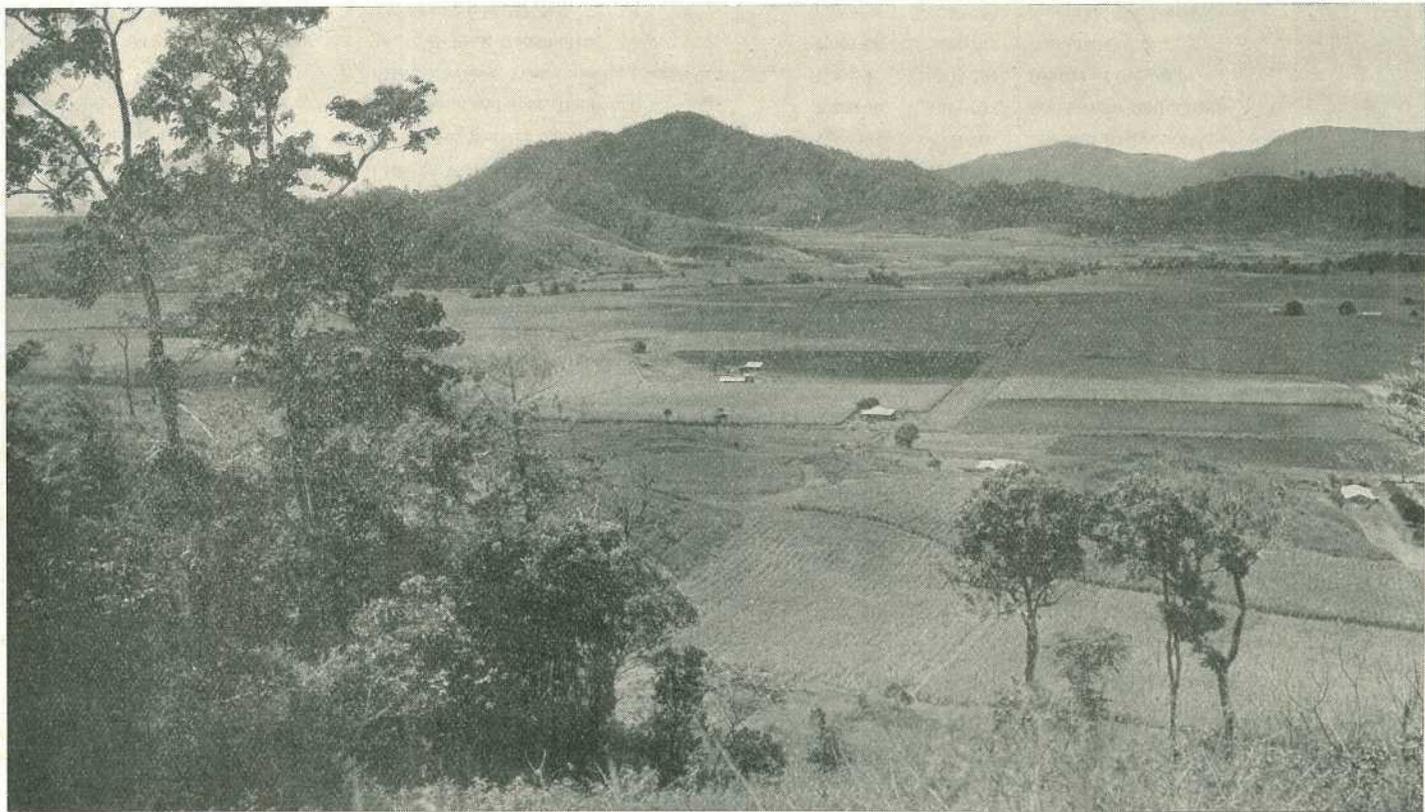


PLATE 242.  
Jungara Cane lands near Cairns, North Queensland.

### PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of Australian Illawarra Shorthorn Society, Jersey Cattle Society, production charts for which were compiled during the month of September, 1935 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
<b>AUSTRALIAN ILLAWARRA SHORTHORNS.</b>				
<b>MATURE (OVER 5 YEARS); STANDARD 350 LB.</b>				
Baby 3rd of Fairfield .. .. .	Mrs. J. Weber, Peak Crossing .. .. .	11,263.05	423.541	Fairy Fosh of Fairfield
Lady Myrtle III. of Blacklands .. .. .	A. Pickels, Wondai .. .. .	9,667.31	390.515	Red Prince of Blacklands
Wadevale Bella (268 days) .. .. .	E. Graham, Goomeri .. .. .	7,936.32	341.412	Lord Carrington of Oakvale
<b>JUNIOR 4 (UNDER 4½ YEARS), STANDARD 310 LB.</b>				
College Stately .. .. .	Queensland Agricultural High School and College, Gatton	8,895.26	452.802	Premier of Hillview
Trevor Hill Roseleaf .. .. .	E. W. Jackson, Nobby .. .. .	8,036.53	324.783	Gambol of Wilga Vale
<b>SENIOR 3 (OVER 3½ YEARS), STANDARD 290 LB.</b>				
Pride 12th of Burradale .. .. .	S. L. Holmes, Goomburra .. .. .	7,380.25	333.293	Envoy of Burradale
<b>JUNIOR 3 (UNDER 3½ YEARS), STANDARD 270 LB.</b>				
Melmerle Jennifer .. .. .	S. L. Holmes, Goomburra .. .. .	8,265.74	280.813	Wunulla Utility
<b>SENIOR 2 (OVER 2½ YEARS), STANDARD 250 LB.</b>				
Ethel 4th of Blacklands .. .. .	A. Pickels, Wondai .. .. .	9,032.63	359.464	Orama of Blacklands
Hillvale Jenny .. .. .	Mrs. J. Weber, Peak Crossing .. .. .	8,071.54	334.274	Marvel of Thorndale
Springlands Champion V. (269 days) .. .. .	J. Strain, Wondai .. .. .	7,458.9	327.707	The Hill Hollywood
Rhodesview Fanny 22nd .. .. .	W. Gierke and Sons, Helidon .. .. .	7,338.65	311.667	Rhodesview Red Knight
Hillvale Betty .. .. .	Mrs. J. Weber, Peak Crossing .. .. .	8,302.4	303.594	Drafter of Greyleigh
Melmerle Rosebud 3rd .. .. .	S. L. Holmes, Goomburra .. .. .	7,001.68	291.733	Wunulla Utility
Penrhos Elva 2nd .. .. .	A. Sandilands, Wildash .. .. .	6,586.88	270.736	Rosenthal Pendant Prince.

## JUNIOR 2 (UNDER 2½ YEARS), STANDARD 230 LB.

Rhodesview Nancy 12th .. .. .	W. Gierke and Sons, Helidon .. .. .	7,597.01	318-885	Prospector of Blacklands
Sunnyview Fairy Floss .. .. .	Rex Tweed, Kandanga .. .. .	7,506.35	313-907	Jellicoe of Headlands
Morden Pansy 5th .. .. .	R. Mears, Toogoolawah .. .. .	7,441.65	310-906	Jupiter of Morden
Melmerle Countess .. .. .	S. L. Holmes, Goomburra .. .. .	7,072.4	298-271	Wunulla Utility
Marn Bess .. .. .	R. Martin, Biggenden .. .. .	6,707.85	296-83	Gentle Victory
Melmerle Polly .. .. .	S. L. Holmes, Goomburra .. .. .	6,752.3	280-352	Wunulla Utility
Penrhos Merle 2nd .. .. .	A. Sandilands, Wildash .. .. .	6,783.9	260-205	Rosenthal Pendant Prince
Melmerle Holly Hock .. .. .	S. L. Holmes, Goomburra .. .. .	5,904.25	248-202	Wunulla Utility
Melmerle Sunflower .. .. .	S. L. Holmes, Goomburra .. .. .	5,702.48	238-608	Wunulla Utility

## JERSEY.

## MATURE (OVER 5 YEARS), STANDARD 350 LB.

Lady III. of Hillview (365 days) .. .. .	A. Geritz, Oakfield .. .. .	10,744.94	563-493	Playlad of Hillview
Wyreene Toddles .. .. .	J. B. Keys, Gowrie Little Plains .. .. .	6,210.59	382-67	Trinity Conqueror
Dorothy of Southport (270 days) .. .. .	G. H. Gibson, Kingaroy .. .. .	7,056.9	355-761	Werribee Twylish Starbright King

## SENIOR 4 (OVER 4½ YEARS), STANDARD 330 LB.

Treearne Milk Girl 3rd .. .. .	D. R. Hutton, Cunningham .. .. .	7,541.13	465-97	Treearne Golden King
Lilybright 3rd of Hillview (267 days) .. .. .	A. Geritz, Goomeri.. .. .	6,980.85	408-497	Mike of Hillview
Silvus of Calton .. .. .	A. Geritz, Goomeri.. .. .	6,177.18	389-298	Retford Meteor

## SENIOR 3 (OVER 3½ YEARS), STANDARD 290 LB.

Lady Betty of Homeleigh (365 days) .. .. .	A. L. Walker, Dawn .. .. .	7,881.9	461-432	Orleigh Golden King
Wyreene Pet .. .. .	J. H. Keys, Gowrie Little Plains .. .. .	6,532.02	336-771	Goldfinders Prospector of Morago

## JUNIOR 3 (UNDER 3½ YEARS), STANDARD 270 LB.

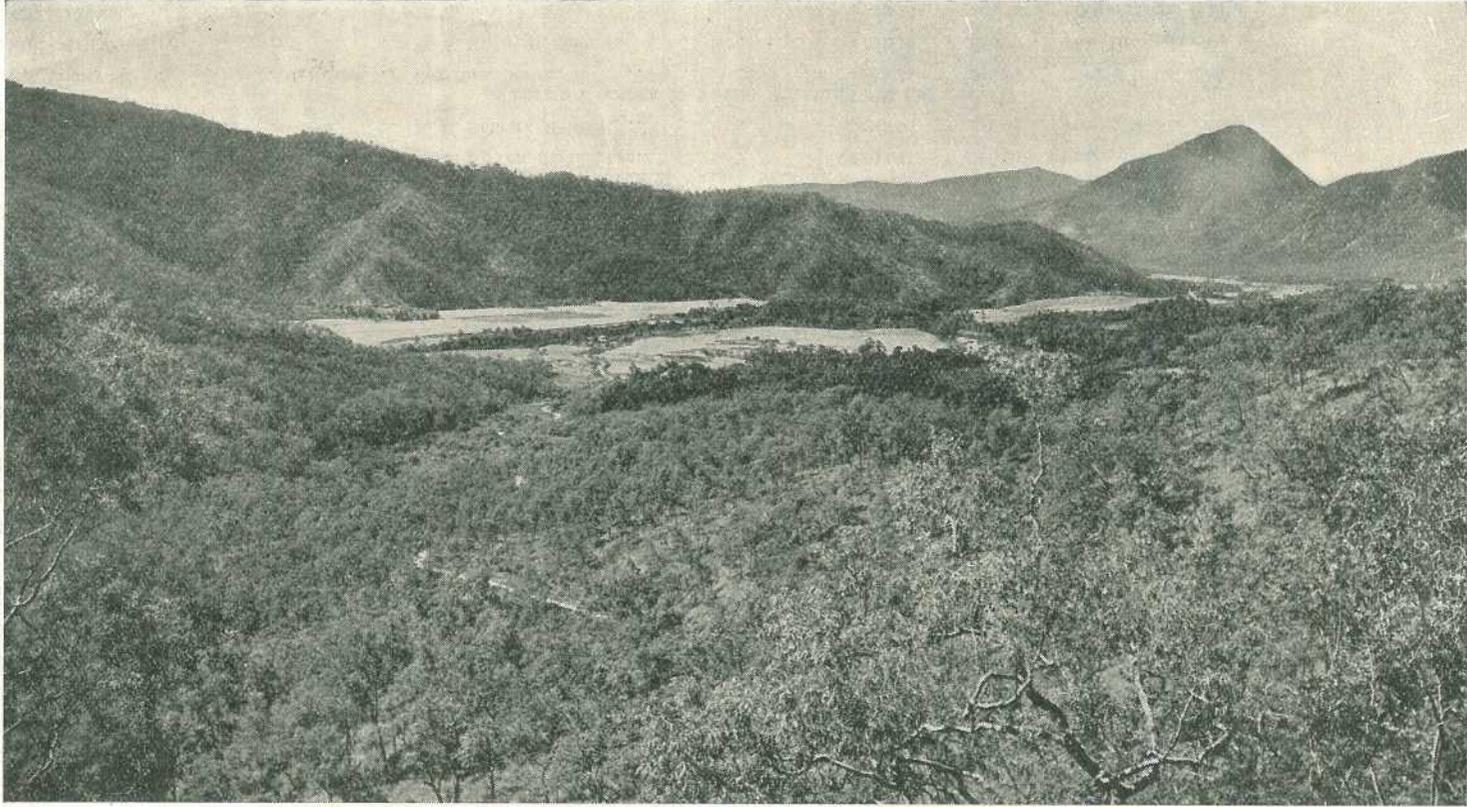
Carnation Butterfly 2nd .. .. .	P. Spresser and Sons, Redbank .. .. .	4,871.24	282-601	Carnation Prince
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## SENIOR 2 (OVER 2½ YEARS), STANDARD 250 LB.

Melba of Woodlands .. .. .	D. R. Hutton, Cunningham .. .. .	6,014.47	309-546	Prince of Woodlands
Balmoral Pride 2nd .. .. .	H. B. Roberts, Maleny .. .. .	5,243.95	250-02	Acaster Master Prince

## JUNIOR 2 (UNDER 2½ YEARS), STANDARD 230 LB.

G. H. Frailty 8th .. .. .	Cox Bros., Maleny .. .. .	4,218.25	273-635	Retford Royal Altavist
Glenview Opal .. .. .	W. S. Kirby, Byrnestown .. .. .	4,539.19	256-79	Glenview Goldfinder
Balmoral Beauty .. .. .	H. Roberts, Maleny .. .. .	4,798.25	233-187	Acaster Master Prince



Looking over the Little Mulgrave Valley from the Range Road—Cairns to the Atherton Tableland.

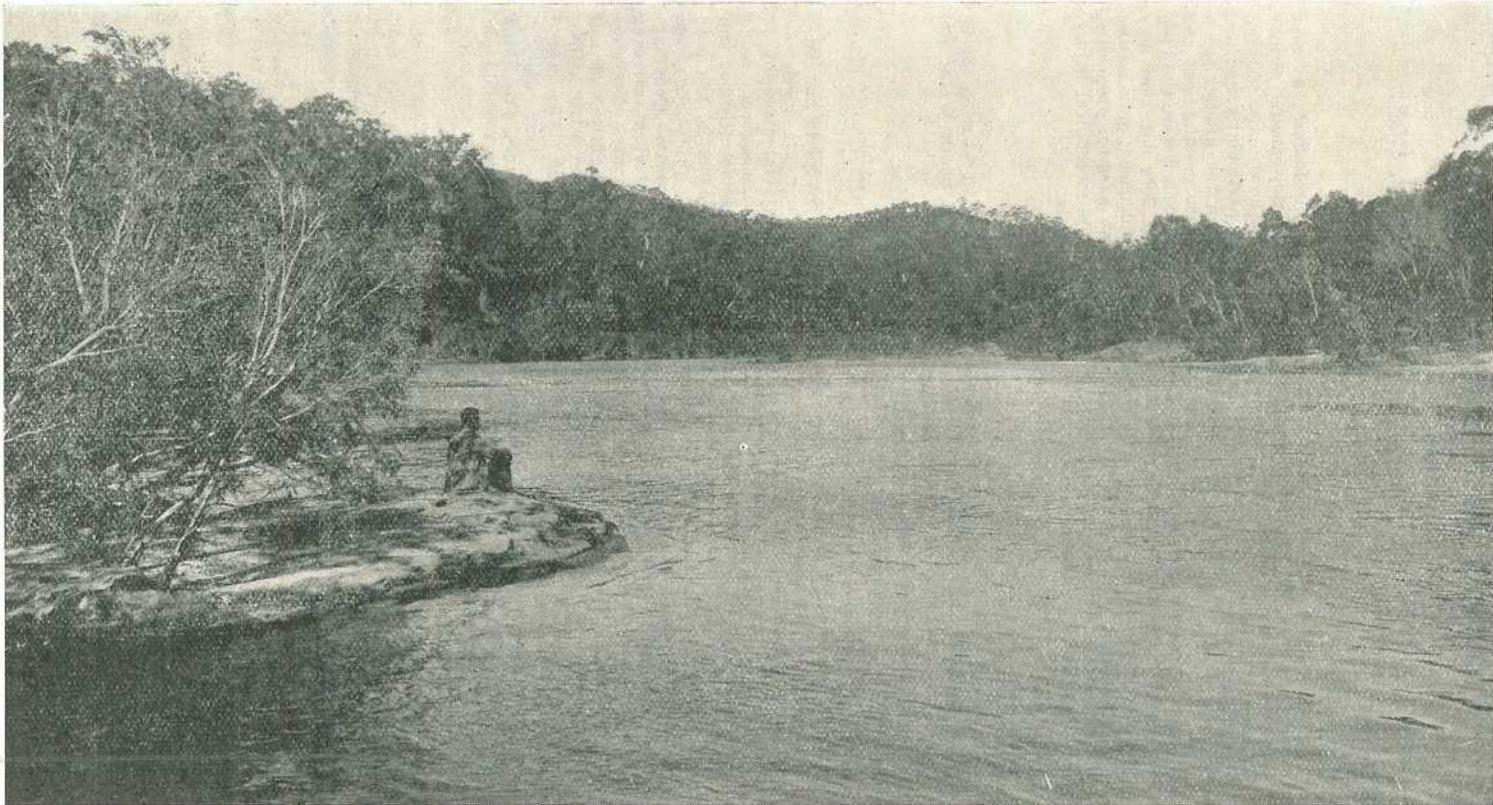


PLATE 244.  
Barron River, near Kuranda, North Queensland

## Answers to Correspondents.

### BOTANY.

Replies selected from the outgoing mail of Mr. C. T. White, F.L.S.,  
Government Botanist.

#### Black Bindweed.

G.A.D. (Wallumbilla)—

The weed represents the black bindweed (*Polygonum convolvulus*), a very common weed in the warm temperate regions of the world, causing serious trouble by climbing round the grain crop and pulling it down; also robbing the soil of a good deal of nutriment. The weed is a particularly bad one on account of the hard seeds retaining their vitality in the ground for a long time. The usual method of eradication is to induce germination, and then hoe or plough the seedlings in. The plant usually seeds before the crop matures and the seeds fall to the ground; or where it does not, they may be harvested with the crop and pass through animals unharmed, germinating in the manure. The plant is not known to possess any harmful properties, but the seeds are hard and sharp-pointed and may cause mechanical injury, exhibiting itself as a form of enteritis in affected animals.

#### Mulga and Myall.

E.P.L. (Roma)—

1. Mulga seeds from Woy Woy, New South Wales, would, of course, not be gathered there, but would be collected in Western New South Wales and would be suitable for sowing at Roma.
2. We have no literature dealing with myall and other edible trees.
3. Myall seeds are listed by Messrs. A. Murphy, Woy Woy, at 3s. per oz. or £1 per lb., and mulga seed at 2s. an oz. or 14s. per lb.
4. Your best plan would be to sow the myall seeds in garden plots and later transplant out to permanent positions. Myall and mulga are species of wattle or acacia and the seed of these trees requires special attention in growing. In nature, they often follow on after a burn, the seedcoat being hard is cracked by the fire. At other times the soil is sufficiently hot and moist to effect germination without any other heat. For example, you have perhaps seen mulga and myall seedlings come up where protection from stock has been afforded. The common practice is to put the seeds into a receptacle and pour boiling or nearly boiling water over them, allowing them to soak in the hot water for twelve to twenty-four hours. A system that has been recommended is to sow the seeds, covering lightly with soil about  $\frac{1}{2}$  to 1 inch, and then watering the pan or seed-bed with boiling water and covering with a few corn sacks to keep the steam in. This is said to assist germination and the young trees will grow up very quickly. Various distances apart are recommended for planting the trees. We think anything from 12 to 20 feet would be suitable, as the trees would not grow as big as under natural conditions; some of the large mulga trees, of course, being a considerable age.
5. A tree which we are rather anxious to see planted in the West is the so-called Portuguese elm (*Celtis sinensis*). Stock are particularly fond of the leaves of this plant and we have seen it grow very well about Dalby. We don't remember seeing it anywhere in the neighbourhood of Roma, but it should grow there quite well. Seed is, generally, not obtainable through the ordinary commercial channels.

Regarding leafy trees. One specimen we remember seeing about Roma was the bellasombra, or *Phytolacca dioica*. Seeds of this tree are obtainable from R. Dick, Purga, via Ipswich; price, 2s. a large packet.

Kurrajong and bottle trees, of course, do very well about Roma and both are well-known fodder plants. Seeds of bottle trees are not generally obtainable through the ordinary commercial channels, but seeds of the Kurrajong can be obtained. Both Messrs. A. Yates and Co., of Sussex street, Sydney, and Mr. A. Murphy, of Woy Woy, list seeds in their catalogues. These, we think, would be well worth planting as they grow much quicker than the myall or mulga and their allies. Of course, they are excellent fodders. All trees mentioned, other than the mulgas and the myalls, should be planted no less than 30 ft. apart.

**Monkey Vine.**

A.J.H. (Daymar)—

The specimen represents *Lyonsia eucalyptifolia*, sometimes called "Monkey Vine." It is a very common vine in parts of Western Queensland and New South Wales, producing a great amount of foliage and generally regarded as excellent sheep feed. It has been found from experience, however, that it is poisonous to feed it in large quantities when fresh and that it is better to cut it and let it to wilt for at least 24 hours, preferably longer, before feeding. Whether it contains a poisonous property or causes death simply by bloat is not known.

**The Luck of Four-leaved Clover.**

J.R.McC. (Mackay)—

The specimen of four-leaved clover forwarded by you is rather interesting. There is a superstition that the four-leaved clover brings good luck and now and again we have had people come to the gardens where clover is very common in the lawns, and by looking assiduously they generally manage to find an odd leaf or two. This superstition has been brought from the Old Country and in a book on the flowers and plants of Great Britain by Anne Pratt, who specialises in the folk-lore attached to the plants, it states among other things, "Melton in his 'Agrologaster,' says, that 'If a man walking in the fields finds any four-leaved grass, he shall, in a short while after, find some good thing.'" In Herrick's "Hesperides," too, we find a slight allusion to this:—

"Glide by the ranks of virgins then and passe  
The shoures of roses, lucky four-leaved grasse;  
The while the crouds of younglings sing,  
And drown ye with a flourie spring."

**How to Send Specimens.**

E.L.L. (Mount Isa)—

We will be pleased to identify any specimens of grasses, herbs, or shrubs you care to send for identification. Of grasses a stalk, doubled up backward and forward so as to wrap up in a piece of newspaper, should be sent. It is as well to enclose a few additional seed heads. Of shrubs, trees, herbs, &c., a shoot a few inches long bearing leaves and, if possible, flowers or seed pods should be forwarded. As you are some distance from Brisbane you will find they will travel much better if you press them between sheets of newspaper for a few days before sending. When dry, number each specimen and retain a duplicate, when names corresponding to numbers will be returned. Grasses are much easier to identify when pressed flat rather than when doubled up in a sheet of newspaper, but perhaps this is too much trouble for you. No charge is made for this service.

**Pittsworth Plants Identified.**

P.R. (Pittsworth)—Your specimens have been determined as follows:—

1. *Sisymbrium orientale*. A species of Mustard Weed. A very common farm weed in Queensland. It taints milk, but is not known to be harmful or poisonous in any way.
2. *Swainsonia galegifolia*. A variety of the Darling Pea. This particular form is common over a large area of forest country in South-east Queensland, but we have not heard of it affecting stock to any great extent.
3. *Myoporum debile*. A small plant very common in Queensland. It is not known to possess any poisonous or harmful properties. We have not heard of a local name given to it.
4. *Gnaphalium japonicum*. Cud Weed. A very common weed not known to possess any poisonous or harmful properties.
5. *Centipeda orbicularis*. Sometimes called Snuff Weed. It has been accused of poisoning stock on occasions in Queensland, but nothing very definite is known about this plant. We are rather doubtful about it being eaten in sufficient quantities to cause trouble.
6. *Stachys arvensis*. Stagger Weed. We have never known this weed to definitely cause trouble among resting cattle. It affects working stock or travelling stock. Stock have to be excited or worked or driven before the poisonous symptoms become manifest.

**Johnson Grass.**

J.H. (Chowey)—

The specimen represents Johnson grass (*Sorghum halepense*), fairly common as a weed of cultivation in many parts of Queensland. It is very difficult to eradicate, once it gets into a field as every piece of the white underground runners that are cut is capable of forming a new plant. Johnson grass has been spoken highly of as a fodder on different occasions, but like other members of the *Sorghum* family it possesses a prussic-acid-yielding glucoside, and is dangerous to feed unless cut in the flowering stage, or allowed to wilt a little before feeding. Cattle should not be put on it on an empty stomach.

**Hexham Scent and Milk Taint.**

R. McG. (Leyburn)—

The specimen represents *Melilotus parviflora*, a melilot or Hexham scent, a very common weed in parts of South Queensland at present, particularly on the Darling Downs between Warwick and Toowoomba. It was boomed as a fodder a few years ago, under the name of "King Island Melilot," and has the advantage that it will grow in soils where lucerne and some other legumes will not thrive. It is an annual, and dies out at the approach of hot weather towards the end of this month or nearly November. The plant is quite useful for grazing, but animals have to become accustomed to the peculiar odour and taste, and it is unsuitable for dairy cattle, as it causes a peculiar flavour in the milk and cream.

**Cluster Clover.**

C.A. (Nethendale)—

The specimen represents cluster clover (*Trifolium glomeratum*), one of the best annual clovers grown in Queensland. It grows up well during the late winter and spring months, and dies off about the middle of November. It is very palatable and nutritious, and stock are very fond of it. Seed is obtainable through ordinary commercial channels. It should be sown during April or May.

**Knot Grass or Knot Weed.**

W.A. (Wallumbilla)—

The specimen represents knot grass or knot weed (*Polygonum aviculare*), a very common weed at times on the Darling Downs, and some of the cooler parts of Queensland. It is not known to possess any poisonous or harmful properties, but its long procumbent runners are very fibrous when old, and if eaten in this state by stock may cause impaction. It is at times rather a troublesome weed, and it is as well to eradicate it, if possible, when it first makes its appearance.

**Red Ash or "Sarsaparilla." Mackay Cedar.**

O.B. (Calen, N.Q.)—

Your specimen is certainly not Poison Peach, but is *Alphitonia Petriei*, commonly called red ash or sarsaparilla. The tree is also probably called peach leaf cedar, but quite likely this name is used for totally different trees as vernacular names vary so greatly in different localities. The plant is not poisonous or harmful in any way and is, in fact, one of the best native fodder plants we possess, all stock being particularly fond of it. The name "sarsaparilla" is given to it on account of the fact that young bark when pulled off is noticed to possess a very strong scent of sarsaparilla.

We will always be glad to name and report on any specimens you care to send. Pieces such as that you send are excellent for determination and quite acceptable for our Herbarium.

Mackay cedar is *Albizzia Toona*. The genus *Albizzia* is very closely allied to *Acacia* and the Mackay cedar is sometimes known as acacia cedar. If you could send a few flowering sprays of this tree at some time the favour will be very much appreciated.

**"Goosefoot" or "Fat Hen."**

E.O.S. (Chelmer)—

It is rather difficult to name weeds in the seedling stage, but we have no doubt that the specimen forwarded by you represents the goosefoot or fat hen (*Chenopodium murale*), a common European weed quite naturalised in Australia. It is not known to possess any harmful or poisonous properties, but, like some other closely allied plants, gives a rather peculiar weedy taint to milk and cream.

**Mat Grass.**

F.S. (Cooroy)—

The botanical name of "mat grass" is *Axonopus compressus*. It was described originally from Central America and is a native of that country, but extends some little distance into South America and into Southern United States. We do not know how it became introduced into Australia, but it has been here for a great number of years, especially in Northern Queensland. It was boomed some years ago as a fodder and certainly some of it was planted both in the Northern Rivers of New South Wales and Southern Queensland. Strange to say, it is regarded as a good fodder in the United States and in official bulletins is recommended as a good fodder in Florida and States adjacent thereto. Its eradication is extremely difficult. In small patches, of course, it can be cut out or kept down with a fairly heavy dressing of waste salt such as butchers' salt. The only method of control in large areas is to plough it out and replace with some more vigorous grass.

**Weeds Causing "Stagers" in Stock.**

S.M. (Wooroolin)—

The two specimens have been identified as under:—

- (A) Stagger Weed (*Stachys arvensis*).
- (B) Dead Nettle (*Lamium amplexicaule*).

Both of these plants cause staggers in working stock. The Wild Mint mentioned is a different plant. The only known method of combating it is intensive cultivation and chipping.

**Milk Tainting Weeds.**

Inquirer (Brisbane)—

The plant specimens have been determined as—

1. *Lepidium ruderale*, Pepper Cress.
2. *Apium leptophyllum*, Wild Carrot.
3. *Senecioia didyma*, Wart Cress.

These are all weeds belonging to the *Crucifer* family, and they are known to cause taints in the flavour of milk and cream.

**Darling Pea.**

H. H. McG. (Hampton, Crow's Nest Line)—

The specimen is the Darling pea or indigo (*Swainsona galegifolia*). This plant is poisonous to stock. Sheep and cattle which eat it fairly consistently are affected by a peculiar nervous disorder brought on by this plant. Mostly stock avoid it, but occasionally they develop a morbid appetite for it, hence the designation "pea eaters" or "indigo eaters."

**Grasses from South Burnett Identified.**

D.D. (Romina, via Goomeri)—

1. *Cyperus gracilis*, a sedge not a true grass.
2. *Calamagrostis filiformis*, Blown Grass. This is very common in damp places, especially round billabongs, melon holes, &c., round the edges of lagoons and similar places. It comes up with the spring rains, but soon dies off. While it lasts it is quite a good fodder.
3. *Arundinella nepalensis*, a native grass for which we have not heard a common name. It is very common in some of the forest country of Queensland, particularly in sandy places, on hillsides, &c. It is a coarse, cany grass, and is only eaten by stock in the absence of other feed.
4. *Echinopegon nutans*, Rough Bearded Grass. A fairly common grass in Southern Queensland. It favours rather shady situations, and in such places is a useful addition to the mixed pasture.

## General Notes.

### Staff Changes and Appointments.

Mr. L. L. Manchester, District Stock Inspector, has been transferred from Mareeba to Charleville.

Mr. B. R. Butler, Patrolman, care Main Roads Work, Ravenshoe, has been appointed an Honorary Ranger under "*The Animals and Birds Acts and the Native Plants Protection Act.*"

Mr. N. E. Sutherland, Acting Clerk of Petty Sessions, Nambour, has been appointed Chairman of the Moreton Local Sugar Cane Prices Board, and an agent of the Central Sugar Cane Prices Board, for the purpose of making inquiries under Section 5 (2A) of the Regulation of Sugar Cane Prices Acts in regard to sales and leases of assigned lands.

Acting-Sergeant G. L. Jaques, Windorah, has been appointed also an Inspector of Brands.

Mr. T. B. Austin, The Kiosk, Elliott Heads, Bundaberg, has been appointed an Honorary Ranger under the Animals and Birds Acts.

### Fruit Fly Eradication.

In October, 1934, a Proclamation and Regulation were issued under "*The Diseases in Plants Acts,*" declaring the Stanthorpe, Warwick, and Killarney Districts to be a quarantine area on account of the presence of fruit fly, and prescribing the nature of the quarantine to be imposed in such area. It was compulsory for fruit growers in those districts to place and maintain traps, charged with an approved fruit fly lure, in their orchards throughout the last fruit season. Executive approval has now been given to the issue of another Proclamation and Regulation similar to the foregoing with respect to luring for fruit fly control in the Stanthorpe, Warwick, and Killarney districts during the forthcoming fruit season. The new regulation will be operative as from 1st October, 1935.

### Barley, Butter, and Cheese Boards.

Orders in Council have been issued in pursuance of the provisions of "*The Primary Producers' Organisation and Marketing Acts, 1926 to 1932,*" extending the operations of the Barley, Butter, and Cheese Boards. The Barley Board's period of extension is from the 24th April, 1937, to the 23rd April, 1942, and those of the Butter and Cheese Boards from the 1st October, 1935, to the 31st December, 1935.

### Northern Pig Board.

An Order in Council has been issued under the Primary Producers' Organisation and Marketing Acts giving notice of intention to extend the operations of the Northern Pig Board for the period from 1st January, 1936, to the 31st December, 1940. A petition for a ballot as to whether or not the Board shall be extended for such period may be lodged by growers on or before the 18th November, 1935.

### Broom Millet Board.

The only nominations received for the election of two growers' representatives on the Broom Millet Board were Messrs. Henry Jacob Scholl, Binjour Plateau, and Henry Zischke, Hatton Vale.

Mr. Hans Niemeyer, the present chairman of the board, did not nominate. The appointment of Messrs. Scholl and Zischke will be made at a later date.

**Dairy Stabilisation Board.**

An Order in Council has been issued in pursuance of the provisions of "The Dairy Products Stabilisation Act of 1933," extending the operations of the Dairy Products Stabilisation Board until the 31st December, 1935. The personnel of this board consists of the members of the Butter Board and two representatives of the Cheese Board, namely: Messrs. J. Purcell (Toowoomba), W. J. Sloan (Malanda), R. M. Hill (Bororen), J. McRobert (Maryborough), T. F. Plunkett (Beaudesert), A. G. Muller (Fassifern Valley), E. Graham (Director of Marketing), H. T. Anderson (Dalby), and A. J. Harvey (Pittsworth).

**List of Licensed Farm Produce Agents, Brisbane:—**

- |   |  |
|---|--|
| Addis Brothers.   | Johnson and Markwell, W.                           |
| Allen, J.   | Johnston, Adam.                                    |
| Anderson, Edward Arthur.  | Johnston, Reginald W.                              |
| Archer and Goss.  | Johnston, William.                                 |
| Arkell, W., and Sons.   | Jordan, Ernest Arthur.                             |
| Australian Fruit and Produce Co.  | Justins and Finlayson.                             |
| Barnes and Co. Pty. Ltd.  | Kellie, Francis Hope.                              |
| Barr, A. S.   | Laidlaw and Co., G.                                |
| Barron, Orr, and Co. Pty. Ltd.  | Lambert, G. and W.                                 |
| Barter, G. and W.   | Leavy, James H.                                    |
| Bowden, T. S. and Co.   | Livingstone, J. R.                                 |
| Burns, Philp and Co. Ltd.   | Lloyd, Margaret.                                   |
| Burrell, Fenton and Co. Pty. Ltd.                                       | Luxford, Sydney.                                   |
| Carseldine, Arthur W.   | Mackay, William M.                                 |
| Carter, Alfred J.   | Male, Joseph Norman.                               |
| Chave, A. E.  | Mant, Charles O.                                   |
| Clark and Jesser.   | Martin and Co.                                     |
| Collard and Mackay.   | Matthews, John.                                    |
| Comino Bros. Pty. Ltd.  | Mendoza and Wright Pty. Ltd.                       |
| Committee of Direction of Fruit Market-<br>ing.                         | Murray, John.                                      |
| Cooksley and Co.  | Murray Bros.                                       |
| Cooper Bros.  | McCausland, Louis J.                               |
| Copp, R. E.   | McCook Bros.                                       |
| Cranley, J. P., Pty. Ltd.   | McCowan and Hammond.                               |
| Cripps, William.  | McDowall, Edward T.                                |
| Dairy Products Co-op. Co. Ltd.  | New Zealand Loan and Mercantile<br>Agency Co. Ltd. |
| Daigety and Co. Ltd.  | Nicholson, Alphonso.                               |
| Davies, W. C., and Co.  | Pettigrew and Wilson.                              |
| Dean, Henry and Sons, Pty. Ltd.   | Plint, H. C.                                       |
| Dinneen, Leslie.  | Potter, W. E.                                      |
| Donald, John Simpson.   | Robinson and Laidlaw.                              |
| Donnellan and Co.   | Robsons Pty. Ltd.                                  |
| Edward, George.   | Russell, H. M., and Co. Pty. Ltd.                  |
| Eriksen, Hans P.  | Scott, Garrad and Co.                              |
| Evans, Arthur L.  | Sellars, R. B.                                     |
| Evans, Norman.  | Sellars, Derek P.                                  |
| Farmers' Co-operative Distributing Asso-<br>ciation of Queensland, Ltd. | Shay, Percy R.                                     |
| Foggitt, Jones Pty. Ltd.  | Sibley, P. C.                                      |
| Foley Bros. Ltd.  | Siemons Pty. Ltd.                                  |
| Fong Pie and Co.  | Skinner, P. J.                                     |
| Gall, George.   | Stanton Bros.                                      |
| Geeves, Hedley. Pty. Ltd.   | Stanton, Harry.                                    |
| Gesler, Fredrick C.   | State Produce Agency Pty. Ltd.                     |
| Good, D. E.   | Sutton Bros.                                       |
| Guinsberg, Israel.  | Tacey and Eyre.                                    |
| Hall and Pascoe.  | Thorpe, H. W.                                      |
| Harris, H. N., and Co.  | Wanless, Thomas H.                                 |
| Hodges and Pratt.   | Watson, W. P. and Co.                              |
| Houghton, E. H.   | Whatling, E. H. R.                                 |
| Hutton, J. C. Pty. Ltd.   | Wiltshire, F. C. G.                                |
| Izatt and Johnson.  | Winters, Edward.                                   |
| Jaeklyn and Jacklyn.  | Wool, A. E.  |
| Jackson, J. and Co. (Produce and Seeds)<br>Pty. Ltd.                    | Wool, H. L.  |
|   | Yow Sang and Co.                                   |

**List of Licensed Farm Produce Agents.**

Backhouse, J. J. C., Killarney.  
 Berlin, E. A., Marburg.  
 Black, H. L., Mackay.  
 Brand, Thomas, Mackay.  
 Curtis, W. E. and Co., Bundaberg.  
 Dawson, Joseph, Rockhampton.  
 Elwing, James Archibald, Rockhampton.  
 Farrelly, Eugene Andrew, Mackay.  
 Featherstonaugh, Albany, Roma.  
 Goltz, F. W., Mackay.  
 Good, D. E., Rockhampton.  
 Gore, Arthur Charles, Cambooya.  
 Gore, Edward and Co.  
 Gower, H. R., Rockhampton.  
 Haigh, E. V., Ipswich.  
 Harding and Walker, Ipswich.  
 Heers, J. W., Coominya.  
 Johnston, H., Rockhampton.  
 Jones, J. E. L., Gladstone.  
 Joyner, R. G., Gladstone.  
 Lee Sang and Co., Cairns.  
 Leonard, T. J., Mackay.  
 Leong Sun, Townsville.  
 Limpus, Bert, Bundaberg.  
 Limpus, C. M. and Co., Bundaberg.  
 Lindemann, C. H. D., Lowood.  
 Manz, Walter, Lowood.  
 Mar Kong, Townsville.  
 Maxwell, Samuel, Warwick.  
 Olsen, A. E., Killarney.  
 Poll and Co., Wynnum South.  
 Porter, William George, Mackay.  
 Profke, Albert, Lowood.  
 Reason, S. C., Killarney.  
 Redmonds Pty. Ltd., Bundaberg.  
 Reeds Pty. Ltd., Maryborough.  
 Rex, J. W., Maryborough.  
 Reye, C. A. H., Townsville.  
 Richardson, A. H., Rockhampton.  
 Robinson, John, Toowoomba.  
 Stewart, D. H., Toowoomba.  
 Tatnell, W. R., Gympie.  
 Thomas, D. B., Gympie.  
 Thomas, George, Gympie.  
 Thomas, L. J., Gympie.  
 Thompson, Sydney, Warwick.  
 Thorpe, T. E., Townsville.  
 Tong Sing and Co., Cairns.  
 Townsville Fruit Exchange, Townsville.  
 Tung Yep, Cairns.  
 Turner, George Baden Powell, Bowen.  
 Walker, E. E., Gympie.  
 Walker, Shaw, Townsville.  
 Walters, W. J., Lowood.  
 Warrys Pty. Ltd., Maryborough.  
 Waters, Punzell, and Williams, Mackay.  
 Wilkinson, Joseph John, Nambour.  
 Wilson, John, Kingaroy.  
 Young, William, Rockhampton.

**Provisional Maize Board.**

An Order in Council has been issued under the Primary Producers' Organisation and Marketing Acts, amending the constitution of the Provisional Maize Non-Marketing Board, by extending the term of the Board for a further period of twelve months, that is, until October, 1936.

**Cotton Board.**

An Order in Council, giving notice of intention to extend the operations of the Cotton Board from the 1st January, 1937, to the 31st December, 1941, has been issued. A petition on the question of whether or not the Pool Board shall be extended for such period may be lodged by growers on or before the 11th November next.

The constitution of the Cotton Board at present provides that members of the board shall be elected biennially, with the exception that those elected in 1936 shall hold office for one year only. An amending Order in Council has also been approved, which cancels the latter provision, thus ensuring that members of the Board shall hold office for a period of two years, as previously.

**Animals and Birds Sanctuary near Tamaree.**

An Order in Council has been issued in pursuance of the provisions of the Animals and Birds Acts, declaring Miner's Homestead Lease No. 5533, held by Mr. R. A. Blake, Stony Creek, near Tamaree, to be a sanctuary for the protection of native animals and birds.

**Animals and Birds Sanctuaries at Hughenden and Mackay.**

Orders in Council have been issued in pursuance of the provisions of the Animals and Birds Acts, declaring Rosevale Station, Hughenden, and the property of W. J. Patullo, Eungella, via Mackay, to be sanctuaries for the protection of native animals and birds.

## Rural Topics.

### Points in Feeding Whey to Calves.

Calves do well on whey and soon grow to relish it. The principal points to be observed are as follows:—

1. Break in the calf gradually to drinking whey after having been started on milk. The same process as in the case of skim-milk should be employed, but care must be taken to boil the milk to prevent it coagulating when mixed with the whey.
2. Guard against bloat caused by too high acidity in the whey.
3. See that too much water has not been added to the whey to reduce and retard acidity when cooking the curd.
4. Provide a good, well-boiled porridge to be added to the whey.

As some time necessarily elapses after the whey is drawn from the vats, before it is fed to the calves, the progress of acidity should be checked by boiling the whey. The use of molasses with whey is also recommended.

### Cow's Record—3½ Tons of Butter in 10 Years.

A fifteen-year-old Guernsey cow, Parson's Red Rose 20th, of the New South Wales Department of Agriculture's stud at the Wollongbar experiment farm in ten lactations under official test has produced an aggregate of 53½ tons of milk and butter fat, equivalent to 3 tons 8½ cwt. of butter. This does not take into account production during unrecorded intervals. This veteran cow holds the production record for the Guernsey breed in Australia, her yield for 365 days as a six-year-old being 17,252 lb. of milk of 6.2 test, equivalent to 1081.17 lb. of butter fat. Parson's Red Rose 20th was born on March 6, 1920, and as a junior two-year-old achieved the excellent record of 10,911 lb. of milk, equivalent to 627½ lb. of butter fat, in 365 days. She completed her tenth lactation test last month, and apparently still has some years of productive usefulness ahead of her.

### Keep the Farm Horse Fit.

The horse should be groomed carefully in the springtime when at hard work and sweating profusely. The skin cannot perform its functions properly unless it is kept clean. Shoulders and neck are liable to be chafed with the collar if grooming is neglected. Keep the horse fit at the busy season at all hazards. Feed him generously, but take care to reduce his corn ration on idle days. The feeding on Saturday evening should always be more sparing in oats than throughout the week. Monday morning trouble would be less common if the horses were somewhat stinted on Sundays. Watering should be attended to regularly. Water before feeding grain. When a horse is overheated at hard work, by no means allow him to take his fill of water. A bucket is quite enough until he has cooled down. An exhausted horse should not be fed a full measure of corn nor should his manger be stuffed with hay. Give him a very light feed at first, and, better still, let him munch a handful of hay. After he has rested for about an hour, he may receive a full feed of oats. A little and often is the golden rule to keep the horse fit.

### Tormenting Flies.

In the hot weather flies may become a terrible nuisance. They pester live stock. They even prevent animals from thriving. They have the effect of lowering milk production. They also carry and spread infection.

The wading of cattle in brooks and muddy ponds is often done with the object of getting away from their tormentors; and it is well known that one of the causes of ropy milk is due to organisms which may have come from the animals wading in muddy water. It is very difficult for a human being to judge the extent of the reactions of an animal to any particular annoyance, pain or suffering.

On the farm it is not possible to do much to reduce the number of flies where cattle graze, but at least something can be done to see that the cowshed is a place of peace and comfort when the milking herd is in it by taking steps to keep out or get rid of the flies, by keeping the manure heap as far away as possible, and from time to time treating it with some suitable preparation.—“The New Zealand Farmer.”

**"Dairy Temperament" in Cows.**

On field days with live stock one usually hears demonstrators refer to the "dairy temperament" of cows. This means the stimulus to convert the nutrients into milk rather than into body fat. This stimulus is an inherited quality, and is found in animals whose ancestors have been bred and selected generation after generation for high milk production. Certain cows with a strong ability to produce milk are at times inclined to produce more milk than is warranted by their feed consumption. Such cows, after calving, usually draw on their body tissues and lose weight. If, at any time, the feed supply is limited, cows with a good dairy tendency use their body tissue for milk, and become very thin. Under the same conditions cows lacking this characteristic tend to reduce their milk flow rapidly and become dry.—"The New Zealand Farmer."

**Fruit Distribution Scheme.**

From "Hansard":—

Mr. HILTON (*Carnarvon*) asked the Secretary for Agriculture—

" 1. How many cases of fruit and vegetables have been disposed of under the fruit distribution scheme which was inaugurated in January last?

" 2. What were the principal centres at which this fruit was sold?

" 3. What amount was realised by these sales?

" 4. What was the profit to the Committee of Direction of Fruit Marketing accruing from these transactions?

" 5. What quantity of fruit and vegetables, grown in the Stanthorpe district, was disposed of under this scheme?"

The Secretary for Agriculture (Hon. F. W. Bulcock, *Barcoo*) replied—

" 1. 10,442 cases of fruit and 4,701 cases of vegetables.

" 2. Fruit was distributed to 107 centres throughout the State, those taking the largest quantities being Mount Isa, Home Hill, Atherton, Cloncurry, and Cunnamulla.

" 3. £3,817 19s. 3d.

" 4. £53 9s. 10d.

" 5. 6,787 half-bushel cases of apples; 601 half-bushel cases of grapes; 4 half-bushel cases of pears. The exact quantity of vegetables disposed of is not obtainable, but during the Stanthorpe season the bulk of vegetables distributed was grown in the Stanthorpe district."

**Marketing Machinery at Fault.**

"In a world containing millions of undernourished people, and where malnutrition is a prime cause of disease and suffering, Australia would be false to her trust to her own people, and to the world if she listened to talk of over production of foodstuffs and clothing materials. Such talk is utter nonsense," declared Sir David Rivett, chief executive officer of the Commonwealth Council for Scientific and Industrial Research at the Royal Show, Melbourne. Continuing, he said, that Australia should not slacken in the least her efforts to produce more efficiently more foodstuffs and to transport them more effectively. "This," he said "applies especially to all fruit, vegetables, dairy produce and meat." Although it was stated that the world did not want and would not take these things, it both needed and was suffering for the lack of them. Thought should be given to what it would mean to Australia if the European nations, America and Asia, suddenly determined that they would have no more under-nourished people within their borders. If that occurred, there would be no need to talk for generations of reducing our production, and there need be no doubt of Australia's capacity to obtain payment for goods in other countries if we were sane enough to make it easy to effect mutually advantageous exchanges.

"Admittedly, the marketing machinery is at fault," added Sir David. "Weaknesses and friction are apparent that were not observed previously. It is hampered, especially by the stupidly exaggerated nationalism which is leading some nations towards poverty when plenty is at their door, and preventing others from taking payment and buying in return for what they have to sell. As a country naturally adapted for primary production it is Australia's duty to strive its best to fit it for its job with a maximum efficiency born of sound knowledge."

### Potato Growing—Importance of a Stud Seed Plot.

All main-crop potato growers should have a seed plot, and this is particularly necessary in the case of growers of "certified" seed potatoes. It should be remembered that there is no treatment which can make a virus-diseased tuber produce a healthy plant, and therefore normal crop yields can only be obtained by using healthy seed.

Whilst a commendable improvement has taken place in recent years where growers have regularly practised fieldroguing of diseased plants, even better results have been obtained where they have established a special stud plot. On a small area the grower can give more frequent roguing, and thus reduce the risk of current season infection. This risk is always a big one in extensive field areas, which can only be rogued at lengthy intervals.

The use of healthy seed in planting the stud plot is of supreme importance. It is not sufficient to have tubers from high-yielding plants, as some of these tubers may be carrying virus disease. Even a comparatively small proportion of diseased plants in a stud plot constitutes a danger of infection. The planting of a stud plot on the tuber unit method (planting all the sets from a tuber one after the other in the row) allows of the quicker recognition of diseased plants, and is to be preferred to the planting of cut sets in a haphazard manner.—"A. and P. Notes," New South Wales Department of Agriculture.

### Lucerne for Grazing—Early Treatment of the Stand.

The early treatment of a stand of lucerne for grazing calls for careful attention. When the plants have reached a height of 8 or 9 inches, provided weather conditions are suitable, the stand should be fed off. This may be done with either large stock or sheep, but whichever are used the feeding must be rapid and of short duration. As many stock as possible within reason should be put on the paddock, but they should not be allowed to feed it down too close. If sheep are employed, stocking should be at the rate of eight to ten sheep per acre, in order to eat the growth off quickly. The animals should be removed as soon as the feed becomes somewhat short, otherwise they are likely to graze the lucerne too harshly and injure the young crowns of the plants.

After the first grazing the plants should be left until they are in the bud stage—that is, just prior to flowering, and the paddock should then be grazed down again. If there are insufficient stock to cope with the feeding off, the use of the mowing machine to cut the surplus must be resorted to in order to prevent waste.

Hoven or bloat is likely to occur in sheep and cattle at any time if the animals are hungry when first turned on to the paddock, and the trouble is accentuated if the lucerne is wet with rain or dew. Once sheep become accustomed to feeding regularly on lucerne, however, very few deaths occur. A mixed pasture of grasses and lucerne minimises the danger to a considerable extent, as a variety of feed is available.

Having grass paddocks to which the sheep have access adjacent to the lucerne areas will result in a better balance of feed than where only lucerne is available. This practice considerably reduces the danger of hoven, and also results in the life of the lucerne plants being extended, as the stock are not feeding on them continuously. It is the young, succulent growth of lucerne which cause most losses from hoven, and whenever possible the feed should be allowed to become more mature and reach the bud or early flowering stage before it is grazed off.

In most of the grazing districts where lucerne is available, we find, in average seasons, a plentiful growth of barley grass (*Hordeum murinum*) during winter and spring months, and some summer grasses during the remainder of the year. Such growth provides a mixture of pasturage and a well-balanced feed, and tends to reduce danger of hoven.

Four cardinal points must be observed to secure the best results from grazing lucerne:—

1. Paddocks should be subdivided, so that the size of the paddock is in correct relation to the size of the farm flock.
2. Sheep should never be allowed to feed on lucerne when it is raining and afterwards while the soil is wet, or both sheep and lucerne are liable to suffer.
3. Hungry sheep should never be turned on to lucerne, particularly if the growth is sappy.
4. If sheep are grazed for any time on lucerne alone, a dry pick is essential for the best results. Stock occasionally show symptoms of lucerne sickness when kept on it continuously.—"A. and P. Notes," New South Wales, Department Agriculture.

### Repair of Iron Tanks—Two Effective Methods.

There are two methods of repairing a galvanised corrugated iron water tank which shows signs of rusting or corroding—one is to line the inside with wire-netting and to apply over this a coating of cement mortar about an inch in thickness, and the other is to re-line it first as before with wire-netting and then with sheets of corrugated iron, leaving a 2½-inch cavity, which is filled, as the process of lining proceeds, with concrete. By the first method the life of a tank can be considerably lengthened, but the thickness of cement is not sufficient to support the contents once the iron has perished. By the second method, however, one constructs a solid concrete tank, using the iron tank as a mould, and the result is a structure which will remain in commission very many years after the original has powdered to dust.

Generally speaking, the use of tanks of not less than 2,000 gallons is advocated; such tanks, when they begin to show signs of wear, can be converted into concrete tanks as described above, at a cost which will be considerably less than that of the purchase of a new iron tank. Such treatment appreciably reduces the volume of the tank, and tanks of less capacity than 2,000 gallons are scarcely worth converting in this way. Even by the first-mentioned method the cost of renovation makes its economy doubtful if the work has to be paid for at builder's labourer's rates. If the farmer does it for himself, however, or if it is done by a farm or station employee, the cost should be much less than that of the replacement of the tank.

To repair a tank by this method first brush all rust from the inside surface and tie around it on the inside wire-netting, preferably of 2-inch mesh, passing the tying wire through small holes in the tank and twitching it up tight. Then plaster the sides through the netting with cement mortar made up of three parts clean sand and one part cement. Continue until the netting is covered, leaving a scratched or roughened surface to form a key for the next coat. In the same way put on the bottom of the tank a 1-inch thickness of the cement mortar.

When this is sufficiently set, a ¾-inch coat of a stronger mortar (equal parts sand and cement) should be trowelled on and finished to a smooth face. Finally, a coat of wash, made of 1 lb. washing soda to 4 gallons of water, should be applied. Holes punched from the outside of the tank with a 4-inch nail are a help to the keying of the cement, and a convenience for the tie wires. The outside of the tank should be painted when the repairs are finished.

To repair a tank by the other process mentioned, remove the top by cutting close round the wall and reserve the top for the new tank. Fix wire-netting, preferably 2-inch mesh, to the wall of the tank, and secure this in position by tie wire passed through holes specially punched in the tank for the purpose.

On the bottom of the tank lay a concrete floor 1-inch thick; on top of this set wire-netting as for the walls, and then place another 1 inch of concrete, making a total thickness of 2 inches. While this concrete is still wet, take three sheets of new corrugated iron, previously curved to a diameter 5 inches less than the old tank, and secured at the laps with galvanised roof bolts set with the heads inside. Set this in position inside the tank, thus leaving a 2½-inch cavity all round. Now fill concrete in to the cavity in small quantities, and carefully tramp solid; the "water-tightness" of the tank is dependent on the thoroughness of this tamping. Having concreted the cavity to the top of the first ring, take three more sheets, fix in position, and concrete as before, and do likewise with a third set.

To enclose the tank take the top that was removed from the old tank, set it in position, and turn down the projecting edge into the wet concrete to secure the top against wind pressure. When all the cement liquid that has run through the holes in the old tank has dried, scrape reasonably clean and apply one coat of oil paint.

The materials required to line a 2,000-gallon tank will be: Nine 9 feet sheets of 26 gauge corrugated iron curved to 7 feet 10 inches diameter, 3 dozen ¾-inch galvanised roof bolts, 10 yards of 72 x 2 in. x 18 gauge netting, 1 cubic yard of coarse sand, and ten bags of cement. Total cost in Brisbane £6. The concrete should be gauged one part cement to three parts sand.

It must be remembered that both these treatments, and, especially the latter, add considerably to the weight of the tank, and if necessary to make sure that the stand or supports strong enough for the purpose.

**Live Stock in Queensland.**

**T**HE Registrar-General (Mr. Geo. Porter) has made available the following information concerning the number of live stock in the various pastoral districts, and in the State on 1st January, 1935, as disclosed by stock returns for that date, lodged in accordance with "The Stock Returns Act."

N.P.—For comparative purposes, the stock figures for the previous year are shown in parentheses.

Burke.—Horses, 30,548 (31,421); cattle, 568,008 (589,181); sheep, 2,595,492 (2,676,981); pigs, 1,263 (615).

Burnett.—Horses, 36,305 (34,984); cattle, 581,404 (556,088); sheep, 4,398 (4,161); pigs, 57,835 (42,792).

Cook.—Horses, 32,524 (33,640); cattle, 497,111 (499,581); sheep, 302 (538); pigs, 8,472 (7,695).

Darling Downs.—Horses, 62,017 (61,959); cattle, 608,313 (552,706); sheep, 2,619,978 (2,543,077); pigs, 61,391 (51,331).

Gregory, North.—Horses, 10,342 (10,562); cattle, 183,521 (153,281); sheep, 1,672,909 (1,626,633); pigs, 311 (110).

Gregory, South.—Horses, 6,070 (6,139); cattle, 112,585 (107,641); sheep, 484,814 (432,215); pigs, 5 (13).

Leichhardt.—Horses, 38,562 (38,354); cattle, 742,965 (694,426); sheep, 1,077,362 (966,409); pigs, 1,609 (1,481).

Maranoa.—Horses, 20,703 (20,337); cattle, 187,422 (179,551); sheep, 3,818,971 (3,357,087); pigs, 995 (1,057).

Mitchell.—Horses, 22,137 (22,250); cattle, 76,258 (80,637); sheep, 5,611,084 (5,124,159); pigs, 422 (579).

Moreton.—Horses, 55,013 (54,956); cattle, 605,864 (590,867); sheep, 7,829 (8,372); pigs, 99,879 (81,187).

North Kennedy.—Horses, 45,208 (46,510); cattle, 502,024 (472,667); sheep, 5,586 (4,684); pigs, 4,522 (4,273).

Port Curtis.—Horses, 26,743 (26,641); cattle, 517,459 (486,273); sheep, 25,409 (27,472); pigs, 7,281 (5,907).

South Kennedy.—Horses, 23,126 (22,707); cattle, 378,663 (349,810); sheep, 257,246 (218,664); pigs, 1,410 (1,176).

Warrego.—Horses, 13,334 (13,617); cattle, 123,381 (114,813); sheep, 3,388,753 (3,077,736); pigs, 393 (435).

Wide Bay.—Horses, 25,972 (25,938); cattle, 367,663 (353,648); sheep, 4,049 (4,616); pigs, 24,085 (18,797).

	Horses.	Cattle.	Sheep.	Pigs.
Total stock on 1st January, 1935 ..	448,604	6,052,641	21,574,182	269,873
Total stock on 1st January, 1934 ..	450,024	5,781,170	20,072,804	217,448
Increase .. .. .	—	271,471	1,501,378	52,425
Per cent. .. .. .	—	4.70	7.48	24.11
Decreased .. .. .	1,420	—	—	—
Per cent. .. .. .	0.32	—	—	—

**Six Maxims—**

1. Teach me to be obedient to the rules of the game.
2. Teach me to distinguish between sentiment and sentimentality, admiring the one and despising the other.
3. Teach me neither to proffer nor to receive cheap praise.
4. If I am called upon to suffer, let me be like a well-bred beast that goes away to suffer in silence.
5. Teach me to win, if I may. If I may not win, then above all teach me to be a good loser.
6. Teach me neither to cry for the moon nor over spilt milk.

These maxims have been hung on the wall of the King's library and business room in Buckingham Palace.—Sir CHARLES FERGUSSON, ex-Governor-General of New Zealand.



PLATE 245.  
Railway Station, Kuranda, North Queensland.

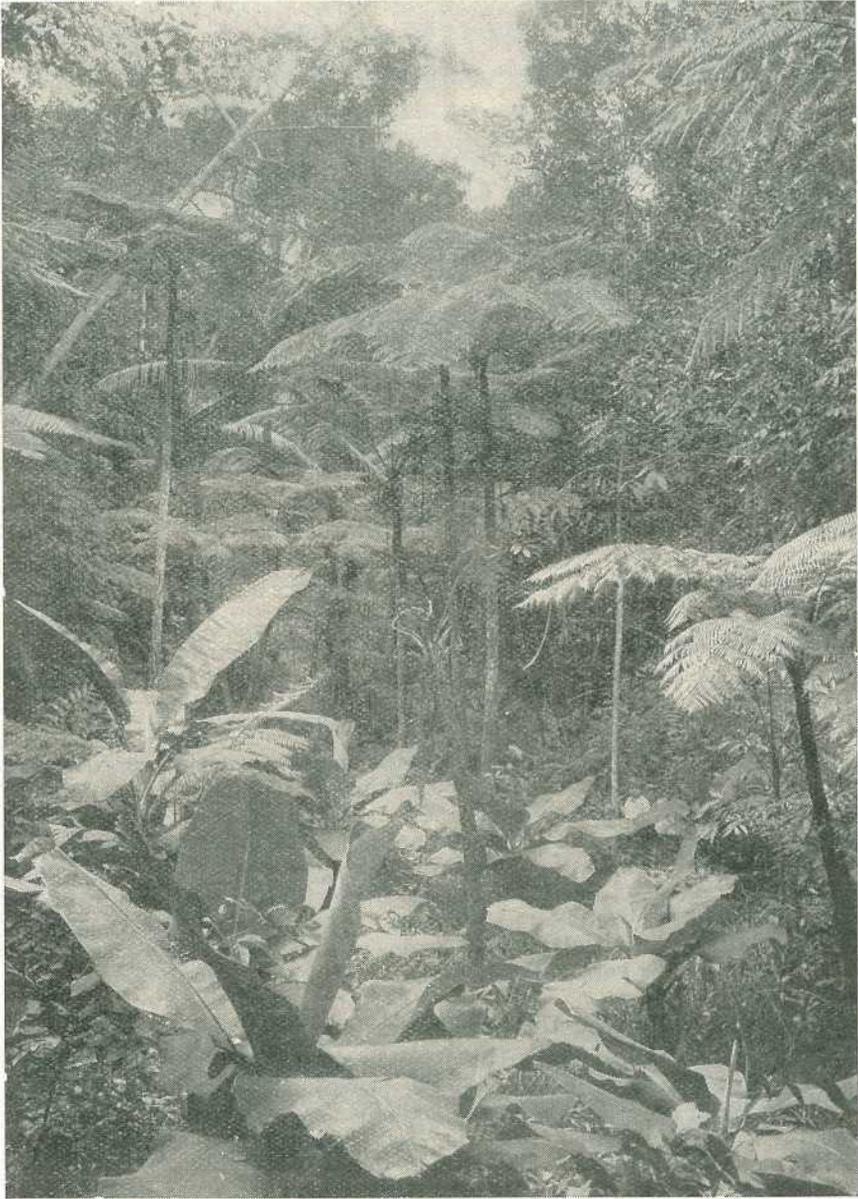
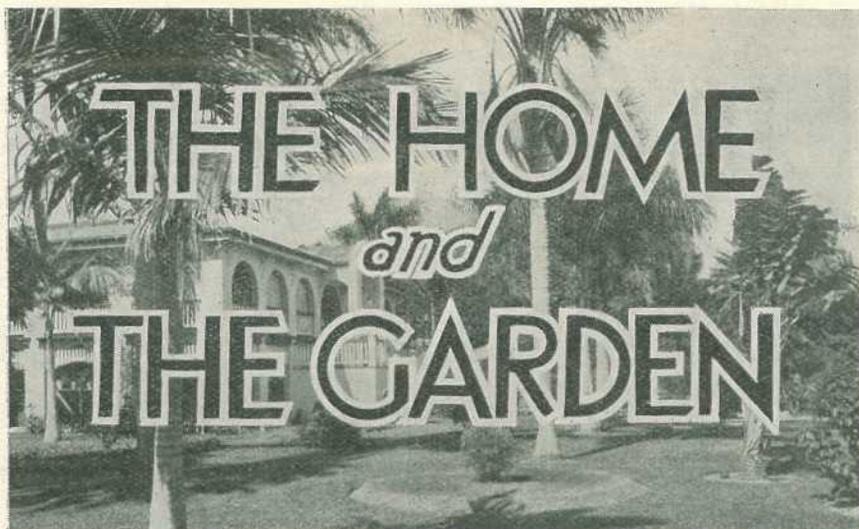


PLATE 246.

In the Jungle, near Kuranda, North Queensland.



## OUR BABIES.

*Under this heading a series of short articles by the Medical and Nursing Staffs of the Queensland Baby Clinics, dealing with the care and general welfare of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable deaths.*

### THE NURSING MOTHER.

To avoid becoming a weary nursing mother one must begin early. So many women in apparently good health are living on a diet that will not suffice to carry them through their period of pregnancy and nursing with a healthy body and a cheerful mind. Probably their faulty diet has become so habitual, that they are quite unconscious that any change is needed. As soon as the expectant mother has become aware of her condition, she is strongly recommended either to discuss this question of diet with her medical adviser, or to get into touch with the nearest Baby Clinic either personally or, if this is impossible, by letter.

### The Diet Should Include Milk.

The advice she will get will depend somewhat on personal or local conditions, but it is not difficult to give her an outline of what she needs. The first thing she will be advised to take is good fresh cow's milk, which should be either scalded or pasteurised. In Western districts goat's milk is as good or better. It is very seldom that whole dried milk (not dried separated milk) must be substituted. Those who do not like the taste of milk may flavour it with cocoa or in some way which they prefer, or they may take it as junket, and part may be taken as custard or in a milky pudding. These may be mixed with sliced or shredded fresh fruit or stewed fruit or, failing these, with canned fruits. The quantity of milk should be one pint daily. Butter and eggs are good foods, but will not supply the place of milk. Cheese is a wholesome food. Meat should not be taken more than once a day.

### Vegetables and Fruit.

Of vegetable foods what are called "greens" are the most valuable. The best is well-washed lettuce, especially if home grown. When this is not available, finely cut leaves of uncooked silver beet are a good substitute. Cooked greens such as spinach, silver beet, French beans, and cabbage take a second place, but should not be omitted. They are often so badly cooked that the best part of them is poured down the kitchen sink. The nurse will explain to you the right way to cook them.

Of the root vegetables the best is the potato, which should replace bread at the principal meal of the day. Sweet potatoes, carrots, turnips, parsnips, and Swede turnips are also valuable, if properly cooked.

Fruit should always be taken and is best uncooked. Tomatoes are the most valuable, after them oranges and pineapples, but all fruits are good in reasonable quantity. Should neither fruit nor vegetables be procurable in drought-stricken areas, eat canned tomatoes, and peas and beans that have sprouted one-half or one inch long.

### The Deficiencies of White Bread.

Brown bread is better, but is not perfect. The wholemeal bread, which sustained the health of our grandmothers, is no longer procurable, and no perfect substitute for it has yet been put on the market. The best substitute available is coarse wheatmeal, which can be made into porridge and taken with a little sugar and plenty of milk. Some prefer a mixture of four parts of this with one part of oatmeal. It is best to avoid all fancy breakfast foods. Unless large quantities of this wheatmeal are taken, a heaped dessertspoonful of bemax or vita B should be taken daily, or two heaped tablespoons of cooking bran. These can be simply moistened with milk or water, or added to porridge or soup. They can also be added to milk puddings or boiled rice or made into scones.

On this diet there should be no difficulty with the bowels. If, however, the mother has contracted the harmful habit of taking opening medicines of any sort, she will need special advice, as constipation is very harmful.

The nursing mother will need besides all this to drink plenty of water, and to take a double quantity of bemax, vita B, or cooking bran.

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### IN THE FARM KITCHEN. SOME QUICK LUNCH RECIPES.

#### Quick Tomato Soup.

Take  $\frac{1}{2}$  lb. onions,  $\frac{1}{2}$  lb. tomatoes, salt, pepper, pinch of sugar, grated cheese (if liked), dripping,  $1\frac{1}{2}$  pints boiling water. Cut up the onions and fry in fat for a few minutes. Plunge the tomatoes into boiling water, and after a moment remove them and peel. Slice, add to the onions, and cook for a little while. Then add boiling water and seasoning, simmer until everything is tender, put through a sieve, and serve very hot. Serve plain or with dry grated cheese.

#### Pot au Feu.

Take  $\frac{1}{2}$  lb. chuck steak, 1 onion, 2 cloves, 1 turnip, celery stalk, 1 carrot, parsley, seasoning,  $1\frac{1}{2}$  pints water. Put the beef into the cold water with a little salt and bring slowly to the boil. Skin well, add the sliced vegetables, parsley, and pepper, and simmer slowly for about one and a-half hours. Strain, use the soup for one course, and serve the beef hot with the accompanying vegetables, or cold with a salad.

**Baked Fish Pudding.**

Take  $\frac{1}{2}$  lb. smoked fish,  $\frac{1}{2}$  lb. potatoes, 1 oz. butter, breadcrumbs, pepper, and salt. Place the fish in a pan with cold water, bring to the boil, and let simmer for five to ten minutes. Boil and mash the potatoes. Remove bones and skin from the fish, flake into small pieces, and mix with the potatoes, butter, salt, and pepper. Grease a small mould or basin, line with a few browned breadcrumbs, and add the mixture. Bake for twenty minutes, turn out and serve hot with parsley sauce.

**Fish en Casserole.**

Take  $\frac{1}{2}$  lb. flathead fillet,  $\frac{1}{2}$  oz. butter, a little milk, salt, and pepper. Butter a small casserole dish and lay in the fillet or small pieces of fish, sprinkling each piece with salt and pepper to taste. Cover bottom of dish with milk, add butter, and cook in a moderate oven for about half-hour. Tomatoes, onions, or mushrooms may be added according to taste.

**Minute Steak.**

Take  $\frac{1}{2}$  lb. rump steak, some salad oil, seasoning, 1 oz. butter, chopped parsley. Cut steak into slices about  $\frac{1}{4}$ -inch thick, place on a board, and beat with a rolling-pin. Sprinkle with salt and pepper, brush over with salad oil, and grill. Serve at once with a nut of green butter on each slice, made by mixing some finely-chopped parsley into the butter, with salt and pepper to taste.

**Braised Chop.**

Take 1 chop, 1 carrot, 1 onion, 1 turnip,  $\frac{1}{2}$  teacupful stock or gravy, salt, pepper, a small piece of butter. Wash and peel the vegetables and cut into dice. Put a small piece of butter in a casserole, add vegetables, and toss for a few minutes. Place the chop on top, season well with salt and pepper, put on a close-fitting lid, and braise in the oven slowly until tender (about forty-five minutes). Add the stock or left-over gravy and serve at once in casserole.

**Lemon Cream Meringue.**

Take 4 tablespoonfuls caster sugar, 1 whole egg, 1 extra white, 1 tablespoonful cornflour, 1 lemon, 1 tablespoonful butter,  $\frac{3}{4}$ -pint boiling water. Mix cornflour and half the sugar well together in a basin. In another basin whisk the egg and add grated rind and juice of lemon. Pour the boiling water on cornflour and sugar and stir very briskly, making a smooth liquid. Put into a pan and cook for a few minutes until transparent. Add butter, allow to cool a little, then stir in egg and lemon juice. Stand pan in another pan with a little boiling water at the bottom and cook for about five minutes. Butter a pie-dish, pour in the lemon cream, and cover with meringue made by mixing remainder of sugar with stiffly-beaten egg-white. Bake in a slow oven until a pale brown.

**Stewed Victoria Pudding.**

Take 4 oz. self-raising flour, 2 oz. suet, pinch of salt,  $\frac{1}{2}$  teacupful water, glace cherries, 1 tablespoonful apricot jam,  $\frac{1}{2}$  cooking apple, sugar, if liked. Mix flour and chopped suet together with a pinch of salt, grate apple, cut up cherries, and add to mixture with jam. Mix with water into a paste, put into a greased basin, and steam for one hour.

**Banana Mould.**

Take  $\frac{1}{2}$  packet pineapple jelly crystals, 2 large bananas,  $\frac{1}{2}$  gill cream. Dissolve crystals in gill hot water. When nearly cold, but before it has begun to set, stir in cream gradually. Peel bananas, mash with a fork, and beat until quite smooth and light. Stir this lightly and thoroughly into the jelly and cream, pour into a glass dish, and stand in a cool place to set. If the mixing is done before the jelly is sufficiently cool, the jelly, banana, and cream will separate into layers.

**Rice Bavaroise.**

Take  $\frac{1}{4}$  cup rice, 1 egg-white, 2 cups milk,  $\frac{3}{4}$  cup sugar, 1 dessertspoonful gelatine, 2 tablespoonfuls cold water, a few drops of vanilla essence. Wash rice and cook with salt, sugar, and milk until soft and thick, stirring frequently. Soak gelatine in cold water and stir into rice mixture. When nearly set fold in stiffly-beaten egg-white, add vanilla essence, and set in a small mould. Serve with sieved fruit.

**Fried Bacon and Banana.**

Take 1 banana, 2 thin slices bacon, toast. Peel the banana, and cut into slices. Take some thinly-sliced bacon and fry in a pan until crisp. Put to one side and fry the slices of bananas in the bacon fat. Serve very hot on pieces of crisp dry toast.

**Kedgeree.**

Take 4 oz. cooked fish, 2 oz. rice, 1 hard-boiled egg, 1 oz. butter, salt, pepper. (The remains of any steamed or boiled fish may be used for this dish.) Cook rice in fast-boiling water for 20 minutes, then drain. Flake fish into small pieces, put butter in a small saucepan, and, when melted, add rice, fish, chopped egg-white, salt, and pepper. Stir until quite hot, and serve garnished with sieved egg-yolk.

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**FOR THE VEGETARIAN MENU.**
**Cheese and Lentil Rolls.**

Take  $\frac{1}{2}$  lb. rough puff pastry, 1 cupful lentils, 2 tomatoes, 2 oz. cheese, 1 cupful breadcrumbs, 1 oz. butter, salt, pepper, mustard, beaten egg.

Wash the lentils, then tie them loosely in a cloth. Cook for an hour in boiling salted water, then rub through a wire sieve. Add the butter, the skinned and sliced tomatoes, and grated cheese, and enough breadcrumbs to thicken. Roll the pastry into a thin strip, cut it into squares, brush it with beaten egg, and place on the centre of each square a roll of the lentil mixture. Fold the pastry over, trim the edges, brush with beaten egg, and bake for twenty minutes.

**Macaroni and Tomatoes.**

Take 4 oz. macaroni, 3 tomatoes, 1 oz. butter, 2 tablespoonfuls flour, salt, pepper.

Break the macaroni into short lengths and put into rapidly-boiling water and cook for twenty minutes. Prepare some tomato puree by boiling the tomatoes and rubbing them through a sieve. Then melt the butter in a pan, add the flour, and pour in the puree. Add salt and pepper to taste. Allow to boil for a few minutes, then add the well-drained macaroni. When the whole mixture is thoroughly hot, turn into a dish and serve.

**Macaroni Cheese.**

Take 4 oz. macaroni 5 oz. grated cheese,  $\frac{1}{2}$  pint white sauce, salt, cayenne pepper, a few dabs of butter.

Break the macaroni into fairly small pieces, put them into boiling salted water, and boil for about twenty minutes, then drain. Cover the bottom of a well-greased fireproof dish with white sauce, sprinkle with cheese, and add a layer of macaroni. Season with cayenne pepper. Continue adding macaroni, covering each layer with sauce and sprinkling of cheese. Cover the last layer of macaroni thickly with sauce and a good sprinkling of cheese. Place a few dabs of butter on top and bake in a quick oven until the cheese is nicely browned. Serve in the dish in which it is cooked.

**Savoury Carrot Pudding.**

Take 1 lb. carrots, half their bulk in breadcrumbs, 2 oz. butter, 1 egg, pepper, salt, Hollandaise sauce.

Scrub the carrots and scrape them, put them into boiling water and cook until soft. Rub them through a sieve. Add the breadcrumbs and butter, with seasoning to taste, and sufficient beaten egg to bind well together. Butter a basin, put in the mixture, and steam for three-quarters of an hour. Turn out the pudding and serve hot with the sauce poured round.

**Nut Rissoles.**

Take  $\frac{1}{2}$  lb. shelled nuts,  $\frac{1}{2}$  lb. cooked potato, mixed herbs, cayenne pepper, salt, a little milk, flour, butter.

Pound the nuts well. Take a sufficient quantity of cooked potato to bind the mixture. Add the chopped herbs and season with cayenne pepper and salt to taste. Form into small rissoles, brush over with a little milk, and dredge with flour. Fry in butter. Serve hot on a bed of spinach, or cold with lettuce salad.

**Nut Roast.**

Take 1 cupful brown breadcrumbs, 1 cupful shelled Barcelona nuts, 2 eggs, 1 oz. butter, 2 tomatoes, 1 cupful white breadcrumbs, 1 onion, salt and pepper to taste.

Melt the butter, and add the chopped onion and the skinned and sliced tomatoes, and fry. Add the breadcrumbs and nuts, finely chopped. Moisten with the beaten eggs. Season with salt and pepper. Press the mixture into a greased pie-dish and bake half an hour. Turn out and serve with apple sauce.

**Vegetable Charlotte.**

Take 3 large carrots, 6 large potatoes, 3 eggs,  $\frac{1}{4}$  cupful flour, 1 teaspoonful castor sugar, 2 teaspoonfuls salt.

Peel and grate the potatoes. Stir in the salt, pepper, and slightly-beaten eggs. Grate and part-boil the carrots in water and cover with the sugar when they are nearly tender. Drain off the water and stir in the potato mixture, flour, and seasoning to taste. Turn into a well-buttered fireproof dish and bake very slowly till a golden brown. For a more elaborate dish this mixture can be baked in a border mould, and the centre can be filled, when turned out, with buttered peas or fried mushrooms.

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**HOW TO MAKE SOAP.**
*Materials.*

6 lb. clean dripping; 2 gallons water; 1 lb. caustic soda;  $\frac{1}{2}$  lb. resin; 3 table-spoons borax or kerosene.

*Method.*

1. Put dripping, resin, and water into a boiler or kerosene tin.
  2. Boil until all fat is melted—15 to 30 minutes.
  3. Add borax or kerosene; remove from fire.
  4. Add caustic soda direct from the tin gradually, allowing bubbles to subside between each addition.
  5. Boil gently for one or two hours.
  6. Pour into a box lined with a damp cloth.
  7. When solid, cut into bars and store in a dry place until hardened.
- 

**RAILING PIGS—HOW TO REDUCE FREIGHTS.**

One of the problems to be faced by bacon factories and meatworks, especially those operating on a small scale, is the cost of transit per rail of pork and bacon pigs. Rail freights, while not excessive, are not based on the actual cost per pig, but on the cost per wagon, whether the space occupied is classed as a quarter deck, half-deck, single deck, or full truck.

This matter was ventilated in North Queensland recently, when the North Queensland Co-operative Bacon Association, of Mareeba, drew attention to the increased freight rates charged on pig wagons dispatched from country sidings. Pig growers, they point out, should load the bottom deck of pig wagons to maximum capacity before placing any pigs on the top deck, for if both decks are used full truck rates will be charged, whereas if only one deck is occupied, and space for such is ordered, only half truck rates will apply.

The association instanced a case where the factory ordered one tier or deck of a pig wagon, and provision was made for loading up to twenty-five bacon pigs at a freight charge for a half-wagon, which, for the distance covered, totalled £1 4s. Eighteen pigs were loaded by the farmers, some being placed on the top-deck, and some on the bottom deck. This resulted in the factory being charged full truck rates of £2 8s., whereas the number of pigs dispatched was less than that required for one deck only. It is in matters like this that farmers and trucking agents can do much to assist in reducing manufacturing costs.—E. J. SHELTON, Senior Instructor in Pig Raising.

Special Notes for December  
THE COASTAL DISTRICTS.

The present number of the Queensland Agricultural Journal contains a special feature, a list of the plants and animals which are found in the coastal districts of Queensland. This list is compiled from the records of the Queensland Museum and the Queensland Department of Agriculture and Stock.

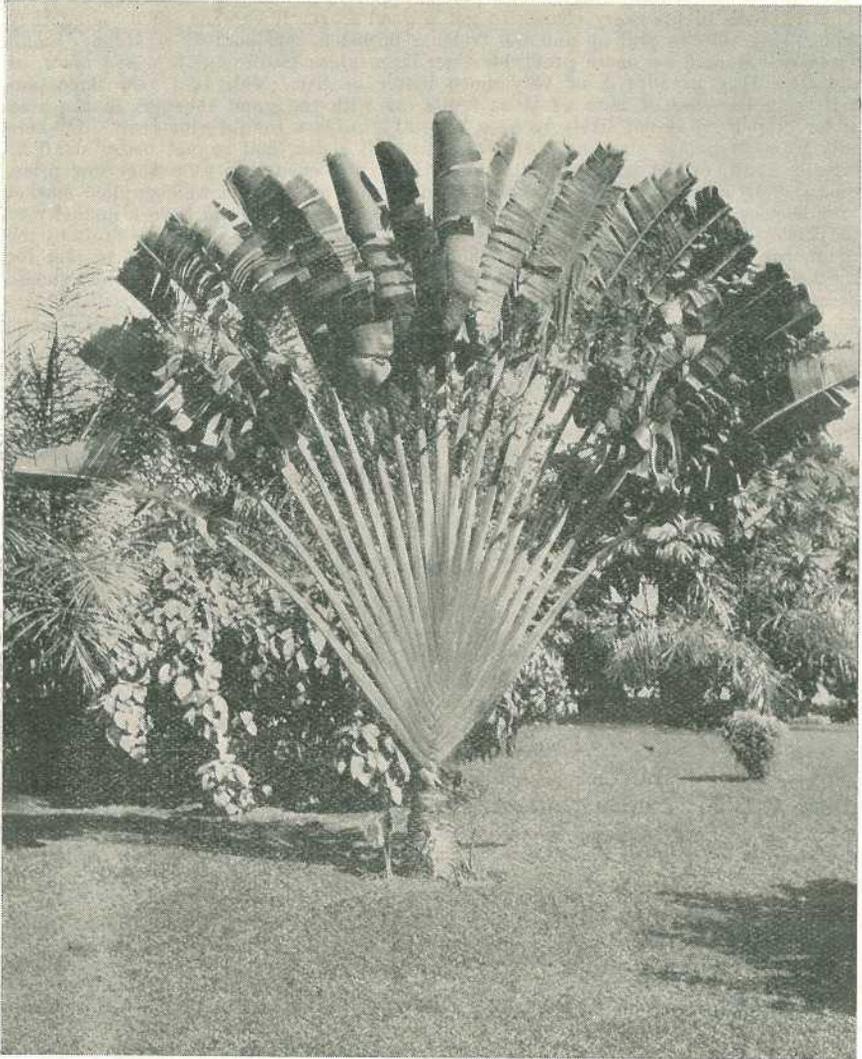


PLATE 247.

THE TRAVELLER'S PALM.—A Corner of a Northern Garden.

## Orchard Notes for December.

### THE COASTAL DISTRICTS.

**T**HE planting of pineapples and bananas may be continued, taking care that the ground is properly prepared and suckers carefully selected, as advised previously in these Notes. Keep the plantations well worked and free from weeds of all kinds, especially if the season is dry. New plantations require constant attention, in order to give young plants every chance to get a good start; if checked when young they take a long time to pull up and the fruiting period is considerably retarded. Small areas well worked are more profitable than large areas indifferently looked after, as the fruit they produce is of very much better quality. This is a very important matter in the case of both of these fruits, as with the great increase in the area under crop there is not likely to be a profitable market for inferior fruit. Canners only want first-class pines of a size that will fill a can, and cannot utilize small or inferior fruit, except in very limited quantities, and even then at a very low price. Small, badly filled bananas are always hard to quit, and with a well-supplied market they become unsaleable. Pineapple growers, especially those who have a quantity of the Ripley Queen variety, are warned that the sending of very immature fruit to the Southern markets is most unwise, as there is no surer way of spoiling the market for the main crop. Immature pineapples are not fit for human consumption, and should be condemned by the health authorities of the States to which they are sent.

Citrus orchards require constant attention; the land must be kept well worked and all weed growth destroyed. Spraying for scale insects should be carried out where necessary. Spraying with fungicides should have already been carried out where necessary, and except in the case of a heavy infestation with black spot or brown spot of the Emperor mandarin, no further applications of copper sprays should be required. A close lookout must be kept, for the first indications of "maori," and as soon as it is discovered the trees should either be dusted with sulphur or sprayed with lime sulphur. Borer should be looked for and destroyed wherever seen.

Early grapes will be ready for cutting. Handle carefully, and get them on to the market in the best possible condition. A bunch with the bloom on and every berry perfect will always look and sell well, even on a full market, when crushed and ill-packed lines are hard to quit.

Peaches, plums, papaws, and lemons will be in season during the month. See that they are properly handled. Look out for fruit fly in all early ripening stone fruit, and see that none is left to lie under the trees to rot and thus breed a big crop of flies to destroy the mango crop when it ripens.

Look out for Irish blight in potatoes and tomatoes, and downy and powdery mildew on melons and kindred plants. Use Bordeaux or Burgundy mixture for Irish blight and downy mildew and sulphur dust or lime sulphur spray for powdery mildew.

### THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

**E**ARLY ripening apples, plums, apricots, peaches, and nectarines will be ready for marketing during the month. They are unsatisfactory lines to handle, as the old saw, "Early ripe, early rotten," applies to all of them; in fact, the season of any particular variety is so short that it must be marketed and consumed as quickly as possible. All early ripening deciduous fruits are poor carriers and bad keepers, as their flesh is soft and watery, deficient in firmness and sugar, and cannot, therefore, be sent to any distant market. The available markets are quickly over-supplied with this class of fruit, and a glut takes place in consequence. Merchants frequently make the serious mistake of trying to hold such fruits, in the hope of the market improving, with the result that, instead of improving, the market frequently becomes more and more congested, and held-over lines have to be sent to the tip. There is only one way to deal with this class of fruit, and that is to clear the markets daily, no matter what the price, and get it distributed and into consumption as rapidly as possible by means of barrowmen and hawkers. Most early ripening fruits are useless for preserving in any way, their only value being what they will bring for consumption whilst fresh. This being so, it is only a waste of time and money to forward immature, undersized, and inferior fruit to market, as it is not wanted, and there is no sale for it. It should never have been grown, as it is frequently only an expense to the producer, besides which, unless the fallen or over-ripe fruit is regularly and systematically gathered and destroyed in the orchard, it becomes a breeding ground for fruit fly and codlin moth, as well as of fungi, such as those producing the brown and ripe rots. Early ripening fruits should, therefore, be carefully graded for size and quality, handled and packed with great care, and nothing but choice fruit sent

to market. If this is done, a good price will be secured, but if the whole crop—good, bad, and indifferent—is rushed on to the local markets, a serious congestion is bound to take place and large quantities will go to waste.

Orchards and vineyards must be kept in a state of perfect tilth, especially if the weather is dry, so as to retain the moisture necessary for the development of the later ripening fruits. Where citrus fruits are grown, an irrigation should be given during the month if water is available for this purpose, excepting, of course, there is a good fall of rain sufficient to provide an ample supply of moisture.

Codlin moth and fruit fly must receive constant attention and be kept under control, otherwise the later-ripening fruits are likely to suffer severely from the depredations of these serious pests.

Grape vines must be carefully attended to and sprayed where necessary for black spot of downy mildew or sulphured for oidium.

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## Farm Notes for December.

**A**LTHOUGH November is regarded generally as the best period for planting the main maize crop, on account of the tasseling period harmonising later on with the summer rains, December planting may be carried out in districts where early frosts are not prevalent, provided a known quick maturing variety of maize is sown.

To ensure a supply of late autumn and winter feed, dairymen are advised to make successive sowings of maize and sorghums, to be ultimately used either as green feed or in the form of ensilage. The necessity for such provision cannot be too strongly urged. Farmers who have not had any experience in building an ensilage stack can rest assured that, if they produce a crop for this purpose, information and instruction on the matter will be given on application to the Under Secretary for Agriculture and Stock; also that, whenever possible, the services of an instructor will be made available for carrying out a demonstration in ensilage-making for the benefit of the farmer concerned and his immediate neighbours.

In districts and localities where supplies of lucerne are not available, sowings of cowpeas should be made, particularly by dairymen, as the lack of protein-yielding foods for milch cows is a common cause of diminished milk supplies and of unthriftiness of animals in dairy herds. Cowpeas and lucerne can be depended upon to supply the deficiency. The former crop is hardy and drought-resisting. When plants are to be used as a fodder, it is customary to commence to feed them to stock when the pods have formed. Animals are not fond of cowpeas in a fresh, green state; consequently the plants should be cut a day or two before use. Economy is effected by chaffing beforehand, but the plants can also be fed whole. Chaffed in the manner indicated, and fed in conjunction with green maize, or sorghum, when in head, in the proportion of one-third of the former to two-thirds of the latter, a well-balanced ration is obtainable. Animals with access to grass land will consume from 40 to 50 lb. per head per day; a good increase in the milk flow is promoted by this succulent diet. The plant has other excellent attributes as a soil renovator. Pig-raisers will find it invaluable also.

A great variety of quick-growing catch crops, suitable for green fodder and ensilage purposes, may also be sown this month, notably Sudan grass, white panicum, giant panicum (liberty millet), Japanese millet, red and white French millet. Well prepared land, however, is required for crops of this description, which make their growth within a very limited period of time. French millet is particularly valuable as a birdseed crop, the white variety being more in favour for this purpose.

Successive sowings may be made of pumpkins, melons, and plants of this description.

In districts where onions are grown, these will now be ready for harvesting. If attention is given, in the case of garden plots, to bending over the tops of the onions, maturity of the crop is hastened. Evidence will be shown of the natural ripening-off process, and steps should be taken to lift the bulbs and to place them in windrows until the tops are dry enough to twist off. If a ready market is not available, and it is decided to hold over the onions for a time, special care should be taken in handling. Storage in racks in a cool barn is necessary; otherwise considerable deterioration is to be expected. Improved prices are to be looked for in marketing by grading and classifying produce of this description.

Cotton areas which were subjected to a thorough initial preparation, thereby conserving a sufficiency of moisture for the young plants, should now be making good headway and sending their taproots well down. Keep down all weed growth by scarifying as long as the growth will admit of horse work.

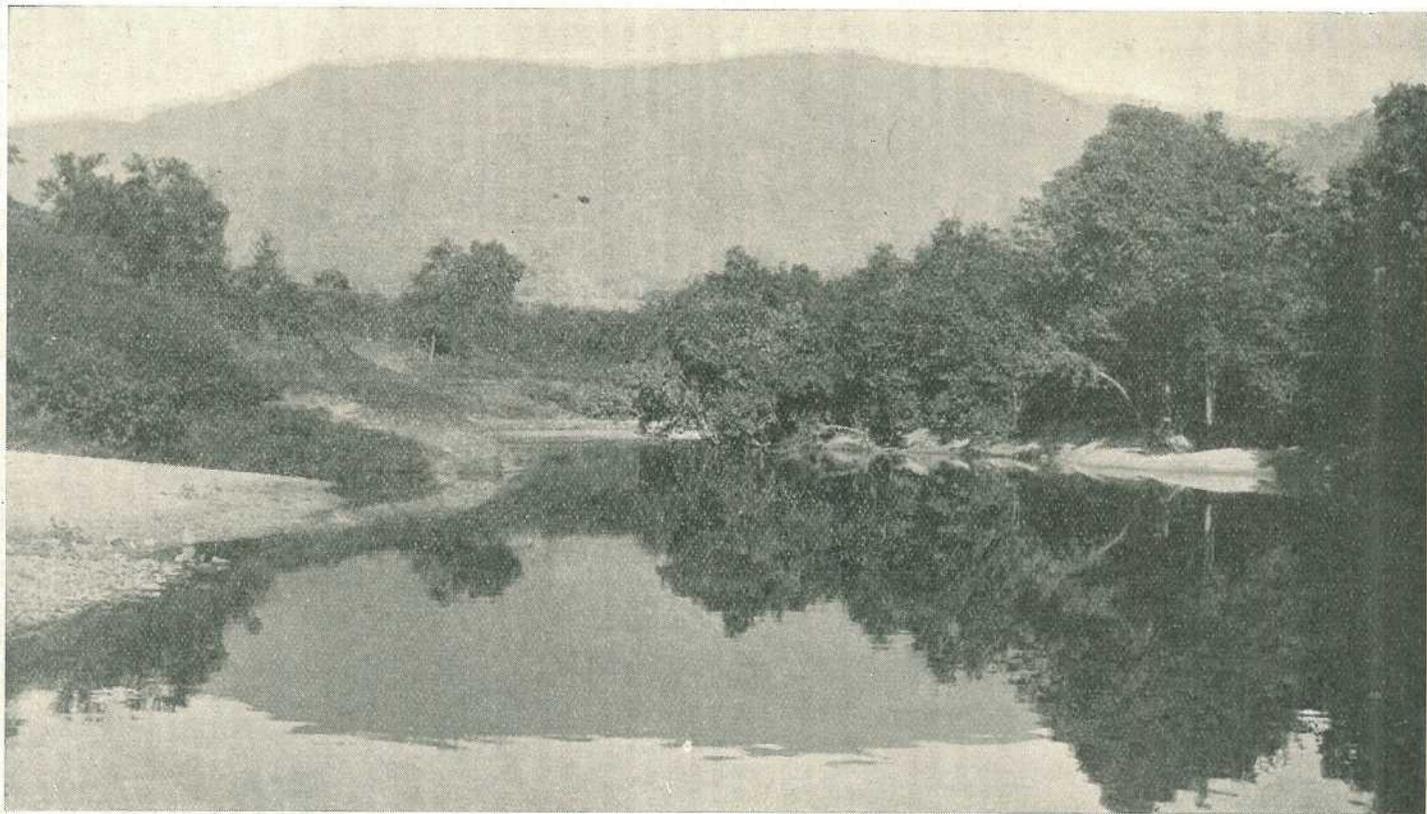


PLATE 248.

The Little Mulgrave River, near Gordonvale, North Queensland,

**RAINFALL IN THE AGRICULTURAL DISTRICTS.**

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF SEPTEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1935, AND 1934, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Sept.	No. of Years' Records.	Sept., 1935.	Sept., 1934.		Sept.	No. of Years' Records.	Sept., 1935.	Sept., 1934.
<i>North Coast.</i>	In.		In.	In.	<i>Central Highlands.</i>	In.		In.	In.
Atherton .. ..	0.71	34	..	2.33	Clermont .. ..	1.04	64	0.61	0.18
Cairns .. ..	1.47	53	0.08	2.23	Gindie .. ..	1.10	36	..	0.06
Cardwell .. ..	1.54	63	0.28	1.92	Springsure .. ..	1.30	66	3.00	0.36
Cooktown .. ..	0.58	59	..	0.62					
Herberton .. ..	0.56	49	0.03	2.46					
Ingham .. ..	1.58	43	0.15	1.61					
Innisfail .. ..	3.53	54	0.20	5.48					
Mossman Mill ..	1.57	22	0.02	1.67					
Townsville .. ..	0.80	64	0.03	0.18					
<i>Central Coast.</i>					<i>Darling Downs.</i>				
Ayr .. ..	1.39	48	0.17	0.15	Dalby .. ..	1.68	65	3.06	0.80
Bowen .. ..	0.82	64	0.68	0.67	Emu Vale .. ..	1.76	39	2.80	1.67
Charters Towers	0.83	53	0.47	0.02	Hermitage .. ..	1.55	29	..	1.71
Mackay .. ..	1.56	64	2.70	0.98	Jimbour .. ..	1.48	47	2.40	0.69
Proserpine .. ..	2.14	32	0.79	1.18	Miles .. ..	1.34	50	2.97	0.52
St. Lawrence ..	1.20	64	1.00	0.92	Stanthorpe .. ..	2.29	62	4.16	2.93
					Toowoomba .. ..	2.13	63	3.36	0.91
					Warwick .. ..	1.82	70	3.19	1.16
<i>South Coast.</i>									
Biggenden .. ..	1.54	36	3.38	0.95					
Bundaberg .. ..	1.59	52	2.49	0.74	<i>Maranoa.</i>				
Brisbane .. ..	2.02	84	3.49	6.33	Roma .. ..	1.42	61	2.84	0.12
Caboolture .. ..	1.86	48	3.07	0.37					
Childers .. ..	1.83	40	2.93	0.71					
Crohamhurst ..	2.70	42	3.81	1.04					
Esk .. ..	2.11	48	4.18	0.94					
Gayndah .. ..	1.59	64	2.01	2.06					
Gympie .. ..	2.12	65	4.10	0.42	<i>State Farms, &amp;c.</i>				
Kilkivan .. ..	1.71	56	2.64	1.03	Bungewongorai ..	0.97	21	..	0.11
Maryborough ..	1.96	64	3.33	1.16	Gatton College ..	1.55	36	2.99	0.77
Nambour .. ..	2.54	39	4.08	0.96	Kairi .. ..	0.68	21	..	1.68
Nauango .. ..	1.84	53	2.64	0.80	Mackay Sugar Ex-				
Rockhampton ..	1.83	64	1.42	0.30	periment Station	1.48	38	3.94	1.06
Woodford .. ..	2.20	48	2.88	0.55					

A. S. RICHARDS, Divisional Meteorologist.

**CLIMATOLOGICAL TABLE—SEPTEMBER, 1935.**

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	SHADE TEMPERATURE.						RAINFALL.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
<i>Coastal.</i>	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown .. ..	29.4	82	67	85	18	61	28	Nil	..
Herberton .. ..	..	78	55	86	18	47	22	3	1
Rockhampton ..	30.04	81	58	90	15	48	19	142	7
Brisbane .. ..	29.96	74	55	82	15	46	7	549	8
<i>Darling Downs.</i>									
Dalby .. ..	30.04	73	46	87	16	32	6	306	10
Stanthorpe .. ..	..	65	39	77	16	20	6	416	9
Toowoomba .. ..	..	68	47	86	16	38	2, 19	336	8
<i>Mid-Interior.</i>									
Georgetown .. ..	29.93	91	62	97	16	50	21	Nil	..
Longreach .. ..	29.98	85	53	94	16	42	22	83	4
Mitchell .. ..	30.04	74	46	82	16	36	3, 6, 23	206	7
<i>Western.</i>									
Burketown .. ..	29.93	90	66	98	17	57	19	Nil	..
Boulia .. ..	29.97	84	57	95	15	47	19, 20	91	4
Thargomindah ..	30.01	73	51	84	30	41	5	168	4

### ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.						Phases of the Moon, Occultations, &c.	
AT WARWICK.							
MOONRISE.							
	November. 1935.		December. 1935.		Nov., 1935.	Dec., 1935.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.	
					a.m.	a.m.	
1	5-3	6-9	4-49	6-32	8-18	9-19	4 Nov., ☾ First Quarter 9 12 a.m.
2	5-2	6-10	4-49	6-33	9-16	10-20	11 " ☉ Full Moon 12 42 a.m.
3	5-2	6-10	4-49	6-34	10-19	11-24	15 " ☽ Last Quarter 10 36 a.m.
							26 " ☿ New Moon 12 36 p.m.
4	5-1	6-11	4-49	6-34	11-23	12-26	Perigee, 8th November, at 8.48 p.m.
					p.m.		Apogee, 20th November, at 4.0 p.m.
5	5-0	6-12	4-49	6-35	12-28	1-29	On the 1st November between 12 and 1 o'clock
6	4-59	6-12	4-49	6-36	1-32	2-35	in the middle of the day, the Moon will be passing
7	4-59	6-13	4-50	6-36	2-35	3-41	from west to east of Mars, causing an occultation of
8	4-58	6-14	4-50	6-37	3-41	4-49	that planet which will be visible in Queensland only
9	4-58	6-15	4-50	6-38	4-50	5-52	at places north of Townsville. A telescope or
10	4-57	6-16	4-50	6-38	6-1	6-54	binoculars will be required to observe this phenom-
11	4-57	6-17	4-50	6-39	7-7	7-48	enon in broad daylight; but a very interesting
12	4-56	6-17	4-51	6-39	8-10	8-38	spectacle will be afforded by the crescent Moon
13	4-55	6-18	4-51	6-40	9-10	9-20	and the planet wherever the sky is sufficiently clear
14	4-54	6-19	4-51	6-41	10-1	9-55	near the zenith of Bundaberg.
15	4-53	6-20	4-51	6-41	10-46	10-27	On the 2nd Mercury will be in a fairly favourable
16	4-53	6-21	4-52	6-42	11-25	10-58	position for observation in the early morning, being
					a.m.		19 degrees west of the Sun and rising 49 minutes
17	4-53	6-21	4-52	6-43	12-0	11-27	before it, the Moon being far below the horizon.
18	4-52	6-22	4-52	6-43		11-56	On the 18th Venus will be at its greatest distance,
19	4-52	6-22	4-53	6-44	12-30	a.m.	47 degrees, west of the Sun, rising at 2.32 a.m.
20	4-52	6-23	4-53	6-44	12-58	12-28	almost due east (only 2 degrees south). Its bright-
21	4-51	6-23	4-53	6-45	1-29	1-1	ness will be much less than on 18th October, when it
22	4-51	6-24	4-54	6-46	1-57	1-37	reached its maximum, the diminution being in the
23	4-51	6-25	4-54	6-46	2-30	2-17	proportion of almost 3 to 4. Early risers will,
24	4-50	6-26	4-55	6-47	3-4	3-6	however, find Venus a magnificent object, apparently
25	4-50	6-26	4-55	6-47	3-41	4-0	in the constellation Virgo, about twice the length of
26	4-50	6-27	4-56	6-48	4-26	5-1	the Cross north-westward of Spica. The Moon, with
27	4-50	6-28	4-56	6-48	5-16	6-3	about half its face illuminated, will be much further
28	4-49	6-29	4-57	6-49	6-12	7-9	westward, not far from the Meridian at 4 a.m. on
29	4-49	6-30	4-58	6-49	7-13	8-14	the 19th.
30	4-49	6-31	4-59	6-50	8-5	9-17	The giant planet Jupiter, which was visible all
31			5-0	6-50		10-21	night in May, will disappear entirely near the end of
							November, when it will rise and set almost at the
							same time as the Sun.
							Mercury rises 4.14 a.m., 49 minutes before the Sun
							on the 1st; on the 15th it rises at 4.11 a.m., 42
							minutes before the Sun.
							Venus rises 2.49 a.m. and sets 2.43 p.m. on the 1st;
							on the 15th it rises at 2.34 a.m. and sets at 2.45 p.m.
							Mars sets at 10.23 p.m. on the 1st and at 10.13
							p.m. on 15th.
							Jupiter rises at 6.16 a.m. and sets at 7.44 p.m. on
							the 1st; on the 15th it rises at 5.30 a.m. and sets at
							7.3 p.m.
							Saturn rises at 1.11 p.m. and sets at 2.9 a.m. on
							the 1st; on the 15th it rises at 12.14 p.m. and sets
							at 1.15 a.m.
							The Cross will not come into view till about 10.30
							p.m. at Brisbane, and at nearly 11 p.m. at Townsville
							on 1st November, and one hour earlier on the 15th.
							3 Dec. ☾ First Quarter 5 28 p.m.
							10 " ☉ Full Moon 1 10 p.m.
							18 " ☽ Last Quarter 7 57 a.m.
							26 " ☿ New Moon 3 49 p.m.
							Perigee, 26th December, at 8.6 a.m.
							Apogee, 18th December, at 12.42 p.m.
							Perigee, 31st December, at 1.24 a.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

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 somewhat 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.

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