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Event and Comment.

The Journal.

WITH this issue we are entering on our thirty-ninth year of publication. The "Queensland Agricultural Journal" was founded by the late Hon. A. J. Thynne, then Secretary for Agriculture and Stock, in 1897, and made its first appearance in July of that year under the able editorship of the late Major A. J. Boyd, F.R.G.S. It has been published without a break ever since, and this number is the first part of the seventy-seventh volume. It is agreed generally that the Journal has had an important influence on the development and progress of rural industry in this State. A high standard was set by its first editor, as revealed by reference to earlier volumes. Every effort has been made to maintain that standard, which is based on a general policy in consonance with progressive agricultural thought, development, and practice. As a farmers' magazine, the Journal has a definite value for the man on the land; and, while its circulation is large and increasing continually, there is no reason why it should not be on every Queensland farmer's bookshelf. Readers would do a good turn to their neighbours who are not already subscribers by bringing the Journal under their notice, especially as the subscription fee—one shilling a year—is merely nominal. As an interesting, informative, and authoritative publication, it should have a direct appeal to the practical farmer and grazier.

Rain.

IN Queensland, the greatest event of the month was the widespread fall of heavy rain from the Gulf country down to the Central-West, which occurred in the last week of June. The precipitation, with registrations ranging from 2 to 9 inches, was due to the unexpected persistence of tropical influences. After the rains came a period of unusually mild weather, so further losses of sheep, which would certainly have occurred had a cold snap supervened, were to a large extent happily averted. Further falls are, of course, required to relieve substantially the position in the pastoral districts, but the measure of temporary relief already received will, in any case, be of immense benefit. Already herbage is appearing above ground, and over a wide area, where grasses had not been entirely eaten out, a green shoot is showing. The growth of herbage on the country where 3 or more inches fell should, at least, carry stock over to the spring, or, possibly, to the period of early thunderstorms, which usually commences in October. Graziers who were hand-feeding their stock before the rain came are, however, continuing the practice until the new herbage is available. While it cannot be said that the prolonged dry spell from which the Central and North-West were suffering has been definitely broken, the June rains have been immensely beneficial to the pastoral industry, and the improvement in the outlook is reflected in firmer stock values and fewer sale transactions.

Problems of the Pastoral Industry.

AT the Blackall Conference, which was representative of grazing and other rural interests concerned with the welfare of the pastoral industry and convened by the Minister for Agriculture and Stock (Hon. Frank W. Bulcock), many important problems were discussed. Opening the conference, Mr. S. Blackstock (chairman of the Blackall district branch of the Graziers' Association) said that it was probably one of the most important meetings ever held in the western country, as it involved bringing before the Government some of the most vital problems which to-day faced the grazing industry. He complimented Mr. Bulcock on the interest he was taking in graziers' difficulties.

Replying to statements made in the course of a discussion on taxation readjustment, Mr. Bulcock said that it was necessary to consider to what degree the finances of the State could be allowed to be eroded. To arrive at some unanimity between the States and the Commonwealth, a conference of taxation commissioners was held at Canberra in June, when this question was brought forward. As an outcome, he believed that a recommendation would be made that would go a long way towards meeting the graziers' wishes. Amidst applause, Mr. Bulcock added that it was his conviction that there must be some averaging of losses to overcome the grave position. After dealing with other matters relating to the scope and incidence of taxation, and to land rentals and freight rates, the Minister outlined at length Government proposals in regard to stock routes. It was believed that a policy was possible under which all-season routes could be provided. There was also a belief, he said, that national stock routes could be provided in such a way that they would be of permanent benefit and an asset to the districts through which they passed. The aim of the Government would be to devise a system of adequate routes well protected and supplied with water. Other aspects of the graziers' problems received the Minister's sympathetic consideration.

Drought Insurance.

MR. BULCOCK made a forceful plea to the conference for the formulation of a practical scheme of drought insurance. This State, he said, had gone through successive drought cycles, and dry periods were of inevitable recurrence. He had arrived at the conclusion that it would be impossible with the present resources and finance of the pastoral industry to make provision for conserving the lives of all the sheep in Queensland, but it must not be forgotten that while they were striving in times of plenty to raise the quality of their stock, in times of drought it was impossible to sustain the ratio of advance being made; and to that degree the industry was being severely handicapped.

In sketching a tentative scheme, the Minister urged the graziers to give it serious consideration. Any weakness in it would thus be discovered and rectified. A further conference would be convened in Brisbane in August to deal with the proposals finally. Such a scheme, he said, would have to be adopted eventually and made compulsory for all graziers owning sheep. The scheme which he had been investigating for the past six months provided for the purchase and storage of fodder on normal markets at normal prices. During the 1927 drought the cost of feeding sheep averaged a shilling a head a month on the basis of £10 a ton for lucerne and 6s. a bushel for maize. If bought on a normal market, this cost could have been halved. The return per sheep in normal times averaged about 10s. a head. Minor droughts occurred about every five years, and major droughts about every ten years. Queensland flocks averaged, in the aggregate, 20,000,000 sheep over a decade, and, if assessed at 3d., would return a capital annually of £250,000, or, say, £1,000,000 in four years, which could be held in trust. Such a scheme would need very material liquid assets. This money could be used to buy feed in normal times, and could be handled by a board controlled by the graziers, with, probably, a representative of the Treasury to advise regarding investments, and a representative of the Department of Agriculture and Stock to act as a liaison officer. When a grazier became a beneficiary under the scheme, his payments would cease until the climatic conditions in his district made it possible for him to again contribute. If wool fell below a certain figure, the amount payable would lapse and, if prices improved, would be made up until an average of 3d. a head was realised. On the question of storage, the Premier (Hon. W. Forgan Smith) had given him a definite assurance that fodder so stored in good seasons as a drought insurance would be conveyed in dry times on the railways at starving stock rates. The scheme provided for storage depots at stragetic points in the railway system, and also at places remote from railway centres, such as Tambo and Augathella.

White Louse of Citrus.

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

THE white louse, *Chionaspis citri* Comstock, occurs on citrus trees throughout Queensland and is one of the commonest insect pests of such trees in this State. In well-tended orchards the species rarely assumes major importance, but where the attention given to trees is inadequate white louse quickly asserts itself and considerable damage to the trees soon follows. In southern parts of the State almost every garden citrus tree carries a large colony of the insect, and the health of the host plants is consequently greatly impaired. The pest is generally more in evidence in dry than in wet times, and similarly is of more importance in inland dry areas than elsewhere.

Description.

As is the case with most species of scales, the insect itself is exposed to view for but a very short part of its life cycle, the remaining part being passed beneath a covering which is usually termed the scale. The scale of the female (Plate 1, fig. 2) is dull brown or almost black in colour, with grey margins and with small brown or yellowish areas which are rather prominent at the anterior end. It is roughly triangular in outline with the sides somewhat curved, the general contour suggesting the shape of a mussel. Along the central dorsal line runs a ridge from which the sides slope away to the margins. Generally, on the trees, this ridge is difficult to distinguish as the scale is typically coated with fine particles of dust and other foreign matter. The creamy coloured adult female insect (Plate 1, fig. 3), which lies beneath the scale, is elongate and possesses a deeply segmented abdomen which widens towards the posterior end.

The male scale (Plate 1, fig. 4) is much more conspicuous than the female, and it is from the former that the vernacular name is derived. The scale of the male is snow white and rather floury in appearance, and three ridges run practically the entire length of the scale and are generally quite conspicuous. The adult male (Plate 1, fig. 6), which is rarely seen, is a very delicate light yellow two-winged insect. The young of the two sexes cannot be separated on appearances and are elongate in shape, light yellow in colour, and capable of crawling about the plant very quickly. The length of the full-grown female averages about one-sixteenth of an inch and that of the male about one twenty-fifth of an inch.

Life History and Habits.

In Queensland white louse breeds practically continuously and young may be found at any time of the year, although during winter their numbers are greatly reduced and natural mortality is then very high. It has been found that the young produced by any one female may emerge over a period of from three to six weeks, and as the females require approximately but sixty-five days to complete their development there is no well-defined succession of generations; hence from the point of view of control a knowledge of the life history does not give much assistance in this case. A great preponderance of one stage may, of course, be found in any one orchard at a particular time, and the application of artificial control measures should therefore always be preceded by a close inspection of the colonies.

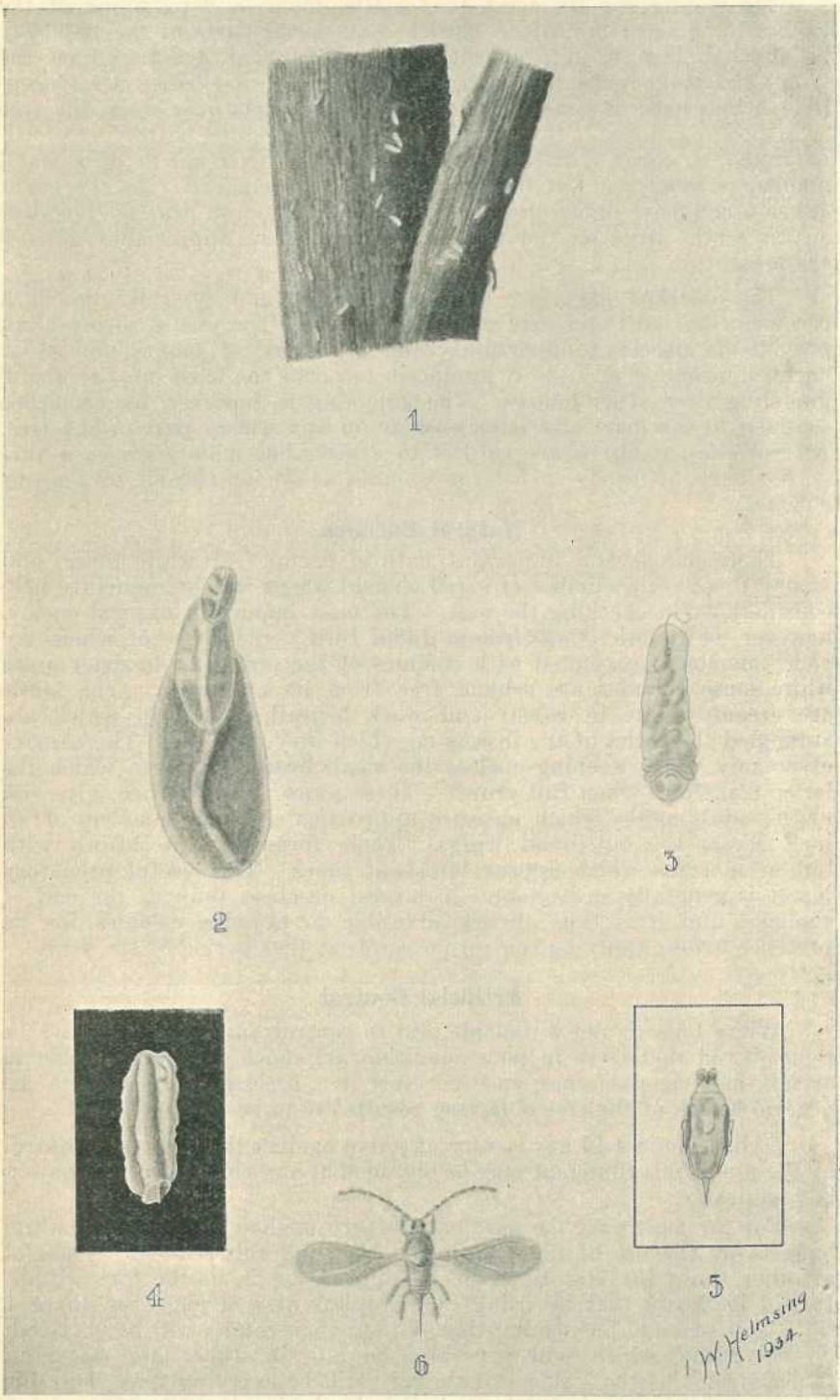


PLATE 1.—WHITE LOUSE, *Chionaspis citri* Comstock.

Fig. 1.—Male scale on bark x 3.
Fig. 2.—Female scale x 24.
Fig. 3.—Adult female x 24.
Fig. 4.—Male scale x 24.
Fig. 5.—Male pupa x 24.
Fig. 6.—Adult male x 24.

The young for the most part settle down in depressions in the bark after a short migratory period. All aerial parts of the tree may be affected, but the largest colonies are almost always found on the trunk and main limbs. Though the fruit, twigs, and leaves are susceptible, white louse is generally found on these parts only when the tree is in poor condition. Occasionally, however, a quite healthy tree will be found to carry a little white louse on the extremities of a small number of branches, but this is never of much moment. As the males are so much more numerous than the females they are usually conspicuous as white areas on the trunks or limbs when appreciable colonies are present.

The attacked parts are quickly weakened and typically the bark becomes very hard and soon cracks (Plate 2). The cracks so produced provide an excellent opportunity for the entry of borers and other harmful organisms, and if produced towards the base of the trunk gumming very often follows. The gumming is, however, by no means confined to this part and it may occur on any woody part of the tree. All varieties of citrus are subject to attack, but mandarins as a rule do not harbour nearly such large colonies as do comparable oranges or lemons.

Natural Enemies.

There are several important natural enemies of white louse, and among these are a number of small chalcid wasps which frequently help considerably in checking the pest. The most important natural enemy, however, is a moth (*Catoblemma dubia* Butl.), the larvæ of which are very commonly associated with colonies of the pest, and in drier areas white louse colonies are seldom free from its attentions. The larvæ are creamy white in colour and work beneath a web in which are entangled the scales of the insects on which they have fed. The cocoons of creamy white webbing enclose the small brown pupæ, to which the larvæ transform when full grown. These pupæ, in their turn, give rise to the adult moths which measure approximately three-quarters of an inch across the outspread wings. Their forewings are brown with lighter margins which appear bluish at times. This useful predatory insect is generally to be found in largest numbers towards the end of summer, and it is thus always advisable to examine colonies for its presence before applying control measures at that period of the year.

Artificial Control.

White louse is not a difficult pest to control, but it must always be remembered that trees in poor condition are much more susceptible to attack than vigorous ones, and therefore it is necessary to attend to the general health of the tree if lasting results are to be obtained.

Hydrocyanic acid gas is very effective against the pest, and control by the use of this fumigant may be obtained at any time when fumigation is practicable.

For the most part the most satisfactory method of combating white louse is by the use of lime sulphur. Although this scalicide is useful at other times the best time for its application is in the late winter. It will be found that by using lime sulphur at a strength of about 1 to 12 just prior to blossoming time, satisfactory results will be obtained. At this time, which will generally be late in July, late maturing varieties such as the Valencia Late may still be carrying fruit, but this does not matter greatly, as in general only the inside parts of the trees

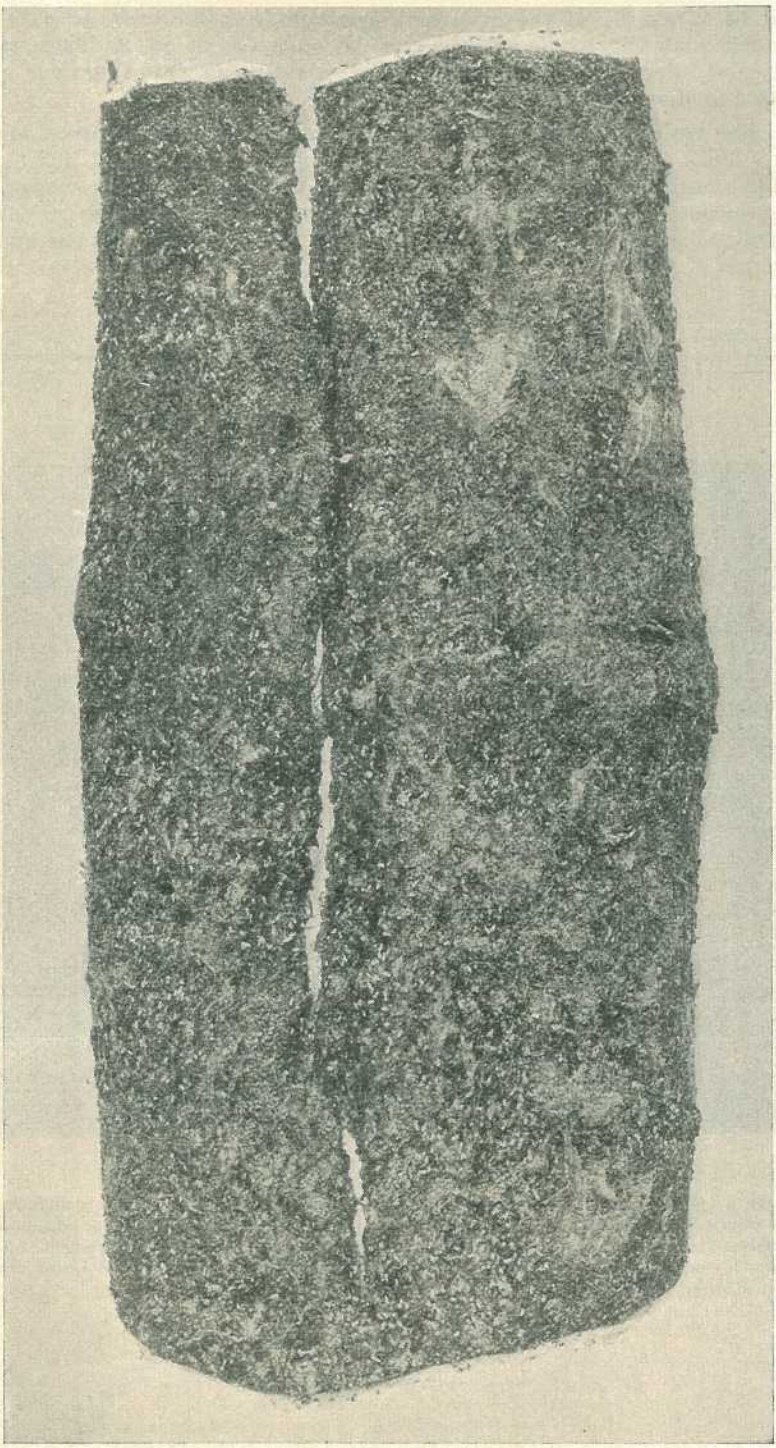


PLATE 2.

White louse infestation on bark. Note predominance of males, presence of cocoons of predatory moth larvæ, and splitting of bark.

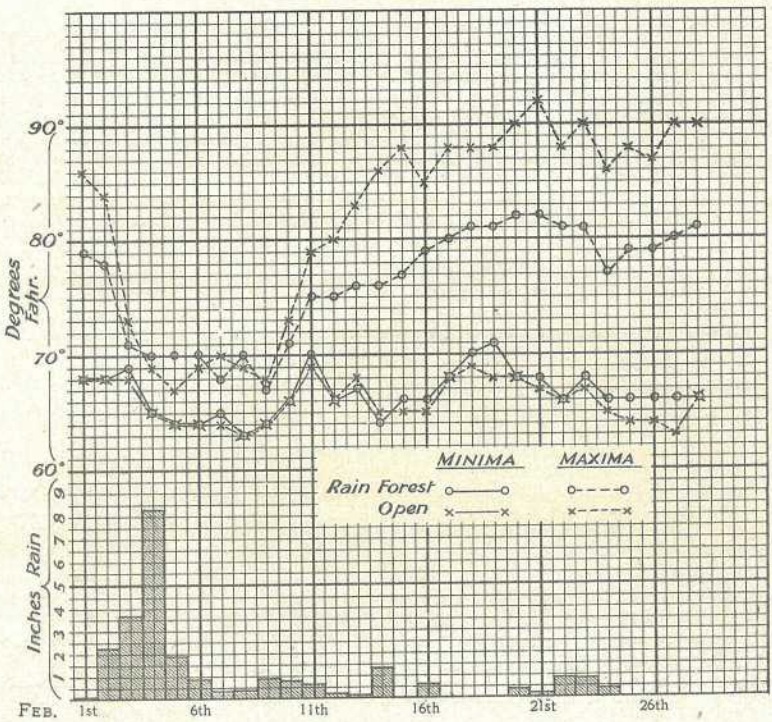
need be sprayed. If the crop has been removed, however, it is recommended that the whole of the tree be sprayed, as in addition to its scalicidal effect the lime sulphur has considerable value against other pests and diseases at this time.

The resin-caustic soda-fish oil mixture is also very effective against white louse and may be employed for the control of this pest during the cooler months. Oil sprays also have some value against white louse, but they do not give nearly such good results as any of the three previously mentioned scalicides and therefore are not recommended for use against this pest.

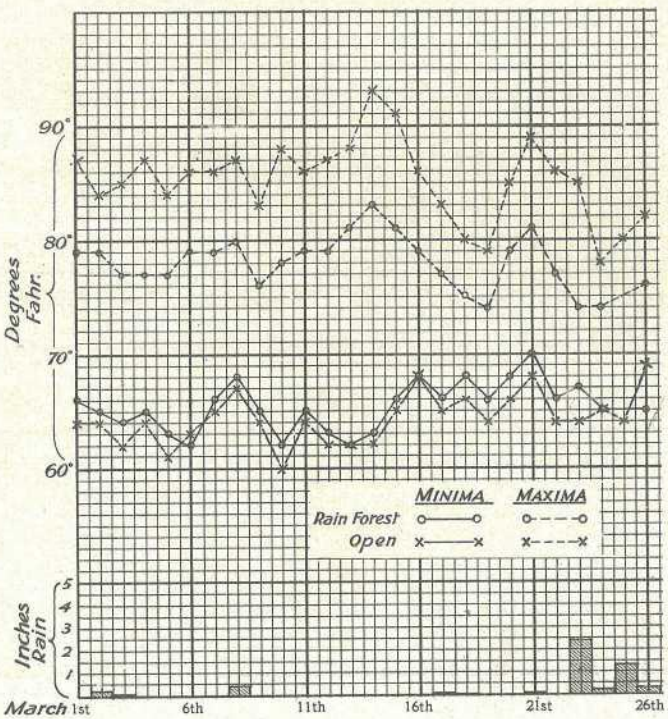
PLATE 3.—ON THE ROAD TO TAMBORINE.

On a gentle upward grade, this highway winds through primeval rain forest to the summit of Tamborine Mountain, a broad plateau of great fertility commanding extensive views over some of the wildest parts of the Macpherson Range, and all the south coastal country—so rich in its river-divided dairy lands—from Point Danger to Stradbroke Island and Moreton Bay.

GRAPH I.



GRAPH II.



The Pinhole Borer of North Queensland Cabinet Woods.

By J. HAROLD SMITH, M.Sc., N.D.A., Entomologist.

(*Continued from page 548, Volume XLIII.*)

CLIMATIC FACTORS.

TO pass from open cleared country into the heart of the rain forest involves a distinct transition from one habitat to another. Though the change is so apparent, a definition of the differences is a matter of some difficulty though they may be of some moment in the insect economy. Actually the rain forest environment is not a unit. Within it are differences such as those presented by intact virgin forest, clearings of a temporary nature due to the collapse of mature trees, and a third type afforded by cleared tracks some of which are disused while others are in constant service as feeder roads for areas being logged. Even in a stretch of unlogged virgin rain forest there are differences of a vertical nature, the habitat in the lower 20 or 30 feet being quite distinct from that in the upper reaches of the trees.

In this special study it seemed obligatory in view of some obvious limitations on Crossotarsan activity to establish the main distinctions between two contrasted habitats—

(*a*) In open country adjacent to rain forest;

(*b*) In the rain forest under canopy.

Clearings in the rain forest so far as temperatures are concerned share some of the characteristics of the first of these and may be regarded as transition habitats between the two. Within the vertical range of the forest similar gradations occur, hence the two habitats chosen for comparison represent the extreme ends of a chain along which are strung the wide variety of habitats offered to living forms in and adjacent to the rain forest.

At both stations similar apparatus was used, comprising maximum, minimum, wet and dry bulb themometers. At one the records of the forest station were available, and at the other the necessary thermometers were placed under complete canopy. For the satisfactory functioning of the wet bulb thermometer access to air currents is necessary, hence the apparatus could not be erected in the heart of the rain forest where such currents are slight. Advantage was, therefore, taken of a belt of regenerated maple silkwood which abutted on to open country, the thermometer being placed just sufficiently far from the open to ensure complete canopy without totally excluding air currents. Records were kept over approximately two months during 1933, and are illustrated graphically and correlated with rainfall records in Graphs I. and II. The essential conclusions were confirmed in 1934 and can be discussed seriatim:—

(*a*) The various records obtained cover the months of February and March, 1933, and show the differences in the temperature minima of the rain forest and open habitats to be slight. They range between 60 deg. F. and 71 deg. F. February was a particularly wet month with some twenty wet days, while March only received scattered storms. Both sets of data indicate that the lower minima are linked up with

precipitation, but the relationship is hardly sufficiently clear to warrant definite conclusions on the point. The most interesting feature is the close approximation of the minima in the two habitats. In the drier month, March, the rain forest minima were always less than 4 degrees Fahrenheit above those in the open, while in the wetter month, February, the two records fit closely together during the first wet fortnight but show a tendency to separate during the drier periods. Perhaps this can be explained by the surface evaporation in the two habitats and the higher humidities at the lower levels of the rain forest. The protection afforded the surface soil and incidentally the lower atmospheric levels of the rain forest by canopy apparently tends to keep the minimum temperature higher than in the exposed open country, except under conditions of general precipitation when such differences tend to disappear.

(*b*) The ordinary disposition of the temperature maxima is best illustrated by the records for March when, apart from occasional storms, the weather was comparatively fine. From these it will be seen that the canopy maxima during fine weather closely follow those of the open but at a level of some 7 deg. F. to 10 deg. F. below it. Thus, in the open the maximum temperatures range from 78 deg. F. to 93 deg. F., while in the rain forest they lie between 74 deg. F. and 83 deg. F. The canopy thus screens the heart of the forest from the extremes of heat normally encountered in the open during the afternoon. The prolonged wet period during the first fortnight of February brings the maximum temperatures in the open and rain forest environments close together and eliminates the normal disparity between the two. In this case the perpetual cloud blanket influences the whole environment in much the same way that canopy does the rain forest ordinarily. Thus, in both rain forest and open habitats the maximum temperatures during wet weather are depressed well below the level of either under fine weather conditions—about 88 deg. F. in the open and 80 deg. F. under canopy—to below 70 deg. F.

It should be noted that the diurnal variation in fine weather as represented by the differences between the maximum and minimum temperatures is much smaller in the rain forest than in the open. In the open the normal diurnal variation is 25 deg. F.; in the rain forest, 15 deg. F. This is perhaps the most significant contribution of canopy to the forest floor habitat.

(*c*) Relative humidities during February and March were usually above 70 per cent. In the prolonged wet period of early February the atmosphere was almost completely saturated and ordinary deviations proper to rain forest and open habitats in fine weather were obliterated. Normally the humidity of the canopied area is higher than that in the open, but in both the atmospheres may become saturated at night. The general movement of humidities is similar to that of the temperatures already discussed, i.e., that the humidities approximate during the night, as do the temperature minima, and separate widely during the day.

The Significance of Canopy.

In discussing the activity of *C. grevilleæ* it has been noted that mass infestation of a log is confined to special periods of the day. The hours of activity on the wing turn irregularly round the period 10 a.m. to 2 p.m., insects rarely arriving at the log earlier than this though they may do so later in the afternoon if conditions are suitable. The

time limits are taken from an ordinary fine day in which open temperatures ranged thus:—

Time.	Temperature.	Time.	Temperature.
9 a.m.	78 deg. F.	2 p.m.	86 deg. F.
10 a.m.	82.5 deg. F.	3 p.m.	89 deg. F.
11 a.m.	83 deg. F.	4 p.m.	90 deg. F.
12 a.m.	85 deg. F.	5 p.m.	85 deg. F.
1 p.m.	85.5 deg. F.		

Hence it is inferred that mass infestation does not take place until temperatures have risen to 82 deg. F. or thereabouts. Temperatures below this tend to inhibit the flight of *C. grevilleæ* and thus the faculty for initiating new infestation. If temperature is also an upper limiting factor it might be inferred that flight does not take place when temperatures rise above 86 deg. F., but high log surface temperatures operate in the afternoon and confuse observations. At any rate the lower limit of 82 deg. F. is of most interest at the moment. No two days are alike, however, and a cloud blanket of a temporary nature may prolong the flight period or prevent it altogether in so far as temperatures are effected. Thus a completely cloudy day may prevent any activity at all, while a fine morning followed by overcast conditions in the afternoon may prolong it.

Observations so far discussed are all concerned with logs on ramps within the rain forest area or in clearings caused by the fall of a tree. The known variation in temperatures at various parts of the rain forest suggested the comparison of infestation on logs hauled under canopy when cut and others left in rain forest clearings. In March, 1933, a walnut-bean tree was felled and a section cut from it immediately rolled into the nearest canopy, some 12 yards away from the trunk of the tree. Equivalent sapwood areas were then exposed on both the canopied log and the parent tree. After exposure to the first diurnal period of Crossotarsan activity, for every single burrow initiated in the log section under canopy, thirty-two were initiated on the parent tree. The difference was maintained through the whole period of susceptibility and has since been confirmed by larger experiments with a number of commercial logs.

Complete canopy in which the undergrowth has been removed to permit the handling of logs invariably allows some sunlight to reach the forest floor, for gaps of various dimensions occur in the overhead tiers of the rain forest. Should the gaps be small and the pencils of sunlight not more than two or three square feet in cross-section, temperatures are unaffected. Larger beams with a cross-section of five to seven square yards may, however, raise temperatures some two or three degrees above those in the surrounding shade. The influence of sunlight can never be great in reasonably complete canopy owing to the movement of the sun relative to the overhead gap. The more evident effect is a slight rise of temperature in the stratum of air through which the beam passes with little diffusion beyond it.

Canopy temperatures already recorded are all taken at a height of 5 feet. Nearer the forest floor they may be much lower, and the position is illustrated by the following series of contemporary readings:—

In the open	90 deg. F.
In teamster tracks	87 deg. F.
Under canopy, 8 ft. from the ground	78 deg. F.
Under canopy, 4 ft. from the ground	78 deg. F.
Under canopy, 2 ft. from the ground	77 deg. F.
Under canopy, 6 in. from the ground	74 deg. F.

The sharp drop in temperature near the ground is doubtless due to the cooling effect of the humus-impregnated forest floor with its normal high moisture content.

Under ordinary logging conditions the superficial drying of sap wood surfaces hinders burrow initiation by *C. grevilleæ*, probably by preventing any further liberation of the chemotropic stimulus which first attracts the insect. Given fine weather at and subsequent to the felling of a tree, few burrows are initiated after the lapse of a week, the greater part of the infestation being completed in the first day. Under wet weather conditions infestation may be deayed for some weeks, for temperatures during wet weather are normally too low for insect flight and thus unfavourable to mass infestation. It is thus difficult to say precisely when an individual barked log ceases to be vulnerable without personal inspection. Logs under canopy dry out much less quickly than those in the open exposed to the sun; hence while logs can be protected from severe Crossotarsan attacks by canopy shelter they may still be attacked if discharged into rain forest camps before superficial drying has taken place. Surface changes on logs held under canopy are slower than on logs in the open or rain forest clearings in any single set of weather conditions. Hence if weather conditions are good barked logs should not be removed from canopy until a fortnight after felling, though a longer period may be desirable. In wet weather a month or six weeks is preferable.

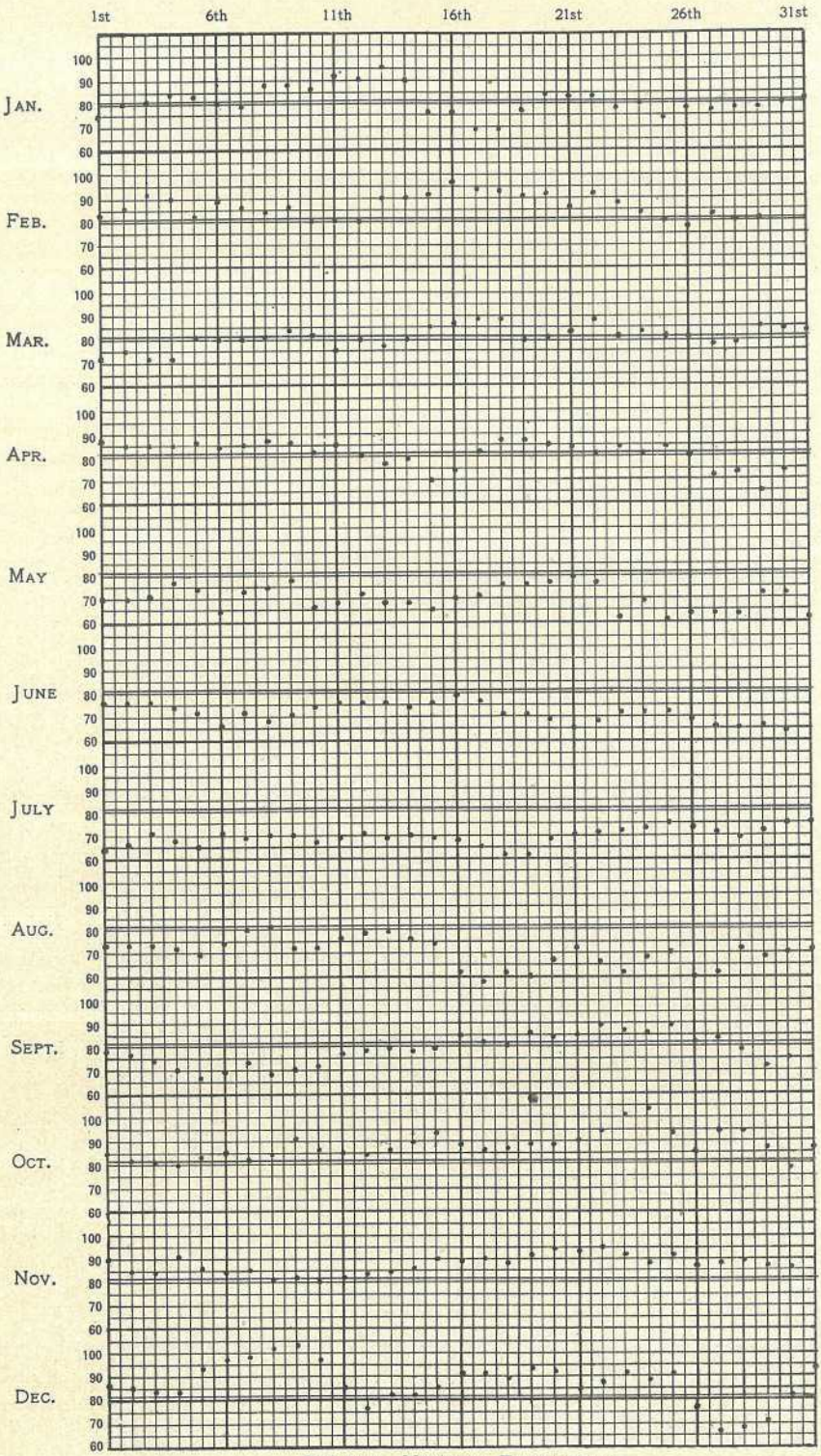
Seasonal Incidence.

The pinhole borer, *C. grevilleæ*, in common with most platypodids is more important in summer than in winter. Greater numbers are then on the wing and susceptible material is more subject to attack. As temperatures have so much influence on the activity of the insect, an attempt has been made to correlate its seasonal movements with known temperature requirements. The daily maximum temperatures for the complete year 1932 have thus been analysed from the Gadgarra records (Graph III.) with this end in view.

Daily maximum temperatures for each month are linked up on the graph and the observed temperature at which mass infestation begins, i.e., 82 deg. F., superimposed. Whenever the daily temperatures have exceeded this limit it is reasonable to suppose that, for part of the day at least, infestation may have taken place; hence while in no one month was the temperature suitable for mass infestation every day, in three—namely, February, October, and November—only odd days were unfavourable. For the five months January, March, April, September, and December the temperatures were for the most part favourable, but sometimes a fortnight might pass without attack. During the four essentially winter months infestation was improbable, the maximum temperatures being below the level required for Crossotarsan activity. It is perhaps unwise to assume that when the maximum temperature in any one day rises above 82 deg. F. infestation is inevitable. For ordinary purposes it may be presumed that when temperatures in any one day only slightly exceed 82 deg. F. the period during which the insect is active will be short. The converse will also be true.

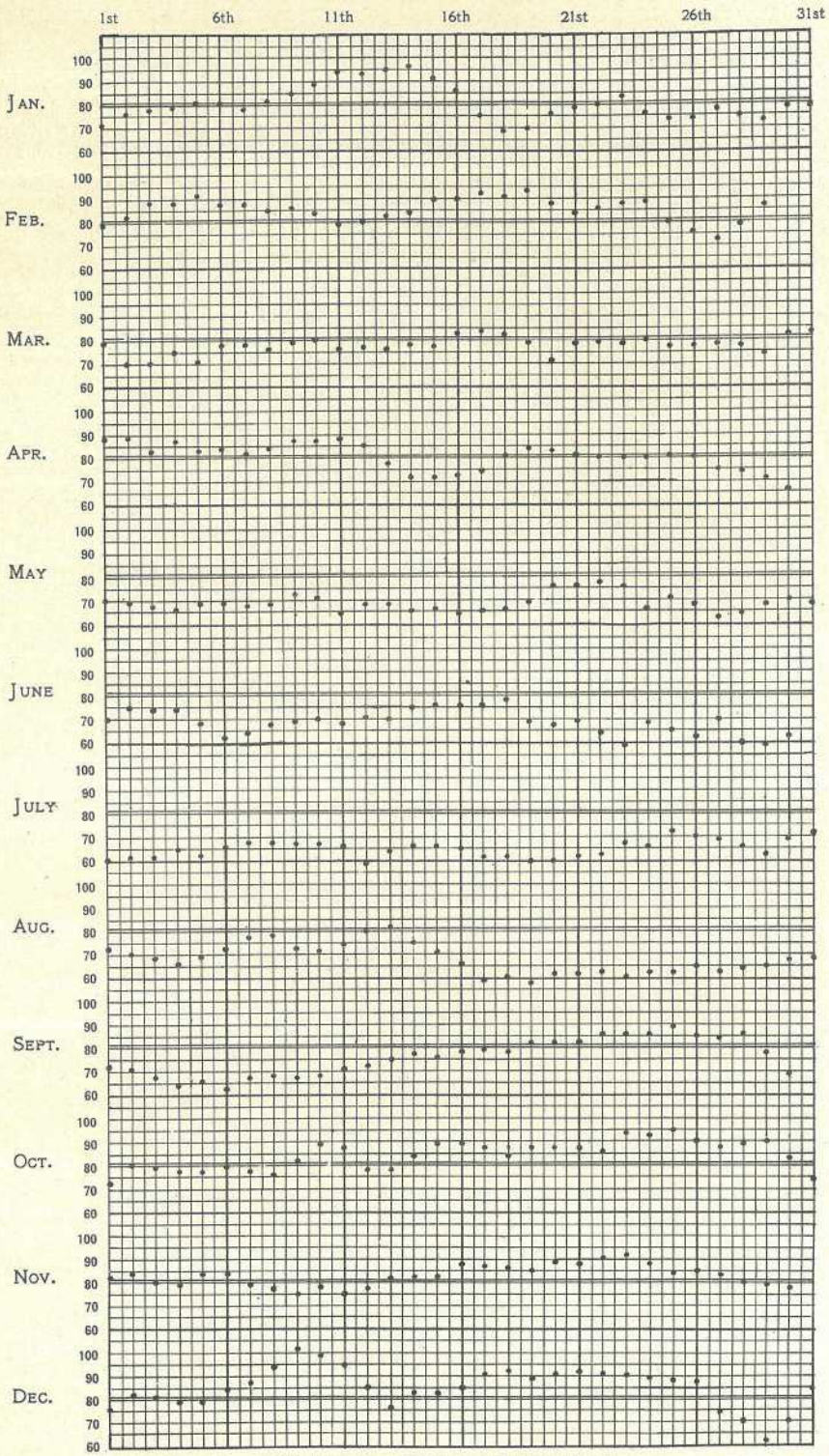
Another interesting point emerges from the data. Sometimes for a week or a fortnight during the summer months daily maximum temperatures may not rise above 82 deg. F. Such periods of relatively

GRAPH III.



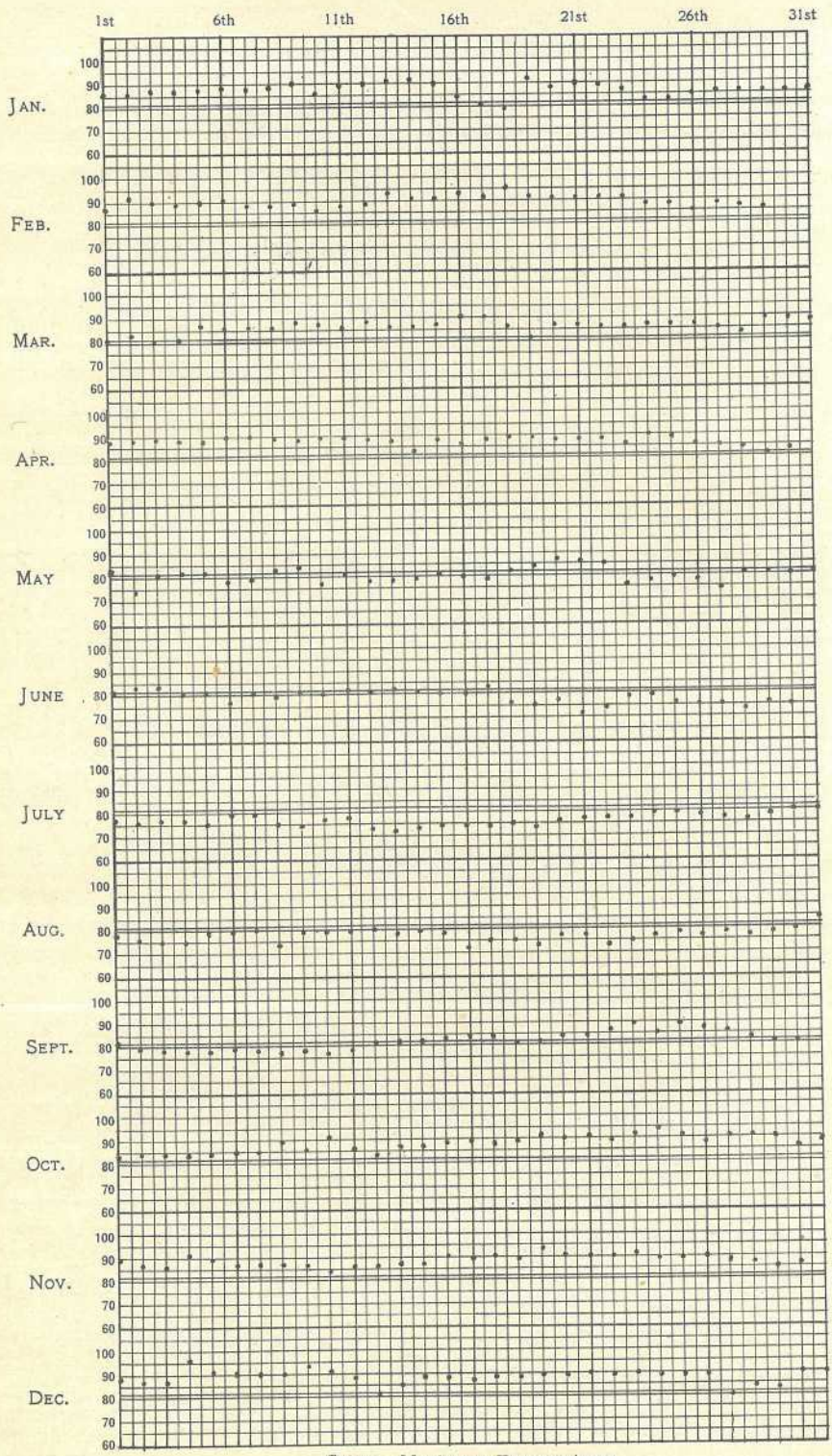
Gadgarra—Maximum Temperatures.

GRAPH IV.



Ravenshoe —Maximum Temperatures.

GRAPH V.



Cairns—Maximum Temperatures.

low temperatures are invariably due to cloud effects with or without rain, prolonged wet periods being common at this time of the year. Theoretically, then, logs may be left in the rain forest environment during wet weather without any great danger from attacks by *C. grevilleæ*.

These conclusions agree with the general experience in North Queensland. Normally infestation is heavy during the spring and summer months, but even within these logs are subject to considerable variations in the amount of insect attack. The frequent suppression of infestation during the summer months in all classes of timber has often been ascribed to precipitation, but it is now apparent that the determining factor is temperature, and the influence of rainfall is therefore an indirect one.

The economic significance of the pest has, as yet, been chiefly studied on the Tableland where cabinet woods are cut in appreciable quantities. The relevant data is especially applicable to this area, but the importance of the insect suggests a comparison between three districts in which logging takes place in North Queensland. These merge into each other, but for purposes of discussion may be designated:—

(*a*) The coastal belt comprising the rain forest clothing the coastal side of the range between Cairns and Cardwell; temperatures vary within comparatively narrow limits and humidities are high.

(*b*) The upper Tableland, an irregular plateau of elevated country behind the Innisfail-Tully part of the coastal range; temperatures show a wide diurnal variation and humidities are much less than on the coast.

(*c*) The Tableland, which includes the country behind the coastal range with Malanda as its centre; the climate is more or less intermediate between those of (*a*) and (*b*).

For comparative purposes the maximum temperatures for 1932 from recording centres within each area (Cairns, Ravenshoe, and Gadgarra; Graphs V., IV., and III.) are linked and the minimum temperature suitable for mass infestation superimposed on the graphs. Table I. shows the number of days in which log infestation was theoretically possible and allows the inference that temperature conditions on the coast are normally more favourable to infestation than those on either of the Tablelands. For eight months of the year—September to April—infestation was possible in all three centres, while the four remaining months almost prohibit attack. This latent period for 1932 is probably much longer than usual, for the winter chanced to be one of the most severe on record, but the outlined parallel between the seasonal incidence of the pest and temperature records suggests a danger of greater borer losses on the coast when rain forest there is systematically felled.

In 1932 the number of days in which infestation was possible in each district was as follows:—

(*a*) Coastal belt .. .. 235 days.
(*b*) Upper Tableland .. .. 122 days.
(*c*) Tableland .. .. 158 days.

TABLE I.

RECORD OF DAYS IN EACH MONTH IN WHICH INFESTATION COULD TAKE PLACE DURING 1932.

—	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Coastal Belt	29	28	27	29	10	5	..	1	16	31	30	29	235
Upper Tableland ..	10	21	5	14	..	..	..	1	10	20	19	22	122
Tableland	13	21	14	18	..	..	..	..	10	29	27	26	158
Maximum Possible ..	31	28	31	30	31	30	31	31	30	31	30	31	..

It is apparent that *C. grevilleæ* may still be active on the coast when it is quiescent elsewhere where temperatures are lower.

[TO BE CONTINUED.]

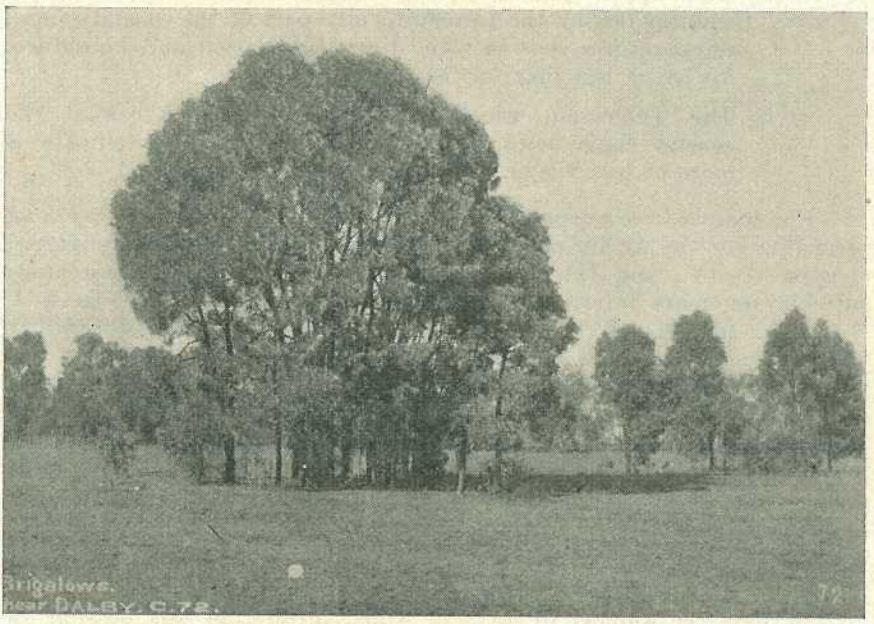


PLATE 4.—PARK-LIKE COUNTRY, NEAR DALBY.
The brigalow provides cool summer shade and shelter from winter's cold westerlies.

Angular Leaf Spot of Cotton.

By R. B. MORWOOD, M.Sc., Assistant Plant Pathologist.

THIS disease is responsible for considerable economic loss in many cotton growing countries. It is believed to have been present in Queensland for a number of years, but until recently has not been regarded as of serious consequence in this State. However, during the past season it has been suspected of causing marked deterioration, and consequently these notes have been compiled in order that those concerned may become familiar with the various aspects of the disease.

Symptoms.

The name indicates the type of lesion produced on leaves and bracts. Infection points are at first translucent dots. They then spread and darken, but are usually limited by the veins and veinlets, so that finally they are dark brown angular spots readily distinguished from the circular spots caused by various fungi. Under wet conditions the infection may spread along the veins and down the petioles to produce elongated dark areas on the stem. Infection may also take place on the stem directly, but it is doubted whether it occurs on any but the youngest stem tissues except by way of a wound or a petiole. This stem phase of the disease is known as blackarm and may result in the breaking of the affected branch and death of all distal portions. It is very destructive in countries growing cotton under humid conditions.

Infection of the flower or very young boll results in shedding, but on the partially developed green boll produces a dark shiny water-soaked area or grease spot. It may remain in that stage, perhaps just penetrating to the lint, or if weather conditions are favourable it will spread and become a sunken brown area involving a considerable portion of the boll, in which case the underlying lint becomes brown stained and in extreme cases wet and rotten. The later stages of rot are considerably varied due to the entrance of secondary organisms such as various species of fungi which may result in the complete destruction of the boll.

The early stages of the boll infection are similar to those of anthracnose (a disease which is not known in Queensland) and somewhat similar to the effects of sucking bug punctures. The later stages, particularly when secondary rots intervene, closely resemble fungus rots either of a primary nature or following insect attack. The boll spot can only be definitely identified when it is found in association with the typical leaf symptoms or by microscopic examination.

Cause.

The disease is caused by bacteria, the causal organism being known to science as *Pseudomonas malvacearum*. This is a minute rod-shaped organism about one ten-thousandth of an inch in length. It can swim in moisture by means of a thin whip-like flagellum at one end several times as long as the main part of the organism. It has no actual resting (spore) stage, but on slow drying secretes slime which protects it from dessication and serves the same purpose as the resting stage of the spore-forming bacteria. It is highly sensitive to exposure to sunlight or sudden drying when in the active state. It develops and multiplies most rapidly at a temperature of 25°-30° C. (77°-86° F.) with a maximum

of 36°-38° C. (96°-100° F.), a minimum about 10° C. (50° F.), and thermal death point of 51°-52° C. (124°-126° F.).

Contributing Conditions.

The bacteria are carried on seed from affected crops and the cotyledons (seed leaves) become infected when leaving the seed coat. This infection takes place most readily when soil conditions are suitable; little of this primary infection occurs at soil temperatures below 20° C. (68° F.) or above 32° C. (90° F.), being at a maximum between 24° and 26° C. (75°-79° F.). Also, with an amount of soil moisture only just sufficient to germinate the seed, little or no primary infection can occur.

The absence of this early infection, however, is often of little advantage owing to heavy later infections blown from neighbouring crops or from the refuse from infected crops of the previous season. Once the disease is established in a crop the bacteria are carried by driving rain and in infected debris. They require free moisture such as is provided by rain or dew for actual penetration, which takes place by means of the stomata or breathing pores. The spread of the disease is favoured by high temperature and high relative humidity, though outbreaks of blackarm and boll rot have been recorded in comparatively dry weather. The leaf and boll spotting occurs on weak and strong plants equally, but there is much less breaking of stems from blackarm in a robust crop. Waterlogging of cotton paddocks is particularly conducive to blackarm, both by weakening the host and providing those humid conditions necessary for the parasite.

Economic Importance.

In countries where the blackarm phase of the disease is of frequent occurrence the resultant loss of crops is obvious and heavy. Such losses have not been known to occur in Queensland. The leaf spot stage does not result in any measurable loss, though the presence of any defect in the economy of the plant should not be entirely ignored. With the boll spot, however, the position is more serious. In addition to the entire loss of some bolls the lint in others is reduced in value. It would be very difficult to estimate the loss which occurs locally from this cause, particularly as the injury somewhat closely resembles that due to sucking bug attack and in the later stages of the disease also to fungus boll rots.

Control.

Once angular leaf spot has appeared in a crop there is no known economic method of preventing its spread. The incidence of the disease will depend on the susceptibility of the cotton and the environmental conditions, particularly temperature and humidity. The latter cannot be varied except by the provision when necessary of adequate drainage or, when irrigation is used, by the cautious use of water. Differences in the susceptibility of cotton varieties have been recorded, and in general it can be stated that long staple Egyptian and Sea Island are the most susceptible. There is, however, insufficient data to make any recommendations with respect to planting resistant varieties.

The only available method of control under ordinary circumstances would appear to be the prevention of the introduction of the causal organism to the crop. Three methods of entry have to be guarded against, namely on the seed, on debris from a prior crop, or from a

neighbouring crop. Infection from the seed can be prevented by using seed from a disease-free crop. The latter is possible as the bacteria are carried on the outside of the seed. Such disinfection can be attained by delinting the seed with sulphuric acid, washing it and treating it with corrosive sublimate (1: 1,000) for fifteen minutes and again rinsing before drying and planting. This method is cumbersome, and in the hands of inexperienced persons somewhat risky, so attempts have been made to find simpler effective and non-injurious disinfection processes. Of these the most promising are the mercurial dusts. Varying results have been reported for some of these materials, and it is proposed to try them out under Queensland conditions. Seed can also be freed from infection by heat treatment.

In addition to taking precautions with the seed the cotton-grower should avoid the presence of infective debris from previous crops. To this end all cotton crops sould be thoroughly destroyed as early as possible after harvesting the crop. The plants should be cut, gathered, and burnt, and the remaining fragments dealt with by early and thorough ploughing followed by good cultivation. The practices which result in the preparation of a good seed-bed will ensure the intimate mixing of the debris with moist soil. Under these circumstances the bacteria do not survive long, whereas when slowly dried in the tissues they secrete a protecting coat of slime and withstand dessication over long periods.

The possibility of infection from adjoining diseased crops must not be forgotten, but if such crops are present little can be done to avoid spread to a clean crop. The growing of a break consisting of some tall crop will help to impede the spread of the disease.

Chloris Grasses in Queensland.

By S. L. EVERIST, Assistant to Botanist.

PART II.

THE next two species to be considered are *Chloris truncata* and *Chloris ventricosa*. From the two previously described they are easily distinguished by the shape of the spikelets. The drawings of the spikelets will illustrate this better than a description. It will be noticed that in these two species the organ labelled "sterile floret" is truncate, or sharply cut off at the top. This is characteristic of both the species here described, and serves to distinguish them from those treated previously. In *Chloris ventricosa* the sterile floret is almost enclosed by the lemma or "husk" of the fertile floret, whereas in *Chloris truncata* this is not so. The lemma of the fertile floret differs in shape in the two species, and this point also is illustrated in the drawings. Both these drawings are upon the same scale, and a comparison can thus be drawn between the size of the spikelets.

CHLORIS TRUNCATA.

(Plate 5.)

Botanical Name.—truncata, from Latin *truncatus*—shortened, referring to the cut-off appearance of the florets.

Botanical Description.—Stoloniferous perennial, stolons usually short and branched. Shoots flattened. Leaves distichous, lower internodes very short, leaf sheaths much exceeding them. Leaf sheaths strongly keeled and much flattened, with broad scarious margins, glabrous, striate; keel scabrous. Ligule small, reduced to a ciliate rim; auricles small and inconspicuous; collar thick, fairly wide, glabrous. Leaf blades usually short, rarely up to 25 cm. long, folded in the bud, folded or flat when mature, strongly keeled, the keel and edges of blades scaberulous; both surfaces glabrous and usually somewhat scabrous; sometimes the upper surface with short hairs near the base. Blades linear, slightly contracted at the base, apex rather obtuse, sometimes shortly ciliate. Leaves of flowering culms closely resembling those of the vegetative shoots except for the longer, less sharply keeled sheaths and the relatively shorter blade. Flowering culms short, erect, terete, bearing 5-10 long, slender, divaricate spikes. In one form the spikes are shorter, stouter, and less widely diverging. Rhachis of the spikes triquetrous, straight, becoming slender towards the tip; scaberulous for most of its length. Spikelets scattered in the lower part, imbricate for the greater length of the spikes. Spikelets sessile or very shortly pedicelled, pedicels, if present, very slender and scabrous. The two florets, which fall entire, are cuneate in profile and sharply truncate at the apex. They are indurated and very often black at maturity. Lower glume 1-nerved, membranous, narrow ovate lanceolate, acuminate, 1-2 mm. long. Upper glume 1-nerved, membranous, linear-lanceolate, acuminate, 2-3·5 mm. long. Lower lemma 3-nerved, the lateral nerves very close to the margin; obovate in outline, narrowly oblong or elliptic in profile, folded and keeled with a shallow longitudinal groove on each face; keel and faces somewhat scabrous. Lower edge of the lemma inrolled, but not enclosing the rhachilla; upper edge not inrolled and bearing a fringe of short hairs. Lemma 2·5-3 mm. long, including the base of the rhachilla, which bears a fringe of white hairs.

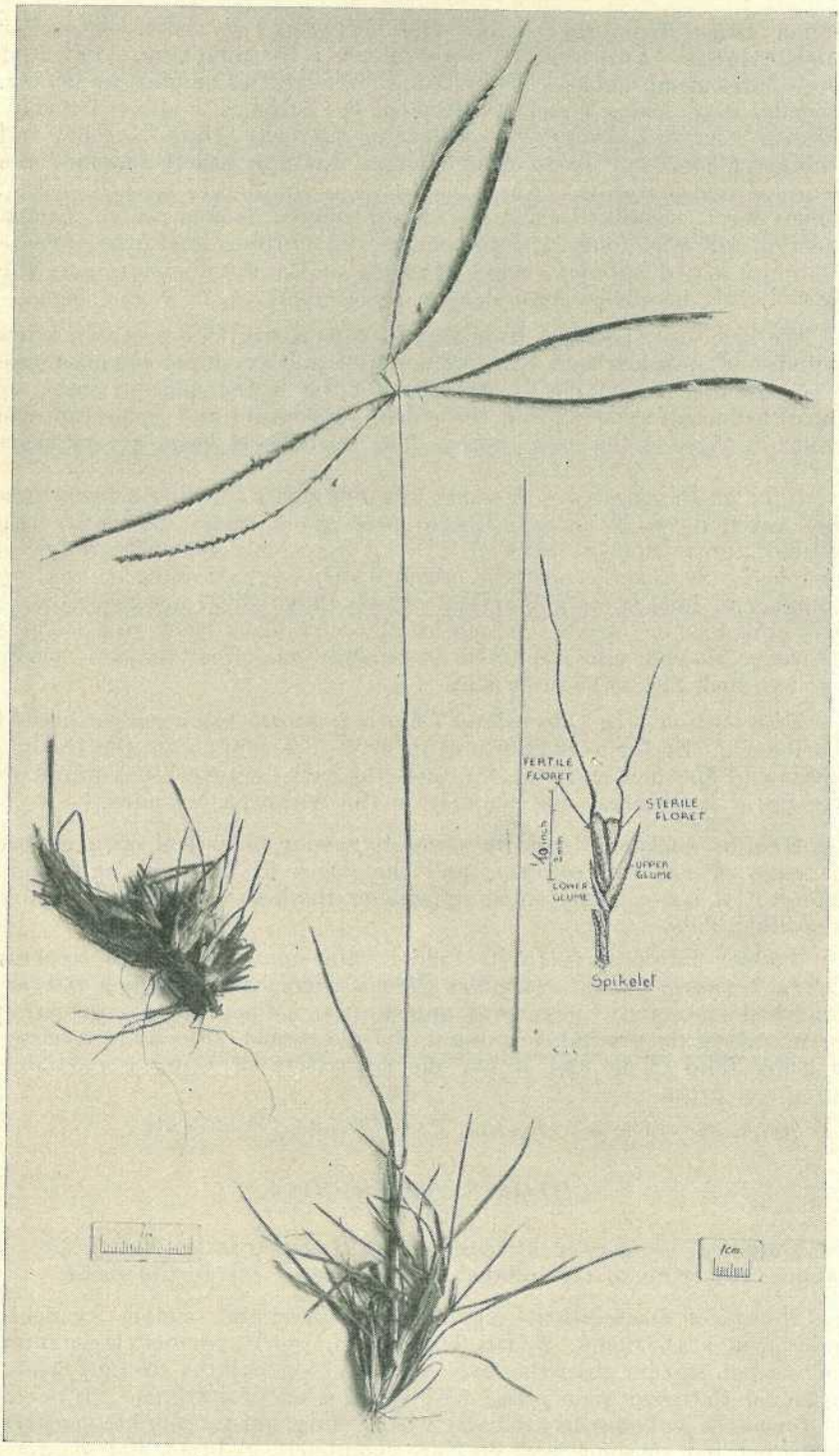


PLATE 5.—CHLORIS TRUNCATA.

Lemma awned from the shallow cleft between two short, obtuse, or truncate lobes. Awn slender, scaberulous, 5-15 mm. long. Palea of fertile floret membranous, obovate, 2-keeled, almost as long as the lemma. Lodicules 2, glabrous, cuneate. Stamens 3. Stigmas 2, short, laterally exserted. Caryopsis triquetrous, linear or narrowly elliptic, smooth and shining, pale brown, up to 2 mm. long. Embryo nearly one-half the length of the caryopsis. Rhachilla between the florets smooth, terete. Upper floret usually consisting of an empty lemma only; lemma 3-nerved, 1-2 mm. long, broadly cuneate in outline, narrowly cuneate in profile, folded but not keeled, truncate at the apex, emarginate, the edges slightly inrolled. Awn slender, scaberulous, up to 10 mm. long.

We have one specimen from Guyra, New South Wales, which bears a number of spikelets with two fertile florets and an empty lemma above them. In this the lemma of the second floret is the same in shape as that of a normal spikelet, and the palea, androecium and gynœcium are similar to those of the lower floret. The third floret bears a very short awn.

Popular Description.—A small, creeping grass forming a dense mat when eaten down by stock. Leaves pale green, short, fine and close together, conspicuously flattened, without hairs, but somewhat rough to the touch. Seed stalks upright, about 1 foot high, bearing at the top a number of long spreading spikes. Upon these spikes are two rows of small spikelets, or "seeds," which usually turn black when ripe. These are wedge shaped, and appear to be sharply cut off at the top. They bear two long fine awns or bristles.

Distribution.—In Queensland *Chloris truncata* has a rather limited distribution. So far as is known at present, it is confined to the Darling Downs and Maranoa districts. In these districts, however, it is abundant over fairly large areas, particularly in the Southern Maranoa.

Habitat.—*Chloris truncata* seems to favour black soil open downs, the edge of red soil country, and the edges of brigalow and belah country. It is not found on sandy soils or the heaviest black soils, such as coolibah flats.

Fodder Value, &c.—In its fodder value and response to stocking *Chloris truncata* closely resembles *Chloris divaricata,* to which it bears a marked similiarity in general appearance. When heavily grazed it spreads along the ground, forming a turf-like sward. Stock are reported as being fond of it, and it has the reputation of being a palatable, nutritious grass.

Reference.—*Chloris truncata* R. Br. Prodr. i, 186 (1810).

CHLORIS VENTRICOSA.

(Plate 6.)

Botanical Name.—*ventricosa,* from Latin *venter*—the belly or paunch, referring to the inflated appearance of the fertile floret.

Botanical Description.—Stoloniferous perennial, stolons branched and rooting at the nodes. Shoots flattened. Lower leaves distichous, internodes much shorter than the leaf sheaths. Leaf sheaths strongly keeled and much flattened, pale green, with broad scarious margins. In two of the forms the leaf sheaths are hairy when young, but usually become glabrous when old, or sometimes they are completely glabrous and scabrous. The other form has much larger glabrous sheaths, which are usually straw

coloured or pale green. Ligule small, membraneous, margin divided into minute cilia. Auricles usually consisting of a thick rim bearing upon its edge a thin, membranous projection, which is a prolongation of the broad, membranous margin of the leaf sheath. In the younger leaves there is usually a tuft of hairs upon the rim of the auricle, though these often disappear as the leaves grow older. Sometimes the hyaline projection of the auricles becomes broken off and only the thickened rim is left. Collar thick, smooth, glabrous. Lower leaf blades usually short and conspicuously flattened, frequently hairy when young, but often becoming glabrous when older. Base of the leaf blade above the ligule often contracted and the edges thickened. In one form the leaves are much longer and broader, and are quite glabrous. The culms are stouter and the plant is much more robust. Spikes 3-9, usually digitate from the apex of the flowering culm, but sometimes 2 or 3 produced from a prolongation of the central axis. Apex of flowering culms and base of spikes thickly set with short white hairs. Rhachis of spikes scabrous, slender, and flexuous. Spikelets usually closely imbricate, sessile. Lower glume 1-nerved, scarious, ovate-lanceolate, acuminate, 1-2·1 mm. long. Upper glume 1-nerved, scarious, linear, linear-lanceolate, or ovate-lanceolate, acute or shortly acuminate, 2·5-4·1 mm. long, usually 3-3·5 mm. Lower lemma 3-nerved, the lateral nerves close to the margin, broadly elliptic or slightly obovate in outline, irregularly elliptic or subrhomboidal in profile, folded and bluntly keeled, keel scabrous, each face of the lemma with a shallow oblique groove; lemma somewhat inflated and embracing the sterile floret, apex emarginate, awned from the cleft, lobes short, obtuse, scabrous or shortly ciliolate. Lower lemma, including the base of the rhachilla, varying in length from 2·4 to 4·8 mm. Awn short and slender, flexuous, scaberulous, 2-10·5 mm. long. Palea membranous, obovate, 2-keeled, keels ciliate. Lodicules 2, small, glabrous, cuneate. Stamens 3. Ovary glabrous, stigmas 2, short, laterally exserted. Caryopsis triquetrous, linear or narrowly elliptic, pale brown and shining, up to 2·2 mm. long, embryo large, nearly half as long as the caryopsis. Rhachilla above the fertile floret smooth, terete, and tough. Sterile lemma 3-nerved or 5-nerved in the upper half by division of the lateral nerves, broadly cuneate in outline, cuneate in profile, and almost enclosed by the fertile lemma, apex truncate and emarginate; surface smooth or scaberulous; 1·3-2·5 mm. long, usually about 2 mm., awned from the cleft of the apex; awn short and slender, scaberulous, 0·8-5·5 mm. long.

Three forms of this grass are met with in Queensland, but as a careful examination of the material in the Queensland Herbarium has revealed a number of intermediates between them, I do not feel justified in separating them. The first one, which was named by Bentham *Chloris ventricosa* var. *tenuis*, is a small, slender plant with spikelets generally about 3 mm. long. The leaves are much the same as those of the second, which Mr. C. E. Hubbard, of the Royal Botanic Gardens, Kew, England, has identified with the plant named by Lindley *Chloris sclerantha*. This generally has the spikelets somewhat larger, 3·5-4 mm., and the plants are stouter. The third one has stout leaves and culms, and is a more robust grass. It grows up to a height of 3 ft. or more, and has longer, stouter spikes. The leaves also seem quite glabrous, whereas those of the other two forms are often hairy, particularly when young. The spikelets are larger and the awns generally relatively shorter, being scarcely longer than the fertile lemma. The fertile lemma varies in length from about 4 to 4·8 mm.

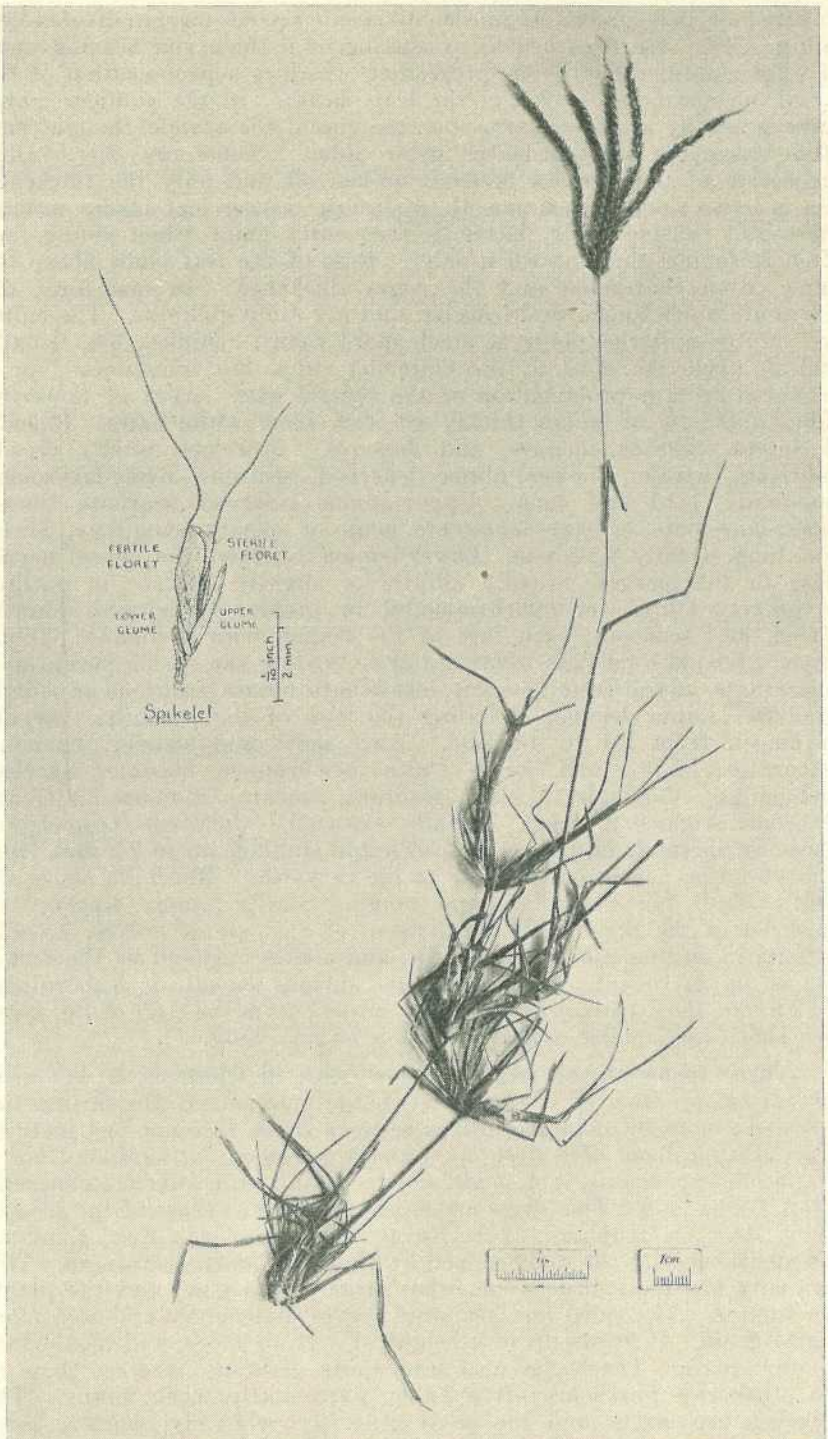


PLATE 6.—CHLORIS VENTRICOSA.

As will be seen, the chief distinction is the size of the spikelets. A very large number of measurements has revealed that variations of more than 1 mm. may occur in spikelets from the same plant, and that the size of the spikelets is not at all constant, considerable overlapping occurring in the size of the spikelets from the different forms. In view of this, it does not seem advisable in the present state of our knowledge to separate the forms under distinct names.

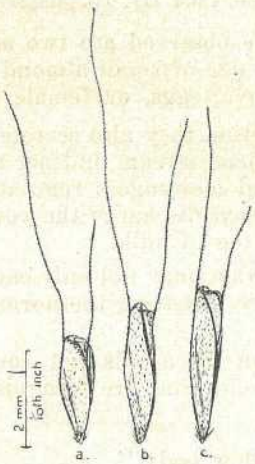


PLATE 7.

The three spikelets shown in Plate 7 illustrate typical examples of the three forms. The plant illustrated in Plate 6 is the second form (*C. sclerantha* Lindl.).

Popular Description.—Perennial grass, rather more robust than *C. truncata,* creeping slightly and forming rather large clumps under good conditions. Leaves in two of the forms short, slender, conspicuously flattened, and usually slightly hairy, though they lose their hairs as they grow older. The third form is larger and more robust, and grows up to 3 ft. or more high. The leaves are larger and coarser. Seed stalks upright, giving off at the top 3-9, usually 5 or 6, flexuous spikes, upon which are borne numerous spikelets or "seeds" in two close, even rows. Each spikelet bears two short, slender awns or bristles.

Distribution.—*Chloris ventricosa* is more widespread in Queensland than *C. truncata.* The small form is found over most of the Moreton district, and in parts of the Darling Downs and Burnett districts. The other two do not seem to approach so near the coast, and are confined to the Western and Central districts. We have specimens from the Darling Downs, Maranoa, Burnett, Port Curtis, Leichhardt, and Mitchell districts.

Habitat.—The various forms of *Chloris ventricosa* mostly favour fairly good soils, though they are found growing in a variety of situations. They are not partial to very light sandy soils, but do well upon the heavier and richer soils of the interior.

Fodder Value, &c.—Like its allies, *Chloris ventricosa* is an excellent feed for stock, particularly sheep. It has the same power of running out and forming a sward, and is a grass worthy of encouragement.

Reference.—*Chloris ventricosa,* R. Br., Prodr. i, 186 (1810). *C. sclerantha* Lindl., in Mitch. Trop. Austr. 31 (1848).

[TO BE CONTINUED.]

Sterility in Dairy Cows.

OVARIAN DISEASES.

By K. S. McINTOSH, H.D.A., B.V.Sc., Animal Health Station, Yeerongpilly.

[*Continued from p. 336, Part III. (September), Vol. XLII.*, 1934.]

THE ovaries as we have observed are two small solid organs, one on each side, about the size of small almond nuts. It is these organs which manufacture the ova, eggs, or female germ cells.

Apart from this function they also secrete certain substances which are discharged into the blood stream and act as chemical messengers in the body. These chemical messengers regulate periods of sexual heat, the muscular impulses which discharge the young calf from the uterus, and the subsequent secretion of milk.

Thus disease of the ovary may not only cause sterility by the failure to produce ova, but also by upsetting the normal regular cycle of sexual heat, &c.

The cause of ovarian disease is not completely understood, but three distinct abnormal conditions are recognised:—

(1) Cystic ovary.

(2) Retained "yellow body."

(3) Fibrosis.

Cystic Ovary.

"Cystic ovary" means the formation of a fibrous walled cyst on one or both ovaries the size of which may be from a pea to an orange. When present, cysts cause frequent and irregular periods of heat without any resulting conception when the cow is served by the bull.

Retained "Yellow Body."

When the ovary discharges the ovum, the latter is replaced by a yellow body in the ovary. If the cow becomes pregnant the yellow body remains intact until the cow has calved when it disappears. If it persists after calving the result is irregular and infrequent periods of heat in most cases with failure to conceive when served by the bull.

To diagnose either of the above conditions it is necessary to feel the ovary with the hand. First cut the finger nails short, grease the hand and arm, and introduce into the rectum or back passage. Do not attempt to feel them through the vagina as it is impossible to do so and considerable injury to the cow will result. Unless the rectum is empty it must be emptied by hand and then placing the palm downwards gently feel the vagina, the neck of the uterus, the body of the uterus, and then the ovaries. The last named lie a little below and on either side of the rectum and move about freely on their loose attachments. Now gently but firmly capture the ovary in the fingers and roll it about feeling carefully for any rounded projections from its surface. If one (or more) of these is felt, endeavour to squeeze it out by pressure with the thumb. If it will squeeze out with reasonable pressure, it is probably a case of retained yellow body, but it is practically impossible to remove ovarian cysts in this manner. If the yellow body is pressed out the cow should again be served at the next period of heat. It must be

remembered, however, that the examination, &c., is being performed through the wall of the rectum and that violent or undue pressure must not be exerted. The operator should also guard against pinching the wall of the bowel or digging it with the finger nails.

As a general rule yellow bodies may be squeezed out leaving quite a small concavity on the ovary, but this is impossible with the cysts for which no home treatment can be recommended. Thus if a cyst is found it would pay to spey the cow, milk her till dry, then sell her to the butcher.

Fibrosis of the Ovaries.

This means that the fibrous tissue which normally forms the framework which holds the ovarian tissue proper has replaced the ovarian tissue and squeezed it out of existence. The result is that the animal may not come on heat at all, and as she cannot manufacture ova or germ cells she is barren. This condition is sometimes met with in old cows or cows which have chronic inflammation of the ovaries. When felt between the fingers the ovary is small and hard. Speying is the only satisfactory method of dealing with fibrosis of the ovaries.

The cause of ovarian troubles is obscure. In many cases they appear to be associated with contagious abortion.

DISEASES OF THE FALLOPIAN TUBES.

The function of the Fallopian tubes is to carry the ova from the ovary to the uterus, thus anything which causes an obstruction of these tubes causes sterility. The commonest cause of obstruction is inflammation, which is in practically all cases an extension from infection of the uterus. The condition is extremely difficult to diagnose and treatment is impossible. Still it is important to know that such may exist and that prevention lies in keeping the uterus healthy.

DISEASES OF THE UTERUS.

The most serious disease of the uterus with which the farmer has to contend is contagious abortion. It is unnecessary to stress the economic importance of this disease to dairy farmers. Suffice to note that it is perhaps the most serious disease with which the dairy farmer is confronted.

The cause is a germ known as the *Bacillus abortus* which lives and grows on the body of the diseased animal and is voided in the afterbirth and discharges from the uterus and also in the milk. It can live and remain infective for some time in these discharges outside the animal body. Thus the disease is contagious—that is, it spreads from one animal to another.

How the Disease is Spread.

The disease is introduced into the herd by the introduction of an infected cow. Three methods of infection are recognised:—

(1) By eating material contaminated with discharges from a diseased cow. This material may consist of grass and pasture plants or perhaps the afterbirth or discharges.

(2) By direct mechanical transmission by the bull. Bulls themselves are sometimes affected with the disease when it may cause inflammation of the testicles or perhaps no visible change in the genital organs. The bull should, however, be regarded as a potential carrier of the disease.

(3) By infection via the teat canal during milking or by contact of the external opening of the teat with contaminated pastures.

The germ of contagious abortion in the animal body is situated in the uterus when the cow is pregnant and for some weeks afterwards, and in the udder whilst the cow is milking.

A common method of introducing the disease into the herd is by using a neighbour's bull or allowing a neighbour to bring his cows to the bull for service.

From the above it will be seen that contagious abortion is not a sporadic disease, but is introduced into the herd by an animal already infected.

When calves are born they are heavily contaminated with the abortion germ but soon lose the infection, it being held that the germ can only live in the sexually mature animal.

Symptoms.

In a typical case of the disease the first symptom noticed is abortion. This is frequently attended by retention of afterbirth. Following the first abortion one of three things may happen:—

(1) The cow may again become pregnant and later abort, doing this several times until she finally becomes sterile or bears full-time calves.
(2) She may revert to normal.
(3) She may become sterile.

Once an animal has contracted the disease she may show the above symptoms, or may appear healthy throughout. Investigations have shown, however, that once a cow is affected she remains a carrier for the rest of her life and thus a danger to clean animals.

Diagnosis.

If one or more cows on a farm abort for no apparent reason then contagious abortion should be suspected, particularly if the trouble is followed by sterility in some cases. It is impossible, however, to diagnose the case with any degree of certainty without a blood test carried out in the laboratory.

If the disease is suspected blood should be taken and forwarded in accordance with the following instructions:—

After clipping away the hair with a pair of scissors, cut with a sharp knife across a large vein on the top outside of the ear, and allow the blood to flow direct into a *scrupulously clean and perfectly dry bottle*. Half a fluid ounce (one tablespoonful) of blood is required, in an ounce bottle. The sample must not be shaken up, but left to stand undisturbed for an hour or two in order to form a firm clot. Then pack, address, and despatch the sample so as to reach the Animal Health Station, Yeerongpilly, with as little delay as possible. Decomposed samples of blood are of no use for the test. If the bottles containing blood are placed on ice or in a cool chamber before being despatched they carry very well.

Parcels should be labelled with the sender's name and address to enable easy identification. The test is carried out free of charge, but we cannot supply bottles.

Elimination and Control.

No satisfactory method of treatment of affected animals has yet been evolved, and the eradication and control of the disease in a herd present very serious difficulties. The simplest and only effective method of dealing with the disease is by eradication.

Firstly, samples of blood from every individual in the herd (including bulls) are submitted to the agglutination test. After the test all positive reactors must be immediately removed from the holding. A second test should follow two months later and again all reactors removed, and so on until two clean tests are obtained.

Practically all of the diseased cattle will be eliminated on the first test but some will not, hence the necessity for subsequent tests.

Should it be discovered that a large percentage of a herd is affected, the course to be pursued then depends upon the financial position of the owner. If he can afford to adopt the eradication method all well and good, but in many cases the sale of such a large portion of the herd would mean disaster. Thus a modification of the above is adopted in many cases in other States. This is known as the two-farm method. This means the division of the farm into two distinct and separate farms divided by a double or buffer fence. On one farm are kept the abortion-free animals and on the other the reactors. If the scheme can be carried out thoroughly it is sound and means the gradual eradication of the disease from both farms. On weaning, the calves must be run in a clean paddock until of breeding age, and then introduced into the clean herd. On no account must they be fed on milk from the abortion herd nor must they be allowed contact with them or the clean cows. Poddies and older calves must, of course, be run separately.

The third method is unsatisfactory, but unfortunately is one which some farmers would be forced to adopt on account of the financial difficulties presented by either the eradication or two-farm method.

This consists of attending to cattle subsequent to aborting or calving in an endeavour to prevent their becoming sterile. No attempt is made to eradicate or control the disease, but an endeavour is made to minimise losses by preserving the fertility of the cows. In time, despite all treatment, some of the cows will fail to breed and these should be speyed, fattened, and sold to the butcher.

Eventually practically all of the animals in the herd will become affected and remain carriers. Abortions become fewer as the cattle pass the aborting stage, and most of the trouble is encountered with young stock which have not yet acquired their tolerance to the disease. Losses through abortion and sterility, though not as a rule drastic, will continue indefinitely, and it is for the stockowner to decide whether he can stand the first loss and avoid future trouble or whether he prefers a small but continuous drain on his profits.

General.

It is interesting to note that recent work has shown that the *Bacillus abortus* may be much more important than was previously imagined. For many years it has been recognised that this and another similar germ affecting goats is the cause of undulant fever in man. Not many cases of this disease in man have been recorded in Australia. It does not cause abortion in humans.

Pure cultures of *Bacillus abortus* have been isolated from unopened cases of fistulous withers in horses, and until further work is done we must regard any horse affected with fistulous withers as a probable carrier of the disease.

The germ has also been found pure in large waterly swellings (hygromata) in the vicinity of joints of cattle.

Pigs also become affected with the abortion germ which causes a disease similar to that seen in cattle. Field observations so far have not shown abortion in pigs to be of very great importance except in isolated outbreaks.

Fowls are mechanical carriers of the disease, the germs passing through their digestive system, and as fowls are omnivorous birds they may easily feed on afterbirth and later from the feed bin; hence their danger as mechanical carriers.

Warning.

In spite of the tremendous amount of scientific work which has been done in this and other countries no cure has yet been evolved for the treatment of contagious abortion. The employment of so-called preventive and curative treatments by drugs, chemicals, vaccines, &c., only results in waste of time and money, and disappointment to the farmer.

Sporadic or Accidental Abortion.

Various factors such as mechanical injuries, acute general disease, certain drugs, drastic purgatives, certain weeds, &c., may at times cause abortion in individual animals, but if this occurs the cause is usually fairly obvious. If any uncertainty exists it would be as well to forward a specimen of blood for test for contagious abortion.

Retained Afterbirth and Metritis.

Metritis simply means inflammation of the uterus or womb and is usually the result of abortion or infection subsequent to calving. The commonest cause of this infection is retained afterbirth.

The afterbirth consists of various membranes which surround the calf before it is born and it is through them that it gains its nourishment and gets rid of its waste products. The membranes are attached to the calf at the navel and to the uterus of the mother by means of a number of so-called "buttons" or cotyledons. These "buttons" consist of tufts of tiny finger-like processes which interlock with similar processes on the uterine "buttons." When the cow calves the contraction of the muscular walls of the uterus not only expel the calf but also squeeze the finger-like processes of the membranes away from their corresponding processes on the uterus and thus allow the expulsion of the afterbirth.

Sometimes through lack of muscular tone of the uterus and often in the case of abortion the separation of the opposing pairs of "buttons" does not take place and the afterbirth is retained. Normally, it is expelled within twenty-four hours after calving, and if this does not happen the cow has to be assisted in removing it. Flushing of the uterus with warm weak Condy's crystals solution together with gentle but steady traction will sometimes bring it away. In many cases, however, it is necessary to remove the membranes with the hands.

Firstly, the finger-nails should be cut short and the hands scrubbed thoroughly clean. Next wash the external opening and hind parts of the cow. Lubricate the arm and hand with carbolic oil and insert the hand into the uterus.

The "buttons" will be readily felt and an attempt should be made to separate as many as possible from their corresponding "buttons" on the wall of the uterus. If the free end of the membrane is pulled gently from time to time this will assist the work. When the operation is complete, flush out the uterus with large quantities of weak Condy's crystals solution by means of a funnel and a piece of rubber tubing.

The cow should be given greenstuff to keep her bowels open, also a dose of from 10 oz. to 1 lb. of Epsom salts, 1 oz. of ground ginger in a pint of water. If the weather is cold rug her or place her in a shed. Flushing out should be continued as long as there is any discharge present.

DISEASES OF THE VAGINA.

The only disease under this heading is vaginitis. It is probably responsible for more cases of sterility than any other one complaint. Probably the cause is a filterable virus, i.e., a germ too small to be seen by means of the microscope, yet demonstrable by the fact that infective material will transmit the disease. It is very widespread throughout the dairying districts of Australia, is very contagious, and the means by which it is transmitted are only partly understood. It is certainly spread from cow to cow by the bull, but as poddy calves also become affected other agencies, probably dust and flies, are also involved. Three forms are recognised, namely:—

Contagious granular vaginitis.

Congestive vaginitis.

Purulent vaginitis.

The firstnamed is by far the commonest form. It is characterised by the formation of numerous small shot-like or blister-like elevations on the lining membrane of the vagina accompanied by a certain amount of reddening. Congestive vaginitis appears as a streaky inflammation of the membrane of the vagina.

Purulent vaginitis causes a slight discharge of pus from the vagina which often sticks the hairs together at the tip of the vulva. The treatment is as follows:—

Procure a 1-pint brass syringe and a number of lengths of rubber tubing.

Dissolve 12 oz. of zinc sulphate in 1 quart of water. This makes a stock solution. Add 1 oz. of stock solution to 1 gallon of water to make the solution for treatment. Each cow should be douched with 1 pint of the solution. As each cow is finished, disconnect the rubber tubing from the syringe, drop it into boiling water, and fit a fresh piece. The tubing may be used again after immersion in boiling water. Treat all cows for three weeks on every alternate day irrespective of pregnancy or whether they appear to have the disease. Then treat each cow in a like manner after calving. This method means extra work and time but is the most effective treatment known.

Frequently the sheath and penis of the bull become infected from cows suffering from vaginitis. He should receive the same routine

treatment as the cows and, in addition the sheath should be syringed before and after service with a weak solution of Condy's crystals.

To accomplish this it is necessary to run the bull in a separate paddock and take the cows to him for service. This is not only desirable from a disease control standpoint but for many and obvious reasons.

OTHER CAUSES OF STERILITY.

Sterility may be the result of any of the following:—Growths in the genital apparatus, tuberculosis of the genital organs, overfat or poor condition, hereditary deformities, mineral deficiency, mechanical injuries, and overworking of bulls.

Of these, tuberculosis and mineral deficiency. It is impossible to deal with these subjects in an article of this nature, but it is hoped that they will be dealt with in the pages of this Journal in the near future.

Summary.

The two outstanding causes of sterility in dairy herds are vaginitis and contagious abortion. Losses due to sterility are in many cases preventable.

It is a practical and payable proposition for a farmer to make every endeavour on the above lines to reduce his losses from this cause to an absolute minimum.

EXPIRED SUBSCRIPTIONS.

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

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

Subscribers whose term expires with this issue are reminded similarly.

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

Clean Crops and their Value to the Farmer.

By A. E. GIBSON, Director of Agriculture.

A CLEAN home amid pleasant surroundings is the pride and joy of the housewife who takes any interest in her own and her family's welfare. Similarly, clean crops and cultivation areas should be the pride and ambition of the farmer who is seriously engaged in farming operations for the maximum return which he can obtain for his labours. When it is considered that it is both expensive to cultivate paddocks for a return of grain or fodder which includes foreign growth to the detriment of the value of primary products, the question naturally arises why is the primary producer so careless of his own particular welfare. Clean seed sown on clean cultivation areas under normal conditions gives the highest monetary return for the trouble and expense of producing a crop, in fact the maximum is obtained by so doing, but where cultivation areas are nothing more or less than propagating fields for the growth of weeds and foreign growths generally, the results are both discouraging and productive of monetary loss. Some few months ago some attention was drawn to this phase of farming operations on the Downs through the medium of the press, and although it was expected that the wrath of the farming community generally would be evidenced in a series of replies through the same source, much surprise and gratification was felt at the receipt of some complimentary remarks from practical farmers, who stated that advice on these lines was welcomed by them and asked for more.

In the preparation of his fallowed areas the average farmer gives little consideration to the fact that the eradication of weeds and foreign growths from such areas is a costly business, meaning generally increased wear and tear on machinery, additional costs where fuel and oil are concerned if tractors are used, and the expenditure of much energy on the part of horse teams where such are utilised. The remedy appears to lie in tackling the problem from another angle, and although this may entail some initial expense in the way of making fences sheep-proof, the ultimate result will well repay the additional cost of labour and material involved. In passing through the Darling Downs either by car or rail the Southern farmer is not impressed by the state of the boundary fences, and although it is difficult in the heavy basaltic soils of this State to keep fences in good order, lack of attention, in many cases, is chiefly the cause of their condition. Fencing posts, if originally split from sound material, last for many years, and it is maintained that if most of the fences were reconditioned, utilising two or three droppers of sawn hardwood as substitutes for posts, the item of expense where posts are concerned could be considerably lessened. The addition of wire netting of suitable gauge and height both strengthens and sustains such a type of fence and at once converts the property into one which is capable of keeping sheep within bounds. The conversion of weeds and foreign growth into wool and mutton is a much cheaper proposition than their eradication by means of implements and the expenditure of personal energy. Additionally, the value of sheep manure is a factor which is overlooked. Whilst their value as a means of checking rank growths of winter cereals is universally acknowledged, this system is

not adopted to the extent to which it might be. Wheatgrowers are well aware that nothing stimulates the growth of a crop or has the same tillering effect as when fed off by sheep. Cattle have not the same value and greater damage accrues to the cultivation.

Headlands, those prolific sources of weeds, are kept in order and the resultant crops, provided that clean and graded seed is utilised for sowing operations, are improved at no extra cost. During last wheat season the prevalence of oats in the wheat crops made it difficult to pronounce whether the original crop was oats or wheat, so badly infested were the paddocks. A continuance of this class of farming must result in loss to the grower by reason of the dockages imposed. I have in mind two particular paddocks, each of considerable area, one of which had had sheep agisted thereon, whilst the other had been allowed uninterrupted growth—apart from cultivating operations; the result was worthy of notice. An almost total absence of oats was noticeable in the one instance, whilst the other was a 50-50 admixture of oats and wheat, which harvesting operations would only intensify.

Canary seed, which comes under the control of the Canary Seed Pool, is another primary product which is productive of much trouble and annoyance to the Board, and ultimately to the individual grower. It is the rare exception to find a consignment of canary seed which has been harvested from clean paddocks, and the amount of freight which is paid by the Board for the transport of weed seeds and rubbish from the growers' stations to Brisbane where it is cleaned, would, if such consignments were clean, mean an additonal advance to growers. Commodity Boards which handle grain are invariably blamed for the cost of operations, but farmers are apt to overlook the fact that they are contributing factors themselves by reason of their lack of approved farming methods. To say that it is impossible to keep a paddock clear of weeds is but a poor compliment to their own efficiency. It is admitted that certain growths are difficult to control, but where such are present the spirit of *Lassez faire* is only too evident, with the result that truth prevails in the statement that one year's seeding means nine years weeding, and paddocks ultimately become useless for the profitable production of grain. Fields which are so badly infested with mixed growths of grain can to a certain extent be handled by cutting the crop for hay purposes, care being taken to see that the grain is sufficiently immature at the time of cutting to ensure that no subsequent propagation at least from that crop will eventuate—better still if the crop is utilised for silage—but in both cases it is only an economic proposition to handle a relatively small area. Wild oats will, as is well known, lie dormant in the soil for years and will only germinate when conditions of soil moisture, temperature, and tilth are favourable for their germination. As oats, and particularly wild oats, put in an early appearance on the fallows sheep are the most efficient and economical controllers of such growth. Occasionally vegetable growths put in an appearance which cannot be dealt with by stock, and where such occurs it is a matter of urgency that these be eradicated at once—if necessary by poisoning. Wild Chickory (sometimes termed Lignum) is perhaps one of the most troublesome in this regard, as its admixture with a crop practically renders harvesting impossible.

Growers of lucerne for marketing direct know the value of clean lucerne paddocks free from the inclusion of grass, particularly where this legume is marketed in the form of hay, as nothing deteriorates the

value of lucerne hay, even if perfectly cured and baled, more than the inclusion of grass. Quotations which appear in the daily press are to the effect that prime leafy well-baled hay will fetch top price and the inevitable grassy lines 2s. 6d. to 3s. lower.

Remember that the item of freight amounts to exactly the same amount per ton on produce produced under indifferent conditions as that on prime produce—wherein, then, is the sense of paying a tax on production in freighting rubbish, weed seeds, &c., to the marketing centres to buyers who are looking for the best, but if forced to do so will purchase a lower quality article at a considerably reduced value—entirely to the detriment of the careless producer.

In connection with advice dealing with clean crops, it is necessary that some mention should be made of the Pure Seed Act, which, as farmers are probably aware, was brought in for their protection, and if they neglect to use the facilities which are made available for them, then they themselves only are to blame.

The purchase of inferior seed is in the end the most costly investment, and one which in this period of low prices for primary commodities cannot be economically entertained. Similarly the control of smut, bunt, and other fungoid diseases is the function of this Department, and advice on such matters is always obtainable. I mention this simply for the purpose of reminding farmers that the assistance of the Department of Agriculture is at all times tendered to the farmers on matters pertaining to their welfare.

QUEENSLAND SHOW DATES, 1935.

July.

Bowen, 3 and 4.
Ayr, 5 and 6.
Townsville, 9 to 11.
Kilcoy, 11 and 12.
Cleveland, 12 and 13.
Rosewood, 12 and 13.
Charters Towers, 16 to 18.
Nambour Show, 18, 19; Campdraft, 20.
Cairns, 23, 24, 25.
Atherton, 30 and 31.
Gatton, 31 July and 1 August.

August.

Caboolture, 2 and 3.
Pine Rivers, 9 and 10.
Royal National, 19 to 24.
Home Hill, 30 and 31.

September.

Brisbane River Carnival and Campdraft, Esk, 6 and 7.
Imbil, 6 and 7.
Pomona, 13 and 14.
Tully, 13 and 14.
Rocklea, 14.
Beenleigh, 20 and 21.
Innisfail, 20 and 21.
Kenilworth, 28.

October.

Malanda, 2 and 3.

Quality in Bright Tobacco and Home Grading.

N. A. R. POLLOCK, H.D.A., Senior Instructor in Agriculture.

[*Continued from p. 568, Vol. XLIII. (June, 1935).*]

Home Grades.

IT is not to be supposed that leaf of the various sizes enumerated and all colours other than green will be found in any one crop, or that injury will be experienced in each of the percentages stated.

Sizes will usually be confined to three above 8 inches. Colours other than green to two, or, in odd instances, to three, and injury to little or much, according to prevalence or otherwise of disease, injurious insects, adverse seasonal conditions, and the grower's attention.

The following grades, according to the sizes defined, are suggested for growers' attention. In each case the grade will be qualified by one of the colours, as lemon, bright mahogany, mahogany, or dark, except in shorts and scrap. All leaf with a definite green cast should be reconditioned and bulked for a further period. In each of the numbered grades the body or thickness of each leaf, as well as colour, shade, and finish, should agree. Dusky or dark colour shades should not be confused with walnut or dark mahogany colour. In the latter the body of leaf is heaviest.

Grade 1 (L1, BM1, M1, or D1, according to colour and body).—Light-colour shade. Bright finish. Tolerance 5 per cent. injury or blemish.

Grade 2 (L2, BM2, M2, or D2, according to colour and body).—True colour shade. Bright to clear finish. Leaf with a greenish-yellow tinge may be included. Tolerance 10 per cent. injury or blemish.

Grade 3 (L3, BM3, M3, or D3, according to colour and body).—True colour shade. Clear to normal finish. Leaf with a yellowish-green tinge may be included. Tolerance 15 per cent. injury or blemish.

Grade 4 (L4, BM4, M4, or D4, according to colour and body).—Fairly true colour shade. Dull finish. Tolerance 20 per cent. injury or blemish.

Grade 5 (L5, BM5, M5, or D5, according to colour and body).—Dusky colour shade. Cloudy finish. Tolerance 40 per cent. injury.

Grade 6 (L6, BM6, M6, or D6, according to colour and body).—Dark colour shade. Dingy finish. Tolerance upward of 40 per cent. injury.

Bright Shorts (BS1).—Leaf 8 to 12 inches in length of insufficient quality to conform to grades 1 or 2 in lemon or bright mahogany. Tolerance 20 per cent. injury or blemish.

Bright Shorts (BS2).—Leaf 8 to 12 inches in length similar to BS1, but with greater injury.

Dark Shorts (DS1).—Leaf 8 to 12 inches in length of insufficient quality to conform to grades 1, 2, or 3 in mahogany or walnut. Tolerance 20 per cent. injury.

Dark Shorts (DS2).—Leaf 8 to 12 inches in length. Dark colour shade. Dingy finish. Showing upward of 20 per cent. injury.

Bright Scrap.—Leaf under 8 inches long and leaf very much broken, or pieces of leaf of a generally pale to true lemon or bright mahogany colour shade. Free from string, suckers, dirt, or other foreign matter. Is not tied into hands.

Dark Scrap.—Leaf under 8 inches long and leaf very much broken, or pieces of leaf of a generally dark colour, irrespective of body. Free from string, suckers, dirt, or other foreign matter. Is not tied into hands.

Green.—The grading of leaf with a definite green cast is not suggested. Should it, however, be found necessary to offer it for sale it may be graded according to the shade of greenness and extent of injury.

The grower will improve his knowledge of quality in flue-cured tobacco and his skill in classification of leaf by examining his grades to see if they respectively conform to the specifications of an American standard.

Hands.

After the leaf has been sorted into the different grades it is tied into hands, each containing from twelve to twenty leaves according to their size. It is not necessary to count the leaves to form a hand, but a sufficient number should be used to make the butt measure as near as possible 1 inch in diameter; if made too big the hands are less presentable and liable to become loose.

Medium-sized leaves of the same colour, made extra limp by steaming or other suitable means, are used to bind the hands. Each such leaf is folded so that the midrib will be on the inside and not show when the hand is tied. Grasping the bunch of leaves in the left hand, the butts are beaten or pressed down until they are level. The binder is then held with the tip pressed firmly against the stems about 1½ inch from the ends by the left thumb and wound tightly round with the edge about ⅛ inch above the butts until about 4 inches remains. The leaves of the hand are now evenly divided and the butt end of the binder pulled through to keep it from becoming unwound. A neater tie is made when the binder is made to cover the ends of the butts before being wound around, but this is not essential. The binder should not reach too far down the hand, a width of 1½ inches to not more than 2 inches with large leaf from the butt end being desirable.

Hands of even size neatly tied render the tobacco much more attractive and tend to influence a better offer. Packages should be neat and clean with growers name and other particulars neatly stencilled thereon. Particulars regarding packing will be found in "Tobacco Growing in Queensland."

In conclusion, the following facts are worthy of careful note:—The smoking quality of ripe leaf from each district is known to buyers who base their offers accordingly. There is little disparity in the highest prices recorded at auction or otherwise for best quality leaf of each Queensland-producing district. Ripeness is the prime essential, and is indicated by colour and leaf aroma. Values will be lessened by blemish, damage, and inferiority of texture, but to a greater degree by unripeness. It has been abundantly demonstrated that unripe leaf is not wanted. The grower is known by his product.

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GARDEN FURNITURE FROM ROUND TIMBER.

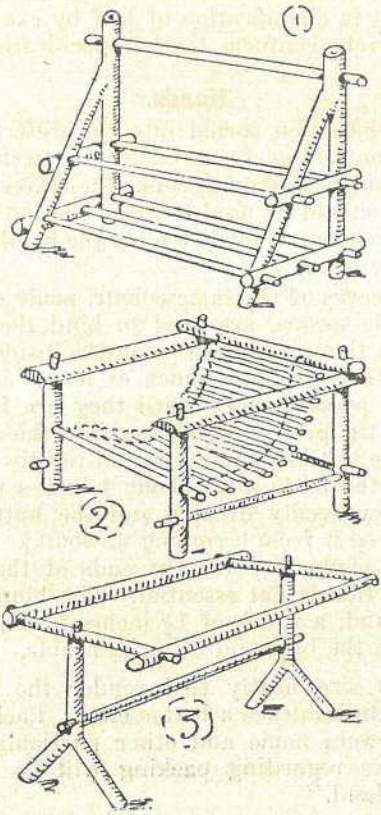

PLATE 8.

Taking advantage of natural forks and curves, No. 1 shows a plant stand using forks for the uprights boring right through for the cross-pieces.

No. 2 shows a lounge chair with round uprights to split slabs for the arms, dowelled together, the seat made of bush sticks threaded with wire, or weave the wire on two strands over and under, cut off the projecting round tenons or dowels when finished; they are left in the sketch to show method of working.

Sketch 3 is a table with forks for legs, cover with boards or round sticks close together if the rustic effect is required. The only tools required are a fairly fine-toothed saw, a brace and a couple of bits, a chisel or even a knife and a hammer. Leave the bark on if possible, or peel, stain, and varnish with a cheap varnish stain.

Tobacco Diseases.

SMOKING TESTS.

The Australian Agricultural Council received at its last meeting a report of the tobacco investigation work of the Commonwealth Bureau of Scientific and Industrial Research. The report follows:—

THE investigational work undertaken by the Commonwealth Bureau of Scientific and Industrial Research covers the following four phases:—(1) Disease studies; (2) chemical investigations; (3) curing experiments; (4) processing investigations and smoking tests.

Disease Studies.

(*a*) Of the disease studies those concerning Downy Mildew (Blue Mould) still occupy the most important place, as this disease has continued to take heavy toll of the crop during the last two years in marked contrast with the relatively disease-free crop of 1932.

Experiments have been concentrated mainly on seed-bed control because, although in late summer and autumn field mildew attracts much attention, especially in the later planted crops, it is the seedling supply which determines initially the potential crop. These experiments are briefly described in the succeeding five paragraphs.

(i.) Experiments in the use of copper emulsion, colloidal copper, and Bordeaux mixture sprays were carried on at Wangaratta, Victoria, and Deniliquin and Ashford, New South Wales. The sprays did not prevent infection, but they tended to check the spread of the disease. Bordeaux mixture was not as effective as the sprays recommended by the Queensland Department of Agriculture.

(ii.) At Ashford, in co-operation with the New South Wales Department of Agriculture, and at Wangaratta, the "Bathurst" type of seed-bed was used to ascertain whether healthy seedlings could be raised without the use of sprays, but during the past season they were not successful in preventing or controlling Downy Mildew.

(iii.) During late spring and summer experiments on a small scale were designed in Canberra to test the effects on the disease of the use of substances which would vaporise readily, such as petrol, toluol, benzol, &c. These were distinctly promising and accordingly, despite the fact that it was autumn, a larger scale trial was set up in Canberra and at Eurobin, Victoria. In the former place 14 cold frames were used, and at Eurobin, by courtesy of Panlook Bros., 17 seed-beds of the "Bathurst" type were made available. The experiments are still in progress and are available for inspection. In both places toluol and benzol were used, and at Canberra petrol additionally with adequate checks. Vapours were used only when beds were closed, i.e., at night and when days were wet, and during fine days they were wide open. All beds were inoculated heavily with viable conidia two or three times in addition to natural exposure to infection by day. The check beds are wiped out; the benzol-treated beds are free from disease, and the toluol-treated beds show a little disease.

The trials will be continued during the coming spring. At present we can say that the experiments have given extremely satisfactory results, especially with benzol, but much more work remains to be done.

Immune Varieties.

(iv.) Whatever control may be reached by the application of substances to plants it is costly as compared with the use of resistant or *immune* varieties. No varieties of commercial tobacco are resistant, but some are not so highly susceptible as others. The testing and crossing of some types is in progress, but it is felt that the chances of obtaining a truly resistant type, particularly from commercial varieties, are rather slender. One avenue should be explored, however, and that is the search in the native home of tobacco, viz., South and Central America, for types which, while not commercially valuable, might be resistant to the disease and, therefore, valuable in hybridising with some of our commercial lines to build up resistant strains.

(v.) Data are being accumulated with respect to the incidence of epidemic outbreaks and climate, host relationships, overwintering, &c. This year again the disease is occurring in the field wherever plants are still standing. *Nicotiana glauca,* a wild host, was found on 16th May to be heavily infected at Cobram, Victoria, which used to be a centre for the growing of seedlings.

(*b*) The other disease which has been under investigation is that which is known as Frogeye and which may be serious in Central and North Queensland in wet seasons. In a preliminary publication it was pointed out that the fungus causing the disease may be found associated with the seed, leaf scrap, the soil, and overwintering plants, and that it could be controlled by using clean seed in clean seed-bed soil and by spraying the seedlings. Experiments conducted at Mareeba showed that sprays recommended by the Queensland Department of Agriculture for Downy Mildew control are effective in seed-bed control of leafspot.

Chemical Investigations.

These are in progress at the University of Sydney and are designed to discover the causes of low quality in certain leaf and ultimately to devise methods whereby improvement in quality may be effected. Having been started not quite a year ago it follows that preliminary work only has been possible, but tests show that leaf of low quality tends to be low in carbohydrate, high in nitrogen, and to give smoke which is highly alkaline to litmus.

Chemical analyses of samples of natural or processed leaf are correlated with smoking tests. The following table illustrates relative values for certain samples:—

Sample Smoking Quality.	Good American.	Australian Good.	Australian Good.	Australian Good.	Australian Poor.	Australian Poor.
Alkalinity	..	1·0	1·4	2·0	10·6	11·3
Nitrogen content ..	1·77	1·52	1·32	1·69	3·42	4·00

Studies were begun on the changes in nitrogen constituents in the plant during growth, through the processes of topping, suckering, and early ripening, and finally during curing.

Curing Investigations.

In order to determine whether the longer curing processes adopted in other countries for heavier types of leaf were applicable to heavier

leaf in Australia, trials in which the curing was more prolonged, especially at lower initial temperatures than is usual, have been in progress at Wangaratta for three years. Smoking tests on this year's trials have not been made, but results from the previous seasons show that with mature, fine-textured leaf there is no advantage in prolonging the curing process at present in use, whereas with heavy and/or immature leaf both colour and quality were improved by a 10-14 days' curing period.

Processing Experiments and Smoking Tests.

Smoking tests are in progress with cured leaf before conditioning and storage for maturation, after maturation but before processing and manufacture, and after manufacture. They are correlated with chemical analyses, curing methods, soil type, climate, &c., and cover the range of samples which the various States have agreed to provide.

Processing experiments were commenced in Sydney about a year ago and some 1,000 lb. of leaf has been conditioned and stored for varying periods of maturation. Preliminary manufacturing tests with 1932 crop leaf involving the use of sugar, honey, liquorice, and such acids as acetic, malic, citric, &c., have been made, and these tend to indicate that smoking quality is improved by such treatments. The work is obviously still in the initial stages.

THE KING AS A FARMER.

His Majesty the King is identified closely, both by inclination and residence, with the farming industry.

Windsor, the traditional home of the Kings of England for centuries past, has always been a centre of the farming activities of the Royal House.

From the early centuries, when Windsor Forest was the hunting preserve of the reigning monarch, we come down to more recent times, when the Home Farms were established on more practical lines. At Windsor there are 175 cattle, 300 breeding ewes, a herd of Middle White sows, and about 1,000 head of poultry.

The cattle comprise pure-bred shorthorns, Herefords, Devons, Jerseys, and non-pedigree dairy shorthorns. The ewes are Border Leicester-Cheviot, crossed with a Southdown ram, and a large white boar is crossed with the middle white sows. Indian game cockerels are used with light Sussex hens in order to provide a good bird for the table.

All the milk, butter, and cream required for the Royal household while in residence at Buckingham Palace or Windsor Castle is sent from the royal farms every morning by road.

About 3,000 acres are farmed by the King at Sandringham, Norfolk, and on no estate in that county is the motto that "Property has its duties as well as its rights" more loyally or practically construed than at Sandringham, and no landowner possessing an estate of such magnitude within the county takes greater interest in its economy or is more conversant with every detail incident to its management.

At Balmoral in the Scottish Highlands, His Majesty has an excellent herd of Highland cattle, which has many victories to its credit. It is not, perhaps, given to this breed to obtain the supreme championship at the fat stock shows, but the King's herd of these picturesque, shaggy Highland cattle is invariably well forward in its breed classes, and has won the breed championship on many occasions both in Edinburgh and London.

The Potato *(Solanum tuberosum)*.

ITS CULTIVATION IN QUEENSLAND.

THE varied climatic conditions and environment under which this crop is produced in Queensland conduce to a close study of local conditions to ensure success. In the potato-growing districts of the Southern States, where there is a recognised spring planting and an autumn harvest, little difficulty is experienced in providing for a supply or change of seed, but, with two distinct crops in the year common to most parts of our State, it is essential that, for one crop at least, imported seed must be secured; and in the more Southern districts contiguous to the coast where a partial immunity from frosts prevails, brought about by a proximity to tidal waters or by specially sheltered or elevated ground, the planting season may commence in July on the warm soils, and the risk is taken with a prospect of high prices for the early crop.

Leaving the coast, August becomes the general month to plant; but on the Downs late frosts put the time back to September; again, in localities within reach of the main railway line in the elevated and more temperate country lying near the New South Wales border, the same reason often delays the planting until October.

To cater for the July or August trade, large quantities of seed potatoes are imported. These may be from any part of the Southern States, where one crop one season is the rule; and the practice of lifting it as soon as ready and disposing of it admits of Queensland merchants securing supplies of "seed" and holding them in a warmer climate for several weeks to encourage the tubers to start into life. Some quick-maturing varieties raised from the early planted fields (July and August) will be available as seed for the following and general February planting.

In the North, the season has to be regulated partly by the monsoons, and planting is usually held over to the winter, until after the wet season.

The diversity of seasons obtainable in the different parts of the State, and the continuity in production going on throughout the year, whilst emphasising a feature of Queensland's agricultural wealth, unattainable in climates of a strictly temperate character, yet lay the way open to the possible introduction of diseases of various kinds from outside sources, as, no matter how carefully the rigid system of inspection applied to imported potatoes and other products likely to carry a nucleus of infection is carried out, it remains that the sooner growers and merchants become alive to the fact and make themselves familiar with the many and varied diseases which the potato is subjected to, and the manner in which these may be minimised, and their distribution checked, the better it will be for all concerned.

While the general details appended concerning the varied phases in the production and marketing of the potato crop may demand some adaptation to individual requirements, too great an emphasis cannot be placed on the marked injurious influences exercised on the potato-growing industry where Irish Blight makes its appearance, unless reasonable precautions are taken to combat such an insidious disease. This State has apparently experienced a greater immunity from the trouble than others, where the devastation of fields throughout whole districts occurred within a few days.

By careful perusal of the descriptions and appearances to be noted in connection with the progress and development of the varying forms of insect and fungus enemies which attack the potato, it is patent that the every-day methods of the grower, and others handling potatoes commercially, require to be regulated by commonsense methods to combat the influences which may act as contributing causes in the spreading of pests and diseases.

A grower in all good faith may have to fall back on bought seed potatoes infected, say, with "scab" (which seems to show up in districts wherever potatoes are grown). If potatoes are untreated for the trouble and are planted in "clean" land, they not only cause a repetition of the disease, but the fungus thus introduced infects the soil for a number of years. A fallacy shared by many growers is that spraying with the usual Bordeaux mixture or other fungicide "cures" Irish Blight, even when it is evident in the crop. Spraying in this instance is not a cure.

The film of fungicide remaining on the plant protects it from spores which may be carried by various agencies from an infected source, and this film, if it thoroughly envelops the growing tissues of a perfectly healthy plant, will be sufficient to kill or check the growth of spores on which the incidence of the disease relies; and the efficacy of the treatment depends on "prevention"—the maintenance of a film throughout the period of growth.

It is a generally accepted belief that certain varieties of potatoes withstand or are inaccessible to the atack of blight, more than others, statements being circulated at times that certain varieties are blight-proof. Experiences seem to point to the fact that when disease does appear in a locality, its effect on "clean" plants is dependent chiefly on environment and the stage reached in their growth, and no definite assertion can yet be made as to whether any variety offers a greater toleration to disease than another.

There is every indication that prices for this commodity will keep up, and are likely to remain so. Farmers who are prepared to take the risks, and give the attention necessary to ensure successful results, may expect a remunerative return.

Numerous varieties of more or less merit, are cultivated in Queensland, and may be classed as either early, medium, or late sorts.

Climate.—No other root crop seems to have such a wide range. It is more of a "temperate" crop, although susceptible readily to frost It is cultivated even in Iceland. In this State it is grown in our coldest district, Stanthorpe, also in the Tropical North; and extensive areas of typical land exist which are suitable for the production of potatoes of the best quality.

Soils.—The best Lucerne and Potato Land are almost synonmous; but the former will thrive on heavier soils and those which become fissured in dry weather. Deep, friable, well-drained, alluvial loams, rich in organic matter and capable of absorbing and retaining moisture, form ideal soil, provided they are situated in a suitable and sufficiently moist climate. Forest and scrub soils approaching this physical condition and naturally enriched by potash from the burning off of timber are also good for potato production. The growth and development of tubers demand a loose soil. Heavy plastic soils, stubborn to work, which crack readily or "set" hard, are unfavourable.

Sandy soils lacking organic matter and the elements for plant nutrition are not suitable for continuous production.

Wet, sour, and clay soils, not naturally aerated, are to be avoided; these have a tendency to produce waxy potatoes of poor quality.

Potatoes show a partiality to properly prepared virgin soils, and the maintaining of a supply of humus is essential for a continuation of payable yields; so it behoves the grower to pay attention to the physical condition of his soil, which is equally if not quite as important as its chemical condition. Examples are to be noted in the alteration of soil texture on some farms after a few years of general cropping; at first, potato crops would thrive well; latterly, and although no marked depreciation in fertility had taken place, a return to the previous yields seems out of the question.

An example may be cited of the influence which "texture" plays on production, when, for instance, an old lucerne paddock is being worked up for potatoes. Unless this is done to allow ample time to weather and mellow down, the soil particles for the most part remain about the size of peas and are incapable of retaining moisture for any length of time, to the consequent reduction of the crop.

Preparation of the Soil.—Whilst the successful raising of marketable crops is dependent largely on the character of the land and the season experienced, the factor in chief lies in its proper preparation.

Hurriedly prepared fields are only courting a partial failure or serious reduction in yield.

Generally speaking, the heaviest falls of rain come in the latter end of the summer, and the winter months are inclined to show averages slightly below normal. Assuming that it is intended to take advantage also of the mellowing and sweetening influences of frost and plant immediately it is safe after the winter, it is imperative that, on virgin soils apart from scrub land, the work of preparation should extend over several months. Operations should be directed in accordance with varying local conditions, but it remains that certain fixed objects must be kept in view—the primary one being tilth, and the secondary a retention of moisture for the approaching planting season and the development of the crop. Any encroachment of weeds or grass on the "fallowing" land will have as its corollary an unsatisfactory condition for all subsequent operations, and, if fouled in this way, the work of the potato-digger is very much hampered.

Cultivate deeply and in accordance with the nature of the soil. On virgin land shallow "breaking-up"—say, in October or early November —with an English type mould-board plough to invert the furrow slice, is commended. Should couch be present, the surface must be worked consistently during the hot weather with the disc and tine harrows to give all the exposure possible to dry it out. If otherwise, roll after the plough, and harrow to fill the interstices between the furrows.

Use the disc harrows just previous to cross ploughing, which should be carried out as soon as grass has rotted down sufficiently, and to a depth of not less than 6 in., which should be increased gradually in the seasons following.

It is inadvisable to create a fine surface tilth at this stage, as if tropical rains are exeprienced much soil washing takes place. Any

inclination to surface crusting will require the early use of the tine or spring-toothed cultivator, which will serve also to keep the land clean.

Manuring for Potatoes.—Potato crops, more than any other, may unquestionably be profitably increased by the use of artificial fertilizers, but, as the crop is dependent quite as much upon the season as upon the fertilizer, it may happen frequently that manuring does not appear to give much better results.

Again, manuring will only be of use if combined with effective cultivation.

The effect of artificial fertilizers may become considerably increased by the addition of farmyard manure, which by itself is one of the best manures for potatoes when applied early as the land is being got ready. As the heavy amounts (10 to 20 tons per acre) of farmyard manure, which would be necessary if used by itself, for a complete dressing, are not always available, smaller quantities of 3 to 6 tons per acre may be used profitably in addition to artificial fertilizers.

As a rule, complete manures give by far the best results, and may even be used in small dressings in comparatively rich soil, and will then prevent their rapid exhaustion.

The dominant manure for potatoes is potash, and it appears that potassium chloride gives better results in some cases than the potassium sulphate. As our soils are generally rather high in chlorides, the use of potassium sulphate is to be preferred, and may be used in quantities from 1 to 2 cwt. per acre, according to the quality of the soil and the presence of available potash.

Nitrogen.—Nitrogen is only required in moderate quantities, and gives the best results if applied in the form of nitrate of lime, cyanamide or nitrolin, or of dried blood, which may be used in quantities from 1 to 2 cwt. per acre. This element has at times a somewhat forcing effect on plants, and under some circumstances may act in a detrimental manner. For instance, should the spring crop receive a check from dry weather just as the tubers are setting and this be followed by thunderstorms and heat, there is an over-luxuriant growth of tops, and the energies of the plant are misdirected with a consequent reduction in yield.

Phosphoric Acid is generally applied, in the form of superphosphate or bonedust, in quantities of from 2 to 4 cwt. per acre.

When a complete mixed fertilizer is to be used, such a one should be chosen which contains from 8 to 12 per cent. of phosphoric acid, 3 to 4 per cent. of nitrogen, and 8 to 9 per cent. of potash, and in quantities of not less than 6 cwt. per acre on soils considered to warrant the application of such dressings. Local conditions vary very much, and are of greatest importance, and even have such an influence on the composition of the soil that an ordinary agricultural analysis may not always be a safe guide; for this reason, small experiment plots are recommended, where the quantity and kind of fertilizers may be gauged to suit the class of soil and other controlling influences. These may be designed as follows:—

1. Unmanured.
2. Nitrogen and potash.
3. Potash and phosphate.
4. Unmanured.
5. Nitrogen, potash, and phosphate.
6. Nitrogen, potash, phosphate, and stable manure.
7. Unmanured.

The Application of Artificial Fertilizers.—A concentrated fertilizer is more readily distributed by mixing it with several times its own bulk of sifted soil. If applied directly to the furrows, the root system of the plants is confined to a more limited space, and the crop will suffer to a greater extent in dry weather than if the fertilizer was spread over the land and ploughed or worked in just previous to planting. This is to be commended when the more slowly assimilable fertilizers are used; for others, exclusive of the most soluble kinds, broadcast the fertilizers over the open furrows before planting. The covering in of the crop will tend to incorporate it with the soil. The soluble fertilizers supplying the nitrogen are usually distributed between the rows by hand when the plants are several inches in height, and this is followed up by scuffling the crop.

Farmyard Manure.—Apart from the manurial constituents contained, it acts as a mechanical improver of the soil, providing humus to surround the soil particles, and preventing plasticity; this, as already noted, is of extreme importance in connection with potato-raising. Usually this class of manure will contain from ½ to 1½ per cent. of useful plant food (N.K.P.), but many things have an influence on its value, for instance, its origin, the manner and length of time it has been stored the nature and quantity of food and litter supplied, and the ages of the animals, &c.

If stored and rotted down in pit or heap, it is reduced to a pasty mass, and much valuable material is lost by fermentation and by its depreciation as a mechanical improver of the soil.

In temperate climates it is customary to apply in drills and plant the potatoes on the manure with satisfactory results; but in this climate it is best carted direct from the sheds to the paddock to be manured, and ploughed in some time before planting. This allows for a more complete decomposition.

Green Manure.—To maintain that loose friable state of the soil so necessary in the production of potatoes, and to improve the mechanical condition of lighter soils deficient in vegetable matter, and of soils which have depreciated in texture from continuous cultivation, the practice of growing and "ploughing in" a leguminous crop as a soil renovator, allowing it to rot down in the season prior to the planting of the potatoes, is commended. Ordinary field and cowpeas are both useful for the purpose—the former adapted for growing from autumn to early spring, and the latter from the latter time to early autumn. Another useful crop for sowing in autumn is rape.

Selection and Condition of Seed.—No matter how well the land has been prepared, if the sets are inferior in quality, a full return cannot be expected; the selection of suitable seed apart from variety has an important bearing upon the success of a crop.

Select from a variety true to type, well grown, uniform in character, and having a clean skin and free from disease; the flesh should be firm to the touch, but yielding slightly under pressure.

The eyes require to be almost level with the surface in most varieties, and particular attention directed to the condition of the buds or young shoots. Sets in a condition to plant should have short robust sprouts; those sowing a long or attenuated growth are to be avoided

Storage in large heaps and a lack in turning the potatoes encourage this condition. Shallow layers are to be preferred with frequent turning, and the picking out of any showing traces of rotting.

The sets for planting are either tubers too small for table use—but graded from a good crop—or those of ordinary commercial size and which have to be cut into sections.

It is generally recognised that, for conditions prevailing over most of the State, whole sets are preferable. Exceptions are to be considered in the event of a possibility of the introduction of disease, when an additional precaution may be taken by cutting, when detection is easier.

For the autumn planting, whole seed is certainly to be recommended. The reason for this lies in the fact that, if wet conditions follow after the planting of cut sets, accompanied by warm weather, the planting may be lost by rotting.

The safest season for "cut" seed is for the August or spring planting, when the soil is colder and generally not so moist.

If whole sets be used, care should be taken to procure from a reliable grower or reputable seed firm.

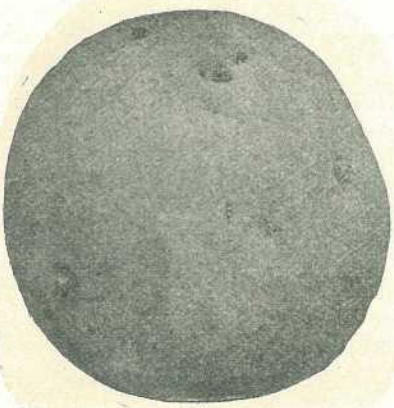

PLATE 9.—ROBUST "SEED" POTATO. NATURAL SIZE.

Very small whole potatoes are not likely to give the same results as a more robust sample about 2 in. in diameter. This latter carries a store of nourishment for the young plant, tides it over a dry time, and gives it an earlier start.

For cut seed, moderately sized tubers are to be preferred; nothing is to be gained by making small sets for reasons similar to above, and they are relatively more subject to rot.

Number of Eyes to Set.—Much importance is often placed as to the number of eyes that should be in a set, but this is of much less value than the size of set. Where several eyes may inadvertently be left on a cut set and these start simultaneously into life, or when whole potatoes are used and planted at a seasonable time, the primary shoot assumes control and gives rise generally to one stem. Exceptions occur in backward seed or if planted late in the spring, and when humid weather is experienced; then considerable suckering takes place.

Cutting Seed.—As to the best method of cutting the tuber into sets, it will be observed that at one end of the potato, in most varieties, there

is a bunch of eyes called "the crown." In the case of the smaller-sized potatoes all that is necessary is to cut them in half lengthways and right through the centre of crown, leaving about an equal number of eyes on each side.

With larger-sized potatoes the first cut should be made across its length and about one-third from the end opposite the crown; this "stem" end forms a set; whilst the other section is cut through the centre of crown at right angles to the first cut, making three sets in all.

Extra large potatoes should be cut evenly into four pieces with a regular cut lengthways as before noted, and then crossways or else into pieces containing from two to three eyes and weighing about 2½ oz. each. A thin knife is preferable, and should pass more freely through a seed potato than a crisp table one.

Time to Cut.—This should be done a day previous to planting to allow the raw surface to heal up; a sprinkling of wood ashes or slaked lime is advisable.

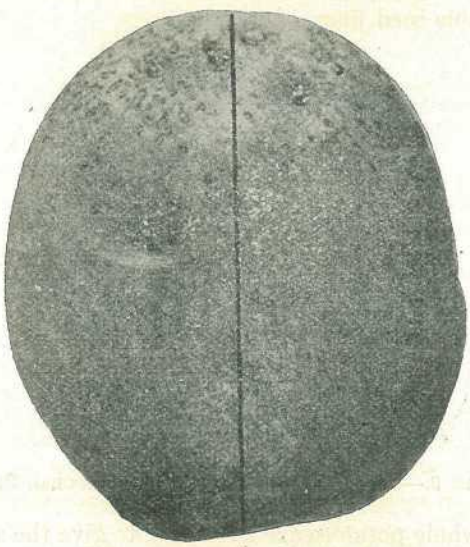

PLATE 10.—"SEED" POTATO CUT TO TWO SETS. NATURAL SIZE.

Sprouting Seed.—Mention has been made previously as to the difficulty of maintaining supplies of seed for the two plantings—July-August and in February—obtainable during the twelve months in this State, necessitating an importation for one planting, as the time between the harvesting of one crop and the planting of the next is so short. Changes of seed from a cooler climate are thus assured, as, if otherwise and an attempt was made to carry on with an early maturing variety, its vitality is soon irredeemably impaired. It is possible to make use of a quick-maturing variety to provide seed for a succeeding planting, provided it is put in early and harvested as soon as "ripe," and then shortly afterwards spreading out the potatoes in a shed or barn in shallow layers to dry thoroughly. Exposure to strong light will turn the colour of skins to a greenish hue, and the process will assist in prolonging their keeping qualities even when planted again.

If bagged subsequently, they will sprout much earlier than if kept in a large heap in a shed, which if moist will have a tendency to cause decay in the potatoes, and when they do sprout the shoots will be nothing like as robust as the treated seed.

Stored potatoes require to be frequently turned and picked over to take out decaying tubers.

Amount of Seed per Acre.—This will vary and depend on the class and size of sets. Usually 7 cwt. to the acre may be taken as an average.

Planting.—It is generally recognised that the earlier the spring crop can be put in, the better the chances of a heavy return, assuming, of course, that conditions are favourable. A late crop, or an unseasonable variety planted at this season, may strike humid weather and have a tendency to produce an over-abundance of haulms and a minimum amount of tubers.

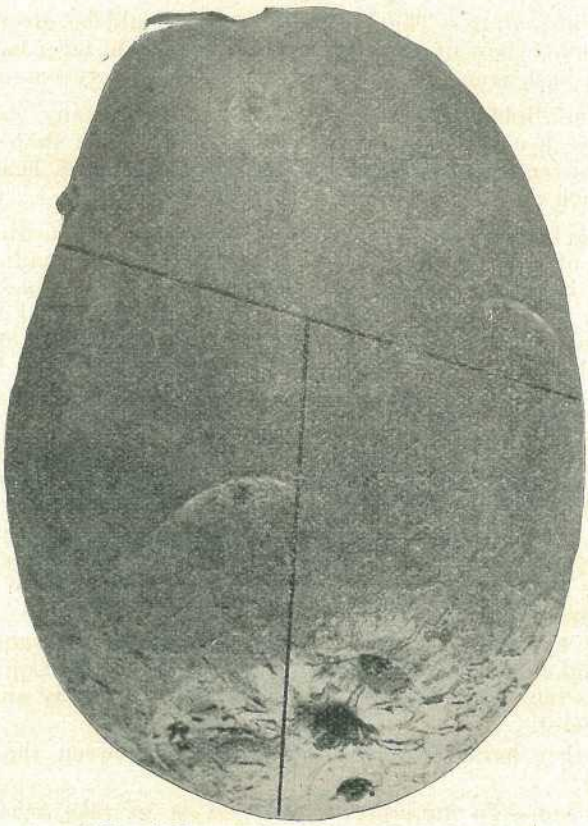

PLATE 11.—"SEED" POTATO CUT TO THREE SETS. NATURAL SIZE.

For the autumn crop, the time is regulated by being put in sufficiently early to allow the tubers to grow and mature before the advent of frost. Whether the crop is to be planted on the flat or ridge will depend largely on the soil and environment. In dry localities, planting and subsequent working should be kept on the flat, the potatoes being planted every 15 in., and at a depth of approximately 4 in. immediately after the plough, and in every third or fourth furrow, according to the width being

cut, so as to bring the rows from 32 to 36 in. apart, and allow for horse cultivation. When ploughed in, whether with disc or other type, it is preferable to plant on the side of the furrow rather than the bottom, to prevent trampling of seed potatoes by horses. For ridge planting, the double mould-board hilling type of plough is to be preferred, but the single plough may be used; in any case the furrows should be planted up and filled in as quickly as possible after opening. Care should be taken in setting the hilling plough so that it will leave a hollow rather than a pointed crown. In the event of the use of fertilizers, reference should be made to the previous notes governing their application.

When opening furrows, undue exposure should be avoided and the planting and covering in arranged simultaneously; three good planters will keep one plough going. Machines may be used with advantage where large areas are planted; these are designed to complete the opening, the planting, and covering in at one operation.

After Cultivation.—The first cultivation should be given just after the young plants show up through the ground. Light lever harrows, with the tines set back from the perpendicular, are to be recommended.

A pair of light home-made harrows, useful for any class of work where "hills" are put up, can be made in a half-moon shape with short tines; these overcome the damage often associated with heavy and flat harrows which do not possess the adjustable tines.

Scuffling between the rows is most important, the ordinary Planet Junior type of machine being used, at least twice. The manner in which the ground has been worked will determine how the tines should be adjusted, so that the earth may be moulded in as desired towards the plants at each cultivation, taking care not to stir too closely or too deeply to disturb the roots.

Where hilling is practised, a special mould-board type of sweep can be attached to the machine for the purpose of combining the two operations at the time of the last stroke of the scuffler. The moulding over of friable soil is important in relation to protecting the tubers from the attack of the potato moth, also to prevent discolouration of potatoes which may be exposed to sunlight, and, if in cold districts where an autumn crop is obtainable, a protection of this character helps to save the potatoes from severe frost bite, if they have to remain any length of time before lifting.

Hilling up with the double-mould plough is advisable in damp positions, and in situations where this class of work is required; and it is equally as important to give the ridges plenty of body and not bring them to a point.

No further horse cultivation is required between the rows after earthing up.

Harvesting.—To anticipate a harvest is to take reasonable precautions other than careful cultural operations to get one, by paying attention to directions laid down, as preventive measures against blight, and the various troubles incidental to potato-growing.

When the crop is sufficiently ripe, this is generally ascertained by the dying down of the haulms, also by the condition of the skin of the potatoes, which should be fairly dry and set, and not readily peeled off.

Early frosts will often hasten the harvesting of the autumn crop, but in the case of the summer-ripening crop, growth is prolonged, and careful

observation is necessary to determine how soon they can be lifted, as the hot weather, and at times the potato moth, make it expedient to harvest as soon as ready. Another reason is that some varieties have a predilection to a second growth.

The means adopted in the harvesting of the crop are many.

The flat-pronged digging fork is still in vogue, but where large fields have to be dealt with it is too slow and expensive, contract prices running from 1s. to 1s. 3d. a bag, and in some cases up to 1s. 6d.

An ordinary single-furrow plough acts fairly well, provided the ground is worked in lands, the side of the furrows on one side of the hill being trimmed off first before ploughing the potatoes out for the "pickers."

A double mould-board plough with a specially shaped pronged share is used largely in some localities, the potatoes being left on the surface after it.

If the ground becomes fouled with weeds or grass, the disc plough may be used, and it is in such situations that a potato-digger cannot operate to any advantage.

Potato-diggers are to be recommended when they can be used on friable soil free from rubbish. Many classes are on the market, some being designed for grading the crop; but, like most machines, they cannot accommodate themselves to all conditions.

Suitable weather and conditions are to be looked for when harvesting; the soil should be sufficiently dry so as not to stick to the tubers, and they should on no account be left lying exposed to the hot sun or to strong winds, which have a damaging effect on their keeping qualities.

Grading.—No grower can afford to neglect this most important feature. The vagaries of the market may at times shatter the good intentions of those who carefully class their products, but it is well known that the law of averages does not apply to a line of mixed-sized potatoes, and a depreciated price has to be accepted when the smaller and unmarketable stuff is included with that of better quality.

With a partly perishable product, there is usually little inducement to hold over for a rise, particularly with the summer crop when the wet season is at hand; and there is, moreover, always a fair and sometimes a heavy percentage of unmarketable potatoes after storing, as well as the extra cost entailed in picking over to be considered.

Potatoes of a regular and uniform size are preferred by the large consumer. The grower who can arrange his grading by a machine or with the "pickers up" in the field does so to his own advantage.

Once in the barn, under cover, sorting-machines certainly facilitate this work; and, if a grower is specialising in seed potatoes, there is some justification in rehandling the "smalls," to cater for the "seed" trade with an even selection of the first grade, and brand up his marketable stuff with his own name or trade mark.

A recommendation has been made that when potatoes are stored they should be kept in thin layers, a dry airy place being preferred. There is little gained in neglecting to protect the open bags of potatoes in the field, as it is here that infestation may readily take place by the potato moth, owing to a practice (which is to be deprecated) of covering the open bags with a bundle of potato haulms.

The Varieties to Grow.—Several references have been made to the seasons and conditions governing the supply of seed potatoes to suit this State's varied requirements.

In recommending varieties it is realised that our climatic conditions preclude the chance of a grower arranging a continuity in the production of one or more kinds where there are two distinct seasons in the year, unless fresh seed is brought in once a year from a cooler climate. The Stanthorpe district climate resembles more than any other that of New England, for instance, and it is quite possible to use seed from an early maturing crop planted there in October, harvest it in March, and hold over for the August planting in warmer localities instead of importing seed. But, although potatoes do remarkably well in some picked spots, the Stanthorpe district (from the nature of its soils) is unlikely to produce, for some time at least, anything approaching a percentage of the seed potatoes required in more favoured potato-growing localities.

Varieties found suitable for the respective divisons are as follows:—

Northern Division—Up-to-Date, Carmen No. 1, Factor, Scottish Triumph, Coronation.

Central Division—Brownell's Beauty, Up-to-Date, Carmen No. 1, Satisfaction, Manhattan, Bismark.

Southern Division—Carmen No. 1, Manhattan, Scottish Triumph, Up-to-Date, Brownell's Beauty, Guyra Blues.

TO NEW SUBSCRIBERS.

New subscribers to the Journal are asked to write their names legibly on their order forms. The best way is to print your surname and full christian names in block letters, so that there shall be no possibility of mistake.

When names are not written plainly it involves much tedious labour and loss of valuable time in checking electoral rolls, directories, and other references. This should be quite unnecessary.

Some new subscribers write their surname only, and this lack of thought leads often to confusion, especially when there are other subscribers of the same surname in the same district.

Everything possible is done to ensure delivery of the Journal, and new subscribers would help us greatly by observing the simple rule suggested, and thus reduce the risk of error in names and postal addresses to a minimum.

Productive Seed.

By N. A. R. POLLOCK, H.D.A., Senior Instructor in Agriculture.

THERE is no question that one of the most important factors contributing to success in Agriculture is the use of highly productive strains of seed.

The subject is one of vital commercial importance, not only to the grower who will receive an increase in yield without extra cost in production and consequent greater monetary return, but to the State, since the return from such primary production is the foundation of the people's prosperity.

Unfortunately, while recognition is given to the value of such a class of seed, too little care, beyond a capacity for satisfactory germination, is paid by the average agriculturist in its selection.

Even amongst the most successful stockbreeders, where, in mating animals every consideration is given to pedigree, prepotency and performance to produce offspring of equal or superior quality in the direction calculated to be the most profitable, there is frequently a neglect to apply even ordinary care in the selection of seed for crops to be grown to feed such stock.

A very little thought should carry conviction that the dominating principles in animal breeding may be applied with equal advantage to plant breeding, and that the capacity for reproduction in quantity and quality can be transmitted by the plant through its seed as well as by the animal through its offspring.

Just as the value of the dairy herd bred for the high production of butter fat is instanced in the bigger monetary return for cream over a herd not so built up, so will the value of a highly productive strain of seed be appreciated in a heavier cropping over seed of average quality.

As interest in the production of the dairy herd naturally leads to consideration of the nutritive quality of the food supplied, so may interest in the use of highly productive strains of seed excite attention to an improvement in the fertility of the soil, better preparation of the seedbed, cleaner cultivation, &c., as well as an improvement all round in farm practice

DEFINITION OF A SEED.

A true seed is defined as the impregnated and matured ovule of a plant containing an embryo which may be developed and converted into an individual more or less similar to that from which it derived its origin. The impregnation of the ovule may have been effected by pollen from the same plant, another of the same variety or species or occasionally from another of a different species of the same genus. Possibly a more appropriate definition for the purpose of this article might be given as "That part of a plant which, separated from its parent suitably treated, is capable of reproducing its kind." In such a category consequently, tubers, bulbs, rhizomes, corms, cuttings, buds and scions could be placed and generally referred to as "buds," since when they are not wholly so, they carry buds, the growth from which constitutes the new plant.

SEED QUALITY.

The external appearance of seeds does not indicate the degree of productiveness, as those of a low yielding strain may appear similar in all respects to others capable of high production. The purity of the seed, however, can to a large degree be noted, especially if a sample is spread under a reading or magnifying glass.

Impurities may then be detected such as dirt, husks, chaff, &c., the weight of which would be a loss to the buyer but not positively injurious. Worse impurities would be foreign seeds and those of noxious weeds, which on account of similarity in size might be difficult to separate, also the spores of fungi that may be present. Regulations under the Pure Seeds Act prescribe a degree of purity (freedom from foreign seeds, deleterious and inert matter) and a particular percentage of germination. This latter varies somewhat with the kind of seed.

Regulations under the Diseases in Plants Act prescribe freedom from disease and insect attack in the case of "seed" of the bud type.

Good seedsmen give guarantees that their supplies will conform to the provisions of the Act. Though advisable, it is not, however, obligatory for the purveyor of seeds to have them tested prior to sale, though a penalty may be incurred if a lot supplied is found not to conform to the provisions of the Act.

The Officer in Charge of the Pure Seeds Branch, Mr. F. B. Coleman, advises that it cannot be too widely known that the Seed Laboratory at Brisbane examines, free of charge, all samples representing seeds that farmers have purchased for their own sowing, providing all samples are plainly written on in ink, setting out the undermentioned particulars:—

(1) Name under which the seed was purchased, or is proposed to be sold;

(2) The number of bags from which the sample was drawn, and the number of bags in the whole consignment;

(3) The marks of identification, if any, on such bags;

(4) The name and address of the sender, with date of sampling;

(5) If the sender is not the actual grower, the name and address of the sender's supplier, with date of delivery.

Samples should be addressed as follows:—

Seed Sample for Examination.
Officer in Charge,
Seed Laboratory,
Department of Agriculture,
William Street,
Brisbane.

The sender's name and address and the particulars as before set out must be written in ink on the actual container.

Special care should be taken to securely fasten up the sample. The examination of samples received at the Laboratory that have been opened in transit is useless for any determination, as only a sample received intact can be taken as representing any bulk.

Certain seedsmen of high repute in addition to the guarantee of purity and viability also give an assurance that their seed is true to name and will reproduce true to type. Not one, however, will guarantee a satisfactory return, as this is so largely determined by soil, season, and the cultural methods of the grower.

In addition to the purity, as regards freedom from foreign matter, and capacity for germination of the sample, the following observations should be made.

Size.

It seems to be a true test that the larger the size of the seed, the better plant it will produce. The embryo root will be much stronger and become better established in the seedbed when the food supply of the seed is exhausted. Of two samples of the same kind it would therefore be advisable to select the larger.

Colour.

Frequently the colour of seed is an index to the purity of a variety. Seeds of some varieties of plants, such as maize, may show the result of pollination by another variety in the colour of the seed thereby produced. This, however, is not the case with the majority of seeds, which only show a cross in the consequent plants. Colour should be normal to the variety or species as known from experience or description. Many seeds possess a natural brightness or lustre; in these cases a dull appearance will suggest deterioration due to age, storage with too high a moisture content, harvesting under-ripe or from the effect of disease.

Shape.

The shape of the seeds should agree with that of the variety. Plumpness can be regarded as indicative of good and healthy growth. Shrivelled skins and a shape not normal to the variety can be regarded as signs of inferiority. Pinched or shrivelled appearances suggest an inward weakness caused by adverse climatic conditions, unripeness when harvested or by attack of insects or the result of disease.

Weight.

This is not always reflected in size, for some hard coated seeds may possess a shrivelled appearance within—nuts are a good example of this. The weight of equally measured samples would suggest the superiority of the heaviest. Lightweight seeds may be due to the same cause as a shrivelled appearance. Immaturity at harvest is a most frequent cause. Exposure to drying winds, bad weather, bad storage conditions, insect attack and disease are all factors in weight reduction.

Smell.

This is quite a good guide with some species to the freshness and in certain cases to the purity of the seed. The presence of spores of certain fungi—cereal smuts, &c.—may also be detected at times by the sense of smell.

Viability.

The germinating capacity of seed is, of course, of most importance. In the Pure Seeds Act, as previously noted, a minimum percentage for each kind of seed is prescribed. External appearances cannot be taken as a guide. Every species has a more or less regular life limit, which

has been tabulated after the result of many experiments. Such life limits, however, may be adversely affected by unsuitable treatment or storage under improper conditions. They may also be lowered by the conditions under which they were raised. Poorly developed plants and those suffering from disease or insect attack may produce seed of acceptable appearance but with a weak embryo. Such seed cannot be expected to possess a vitality equal to that raised under ideal conditions. Ripeness at harvest is just as important in this relation as in others. Ripe seed will retain its vitality for a longer period than unripe. In addition to capacity for germination, the strength of the embryo in regard to extension of growth materially adds to seed quality. Generally speaking, the maximum germinating capacity of any kind of seed can be considered as within a year from its harvest.

Price.

When seed is purchased cost should not, as it too frequently is, be the determining factor. Cheap seed should be viewed with suspicion, even when it is free from impurities, and gives the percentage of germination demanded by the Pure Seeds Act. Where care in selection is exercised with a view to increased production price must necessarily be advanced well beyond that of the commercial article. In addition, the reputation of the purveyor should be taken into consideration. Generally speaking, firms of seedsmen that have been established for a considerable number of years can be expected to have built up their business by fair dealing. The best of these have areas for testing varieties and for breeding up strains thereof with a view to improved production, disease resistance, &c. They also enter into agreements with approved farmers to grow crops from seed supplied in order to secure adequate stocks of pure seed.

Productive Capacity.

Though a seed sample may conform to the provisions of the Pure Seeds Act in viability and freedom from impurities and be attractive as regards size, shape, weight and colour, the productive capacity of the resultant plants cannot be gauged unless the history of the seed is known. If it has been derived from a heavy-yielding crop of a pure variety, where there was no possibility of pollination from another variety, the advantage is obvious.

Suitable Varieties.

While a particular variety of a crop may yield well on different classes of soil and under varying seasonal conditions, it does not follow that it will prove the most productive on every class of soil or under all conditions of climate.

Soils vary in texture from heavy clays to light sandy loams as well as in their degree of fertility. Some are of good depth, others shallow. Some are naturally well drained, others less so or with a retentive clay subsoil. While lack of fertility can be overcome by manuring and drainage be improved, texture can be but slightly modified. Climates and average seasonal rainfalls are also controlling factors.

It is reasonable to suppose that particular varieties will be found to excel on heavy soils, others on light, some under a good, well distributed rainfall, others under lighter precipitations. Some will

be of value through early maturity and others more profitable owing to a longer growing season.

The progressive farmer will seek to determine the variety or strain of a variety most suited to his conditions of soil and climate. This he may effect through the experience of his neighbours and by comparative trials over a number of seasons. Having arrived at a conclusion he will satisfy himself of a reliable source of supply or raise his own requirements. In the latter he will have opportunity by selection to improve the strain, not only in yield and quality but in other directions.

PLANT BREEDING.

All cultivated plants have reached their present degree of productivity as a result of seed or bud selection, some present varieties having been developed from an original stock by careful selection and cultivation during the course of a comparatively few years, while others are the outcome of centuries of gradual improvement. It is natural to suppose that the improvement of plants grown for food purposes by seed selection commenced very shortly after primitive man evolved the idea of cultivation. Such a practice would be very ancient and antedate all records, for the earliest so far discovered refer to crop production and cultivation as a more or less general pursuit. Propagation and improvement by bud selection would doubtless be of somewhat later development, yet ancient writings refer to the practice having reached a high standard in Syria and Persia centuries before the dawn of the Christian era. Professor Hehn[1], in discussing the introduction of plants and animals from Asia to Europe, gleans much of interest in this connection from the classical literature of Ancient Greece and Rome. From this he quotes "The Syrian slaves brought with them, besides other sensual perversions of the East, the oriental subtleties in the treatment of animals and plants. Not only castration, circumcision, and the breeding of mongrel beasts (mules) but the lopping and dwarfing of trees and crossing of species by imping and grafting had been early practised in Syria. Purposely produced monstrosities, a careful perpetuation of freaks of nature, an artful sporting with the power of growth—all this was indeed only the same impulse in a depraved form as that which originally made the olive and the date palm fruitful, invented the caprification of the fig, produced double roses and violets and so on."

Plant improvement, therefore, cannot be considered as an art of modern achievement, for it may be possible in former civilisations, wherein there is evidence of work in that direction being accomplished, varieties of certain crops may have been evolved of equal quality to some of those in present use, and arts in breeding understood which were lost in the vicissitudes attendant upon their decline.

Plant-breeding is a term recently brought into use to cover all operations and processes in the propagation of new varieties and the improvement of others, such as hydridising, cross-breeding, and seed and bud selection.

Though cross-breeding and seed and bud selection were practised to some extent previously, general interest in plant-breeding was not aroused until after the publication of the investigations and observations

[1] Wanderings of Plants and Animals—Hehn and Stallybrass, International Library.

of Charles Darwin, during the latter half of last century, in which he suggested a principle of the variability of plants when under cultivation and the influence of continued selection in the origin of species.

This interest was later intensified by the results achieved in hydridising, by which new forms of plants were evolved. Discussions on these led to most exaggerated statements and claims of a most surprising nature being made by irresponsible persons as to the possibility of influencing nature to our will. It is a coincidence that Hehn[1] mentions the same sensationalism as existent in ancient Rome just after the art of budding and grafting was introduced from Syria some 2,000 years ago, as he quotes Pliny[2] professing to have seen a tree that bore on its different branches, nuts, olives, grapes, pears, figs, pomegranates, and several sorts of apples, all at once. The manifest absurdity of Pliny's statement is almost equalled to-day in the extravagant views in other directions frequently expressed by persons insufficiently versed in the subject.

During the closing decade of last century an almost world-wide recognition was given to the practicability of a systematic improvement in the production of the many plants that are cultivated to supply the requirements of the human race. Various governments established plant-breeding stations and to-day the principles of plant-breeding are part of the scheme of instruction at all scholastic institutions, where a knowledge of the subjects pertaining to agriculture is chiefly imparted.

The Government of the State of Queensland was not behindhand in this respect, as State farms, experiment and plant-breeding stations were established in different parts of the State and a trained staff employed in the Department of Agriculture to afford advice and instruction to men on the land in every phase of agricultural endeavour.

Special attention has been and still is paid to plant-breeding, particularly wheat and maize. Of the former many new varieties to suit various local conditions have been successfully raised, while in the latter by judicious selection the productiveness of a number of varieties has been much increased. A great many other crops receive attention, of which small quantities of seed of pure productive strains are made available to farmers.

The science of plant-breeding may be defined as a knowledge of the limitations imposed by nature in the modification or improvement of plants. Particularly is this true in the evolution of new plants by hybridising or cross-pollination. In this connection though crossing of varieties and occasionally of species may be more or less easily effected, it does not follow that the resultant plant will be an improvement on either of the parents or, if so, that such improvement will persist in future generations. Where propagation can be effected by buds, of course, perpetuation of the new plant is more certain.

A very special knowledge is required to allow even a modicum of success in raising a new variety by cross-breeding. When consideration is given to the many thousands of crosses annually effected in the plant-breeding stations throughout the world and the very few worthwhile varieties that are evolved over a period of years, it will be realised the breeding of new plants is attended with considerable cost and much

[1] Wanderings of Plants and Animals—Hehn and Stallybrass, International Library.

[2] Pliny—23-79 A.D., in *Historia naturalis.*

disappointment. In view of this the individual farming for profit will be well advised to leave such to specially trained officers employed at plant-breeding stations established and maintained at the country's expense. His advantage will be found in the breeding up by careful selection of an established variety found most suited to his conditions of soil and climate.

The art of plant-breeding, as in animal-breeding, lies in the selection of the parents with a view to perpetuating purity and increasing productiveness while maintaining or improving constitutional vigour and disease-resistance.

In animal reproduction it is necessary that there shall be two parents. With plants, however, this is not always the rule. Some, the majority of those cultivated, are bisexual, in that the flowers are complete, carrying both male and female organs—wheat, oats, barley, peas, beans, &c., are well-known examples.

Others, termed monoecious, have male and female flowers borne separately on the same plant, as in maize, pumpkin, &c. Still others are dioecious, having male and female flowers borne on separate plants, as with the pawpaws.

Cross fertilization is effected when the pollen from the flower of one plant is transferred to the stigma of another, as by insects, wind, or other mechanical agencies.

Where the flowers on a plant are bisexual and the anthers close to the stigma, transference of the pollen from one plant to another or cross-fertilization is, according to the plant, usually uncommon. Such transference is mainly due to visiting insects and occasionally to wind. Natural crosses of wheat, for example, are rare, even when varieties are grown in close proximity. On the other hand, crosses of sorghum are common, especially with plants near by.

Plants with complete or bisexual flowers are intended by nature for self-fertilization (selfing or inbreeding), as it is found desirable characteristics are not thereby impaired.

In the case of plants, however, where male and female flowers are separately borne, it is evident that cross-fertilization is desirable. With such plants continued selfing or inbreeding causes rapid deterioration. both in vigor of plant and productiveness.

With this knowledge the breeder, acting on the principle that like begets like, can, with plants in the first category, select individuals of outstanding merit, and by hooding the flower head before the flowers have opened secure seed that is certain to be free from pollination by another plant.

With those in the next, however, greater care must be exercised in seeing that pollination can only be effected from plants of equal merit as regards purity of strain, vigour, and productiveness.

Seed Propagation Plots.

In both classes it is advisable, except in an odd instance of the first, such as tobacco, where selection can be made in the field, to institute seed propagation plots, which would be sown with the best available seed. It is important that the seed selected in the first instance for breeding-up should be of a fixed or pure variety. If it is the unfixed product of a cross it will be liable to follow Mendel's laws and cause

much disappointment. Assistance in the selection of a pure or fixed strain will be available from the Department of Agriculture.

Isolation.

In order to prevent possibility of pollination by another variety, the seed propagation plot should be sown at a time which will allow of flowering at least three weeks before the main crop or another of a similar kind. A better practice, where possible, would be not only to sow the plot so much earlier but to grow it at such a distance from another as to disallow transference of pollen. The distance over which pollen can be carried by wind or insect has not been determined, but an instance of cross-pollination of maize was personally observed where the crops were half a mile apart.

Roguing Out.

To secure the best seed which will be most likely to transmit desirable characteristics it is imperative that not only must cross-pollination from another variety be prohibited, but also from individuals from the same strain showing departure from type or weakness in any direction.

Careful attention should, therefore, be paid to the propagation plot to eliminate the latter and allow only those agreeing with the adopted standard to flower and set seed.

Lines of Selection.

In every propagation plot it will usually be found that one or more individuals show superiority over the rest of the plants therein. The seed from these should be separately saved to sow the propagation plot next season, while that from the balance of the plot is used for the main crop. Following this procedure it can be expected that vigour of plant, disease resistance, and productivity on desirable lines will be enhanced.

Disease-Resistance.

Disease is not a natural concomitant of either plants or animals, as each is endowed with a resistance thereto proportionate to its constitutional rigour. When vitality is lowered by improper breeding, insufficient nourishment, particularly in early growth or other causes, the natural resistance is impaired, rendering the individual more susceptible to attack.

It is obvious, therefore, that in selecting plants for special seed purposes, health and vigour of growth should merit first consideration. Success cannot be anticipated if seed is selected from ill-nourished or diseased plants.

Type.

In every crop there are several features contributing to excellence in the product of which prominence in one or more may be said to constitute a type or strain. These may be exemplified in habit of growth, earliness or lateness in reaching maturity, abundance of leafage or its size and texture, fineness of stem, greater succulence, uniformity of size, shape and colour, flavour, milling quality, &c., &c., according to the crop.

Type should suggest quality, hence its importance and the necessity for perpetuation by careful seed selection.

In breeding-up it is most important that the seed selected in the first instance shall be of a fixed or pure strain. Should it not be so,

departures from type will be frequent and a special knowledge and ability be required for selection to allow of improvement. With the purest strains slight variations are not infrequent; some may show a decline in quality and others an advance. With a true conception of the objective in mind selection from the latter should not be difficult.

Yield.

In the selection of seed from special plants for the propagation plot, the quality of productiveness will naturally be sought. The quantity of yield, however, should not exclude consideration of its quality, as frequently a lower yield of higher quality is more remunerative. In other words, the monetary return that might be expected from the yield should influence the decision.

Bud Selection.

Perpetuation of type by bud selection is much more certain than by actual seed. Selection, however, whether as tuber, bulb, rhizome, corm, cutting, bud, or scion should receive careful consideration, not only in regard to vigour and freedom from disease but to the extent and quality in productiveness of the parent. Where the bud or scion is to be grown on a stock care should be exercised in seeing that such stock is suitable and that it is healthy and disease-resistant.

Lack of care in bud selection is frequently responsible for decrease in yields as well as perpetuation of disease. A common example of this may be noted in potato crops when the "smalls" are set aside to produce the next crop without regard to the health or productiveness of the parent. As like tends to beget like it may be expected the return from "seed" of a potato plant producing a majority of smalls will be hardly likely to improve on the parent. Selections wholly from parents producing quantity with quality can be calculated to improve yields and dispel the illusion that change of seed is periodically necessary in case the crop should "run out."

Soil and Culture.

It is not to be expected that any highly productive strain of seed will give a satisfactory return on poor soil under indifferent cultivation in either a poor or good season.

The soil of the propagation plot, as well as that for the main crop, should at least be reasonably fertile and receive proper cultivation. The result of extra attention towards the latter in the seed selection plot is calculated to influence improvement on that usual in the field.

Reserve Supply.

In order to obviate loss of selected seed through disaster after sowing, it is advisable to hold each season a quantity in reserve. This should be held under proper conditions that will not permit of deterioration.

Pedigree Seed.

The progressive dairyman who by careful selection and mating has painstakingly built up a highly productive herd may point with pride to the increased profit therefrom, also to the consequent demand experienced for young animals of his breeding. Is it not equally or more practicable for the farmer to build up a strain of highly productive seed by careful selection each season and to point with equal pride to his increase in profit and also to the demand for his seed?

The Buckscraper.

A USEFUL IMPLEMENT IN FARM, ORCHARD, AND OTHER WORK.*

THE several sketches given will serve to illustrate such a scoop, or buckscraper, as it is usually called, and is the implement mostly in use in parts of California and Victoria where large tracts of land have had to be levelled for orchard purposes, lucerne, &c. It has also been found useful for grading roads and making channels and earthen fills; it is most handy for making and cleaning out stock-tanks; in fact, it is claimed to be the best scoop for general use by all who have ever used it. Any blacksmith can easily make the necessary ironwork, and the woodwork can be put together by any handy man. The buckscraper, as we shall call it, may be made in two sizes; the smaller size 4 feet long, for two horses, and the larger size 7 feet long, for four horses.

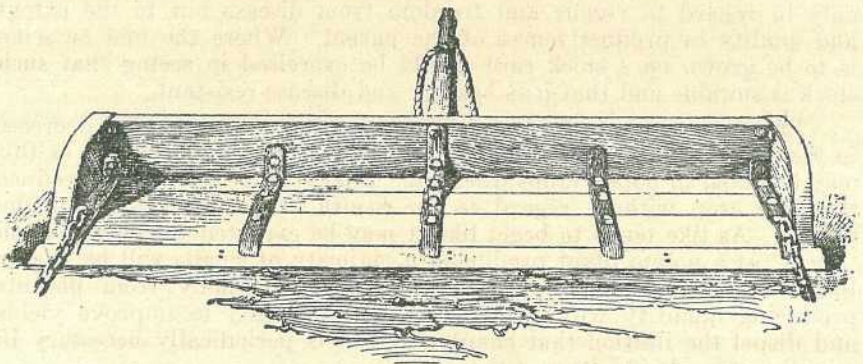

PLATE 12.

Plate 12 illustrates the inside of the scoop before being filled, showing the handle at the back, and the two chains, one at either end, by which it is drawn; the larger size having two horses hitched to each chain, and the smaller only one horse to each chain. The chains by which the buckscraper is drawn are 2 ft. 9 in. long, with a large ring at the end for convenience in hooking on the swings.

Plate 13 shows the bottom and end of the buckscraper, and gives a fair idea as to how the implement is constructed. There are two runners, or rockers, which serve to carry the weight when the scoop is filled. These are shod with steel. When empty, it is usually drawn along (as shown in Plate 13) until ready to fill, the ends acting as runners. These also are shod, to prevent the woodwork from wearing out. There is a 3-in. rope attached to the end of the handle; this for convenience in bringing the buckscraper into position for filling. The driver, by placing his foot on the blade—which, when the scoop is in Plate 13 position, is touching the ground at the back—and giving the rope a sharp pull, will easily bring it into position for filling. For the purpose of dumping out the earth, he raises the handle gradually while

*Adapted from an article by W. J. Allen in the "Agricultural Gazette" of New South Wales for March, 1907.

the horses are moving, the earth emptying itself slowly and being evenly distributed over the surface of the ground, instead of being dumped in a heap, as is ordinarily the case with scoops. This is a great help in doing fine work, such as the final levelling of the land for orchard or lucerne, where it is necessary to have a perfect grade for irrigating, or for roads, fills, &c. The driver will probably take a day or two to become used to the implement, but when he does so he will not change it for any other, as earth is quickly and cheaply removed by it.

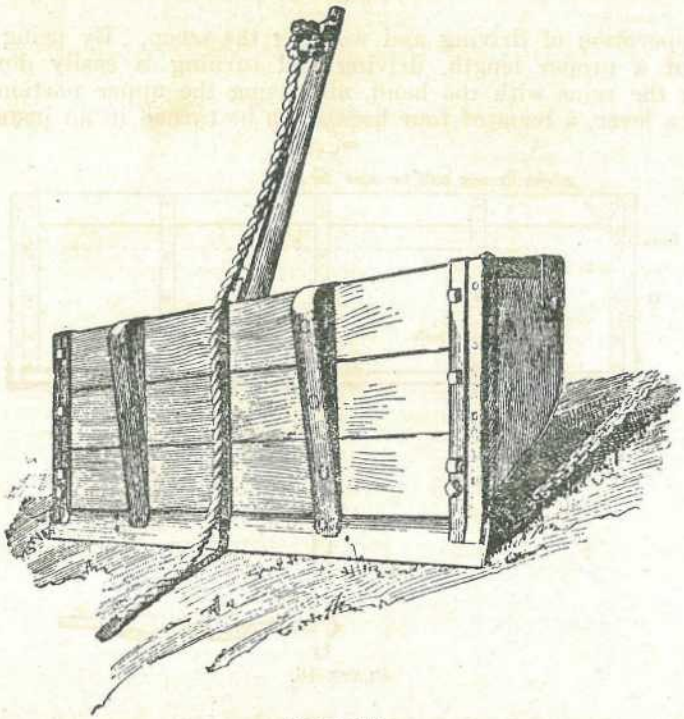

PLATE 13.

The proper yoking of the team is a most important consideration. In the small buckscrapers designed for two horses the swingle-bars are attached, as shown in Plate 17. Each horse is attached to a single swingle-bar, and is free to move without reference to the other horse, except for the coupling-strap, about 2 ft. long, connecting the horses at

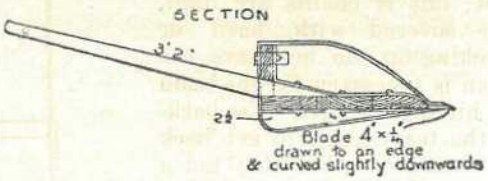

PLATE 14.

the hames. With four horses, they are yoked abreast, but each pair is attached separately to the draw-chains by means of an ordinary set of two-horse swingle-bars (see Plate 18). The four horses are connected at the hames to prevent them see-sawing; it also saves the driver, and enables him to control the team better, if the horses are also connected

at the bits by a strap or short length of rope; these are better fitted with proper snap-hooks that are quickly undone. One man performs the

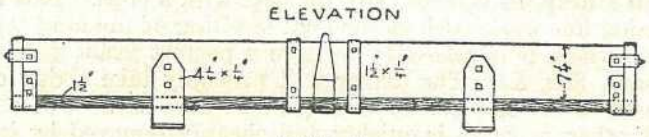

PLATE 15.

whole operation of driving and working the scoop. By using leather reins, of a proper length, driving and turning is easily done. By holding the reins with the hand, and using the upper portion of the arm as a lever, a team of four horses can be turned in an instant, and

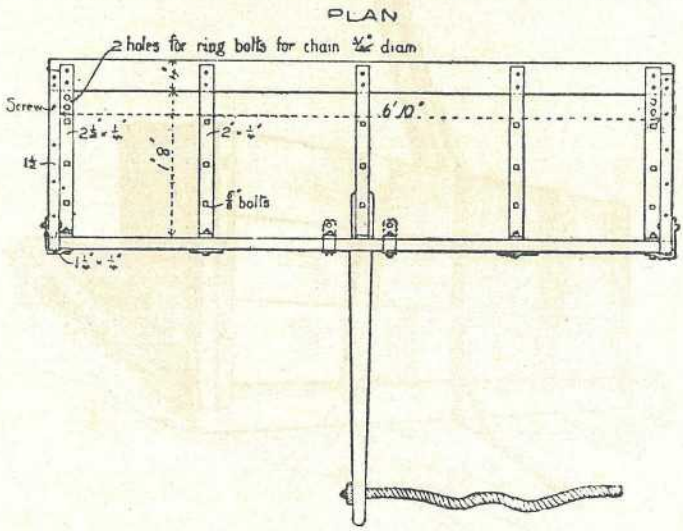

PLATE 16.

much better work done than is possible where one man drives and the other works the scoop.

It is strongly advised that leather traces be used, as little trouble from chafing will occur, notwithstanding the great amount of turning and the narrowness of the swingle-bars; but if chains are used, they should be covered with basil or bagging. In yoking-up, do not have the traces longer than is necessary for the team to walk without hitting the bars. Use back-bands, and let the team learn to get back in their places themselves when they get a leg over the traces. They soon learn, and it saves a great deal of time. The buck-scraper when full of earth should ride on the runners without digging into the ground, and when empty should be light on the hand, so that little heavy lifting has to be done by the operator. A properly-balanced buckscraper depends on the

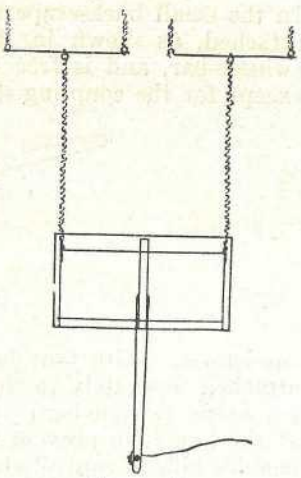

PLATE 17.

position of the eye-bolt attachments for the draw-chains and the way the team is yoked-up.

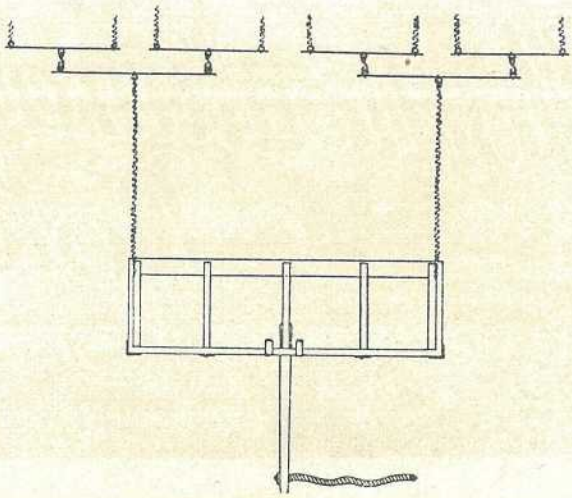

PLATE 18.

Very slight alterations in these particulars may make all the difference between a clumsy machine and one that is easy to work.

PLATE 19.—ON THE BLACKALL RANGE, NEAR BRISBANE.

Dairy lands on the near North Coast looking across from Maleny to the Glass House Mountains, named by Captain Cook.

APPLE INDUSTRY.

Scientific Problems.

The Australian Agricultural Council has received a comprehensive report on the economic and scientific problems of the apple industry from the Council for Scientific and Industrial Research. This follows:—

INVESTIGATIONS into the various types of disorders which affect different varieties of apples in storage are being conducted in Tasmania by Mr. W. M. Carne, of the Division of Plant Industry, working in co-operation with the Tasmanian Department of Agriculture and the University of Tasmania. These disorders, which are of a very complex nature, are being determined and classified. Definite information is being obtained regarding the conditions under which they are developed, and methods of control are being studied. The investigations are of importance not only with respect to the apple industry but also in connection with the elimination of unprofitable or undesirable varieties of apples.

Studies of the effects of seasonal climate on the quality and storage capacity of apples are being conducted in conjunction with those on maturity, size of crop, &c., and whilst the effects are obviously difficult to determine, in some cases definite correlations have been found. For example, severe water-core accompanies heat waves in the fruit growing season, and crinkle follows if the hot conditions are severe and prolonged. If the heat wave occurs during or just prior to picking, so that when picked the fruit has water-core, it will develop breakdown in storage.

Bearing Problems.

Investigations are also being conducted into the problem of alternate light and heavy bearing of apple trees. Except in a few instances neither manurial, pruning, nor fruit thinning practices have given any satisfactory results with respect to this problem, either in Australia or elsewhere. In the hope that the investigation into the process of fruit bud formation might indicate a point of attack on this problem the

Council's Division of Plant Industry has, in co-operation with the Victorian and South Australian Departments of Agriculture, made studies of the process of fruit bud formation, and the relation of this process to the growth of the tree in apple varieties of both biennial and annual cropping habits. The information thus obtained, whilst increasing our knowledge of the mechanism of the process, emphasises the difficulty of controlling the biennial cropping habit by means of cultural operations performed subsequent to blossom time.

Two lines of further investigations are indicated:—

(i.) The development of a commercial method whereby the heavy blossom of the "on" year may be reduced to an amount sufficient to set a moderate crop.

(ii.) The discovery of strains of varieties, in which the feature alternation is not so pronounced (vide citrus). A search of established orchards may result in the discovery of strains possessing the quality of even cropping.

Stanthorpe Stocks.

In co-operation with the Committee of Direction of Fruit Marketing of Queensland and the Department of Agriculture, an investigation has recently been commenced at Stanthorpe into the question of the type of stock most suited to the requirements of that district. Certain East Malling Stocks are being used and compared with other stocks such as Northern Spy and seedling stocks, but it will be some years before results are likely to be available.

Cold Store Wastage.

The different types of wastage occurring in Jonathan apples in cold storage and the conditions giving rise to them are being studied intensively in co-operation with the Victorian Department of Agriculture at the Government Cool Stores, Melbourne. The object of the investigations is to determine the effect of maturity, locality, and tree individuality on the keeping qualities of the apple. Satisfactory progress has been made in the work, and it is anticipated that before long it will be possible as a result of the investigations to make definite recommendations regarding Jonathan apples for export, particularly in regard to the degree of maturity at picking.

Apple Cases.

The Council's Division of Forest Products, in co-operation with the Standards Association of Australia, has conducted an extensive series of experiments into the most suitable type of case for apple exports. The evidence which was obtained showed that different types of cases were used in the apple export trade and that serious inconvenience in production, packing, and stowing, and adverse comment in marketing resulted. The first step was, therefore, the elimination of a number of undesirable types of cases following on action which had already been taken in this direction by the Apple and Pear Export Council.

Under the Commerce Regulations two types of cases are now permitted, viz., the Canadian and the dump. The Regulations are, however, of a broad nature regarding variations in capacity, and in addition make no provision for the sizes of the individual parts of the case. Commercial cases are accordingly at present far from being standardised.

The results of the experiment showed that a case of the dump shape, enlarged from the statutory $8\frac{3}{4}$ in. width to 9 in. in order to accommodate the minimum weight of fruit required by overseas buyers, gave the best protection to its contents. An experimental shipment of 540 cases was made by the Council in 1934, but the results were inconclusive. Apparently any difference in respect to liability to bruising which might have existed between the two types of case was hidden by undetermined causes of bruising more important than the type of case.

The Council for Scientific and Industrial Research and the Special Committee on fruit cases appointed by the Standards Association of Australia have undertaken sufficiently detailed tests and export trials to show that the question of standardisation of the apple case is influenced at present by factors other than the protective value of the cases. It appears that the industry should make the next decision as to how largely bruising affects the sales value of apple consignments. It should then take the necessary steps to choose a standard which will give the requisite degree of protection and at the same time fulfil the majority of the marketing requirements.

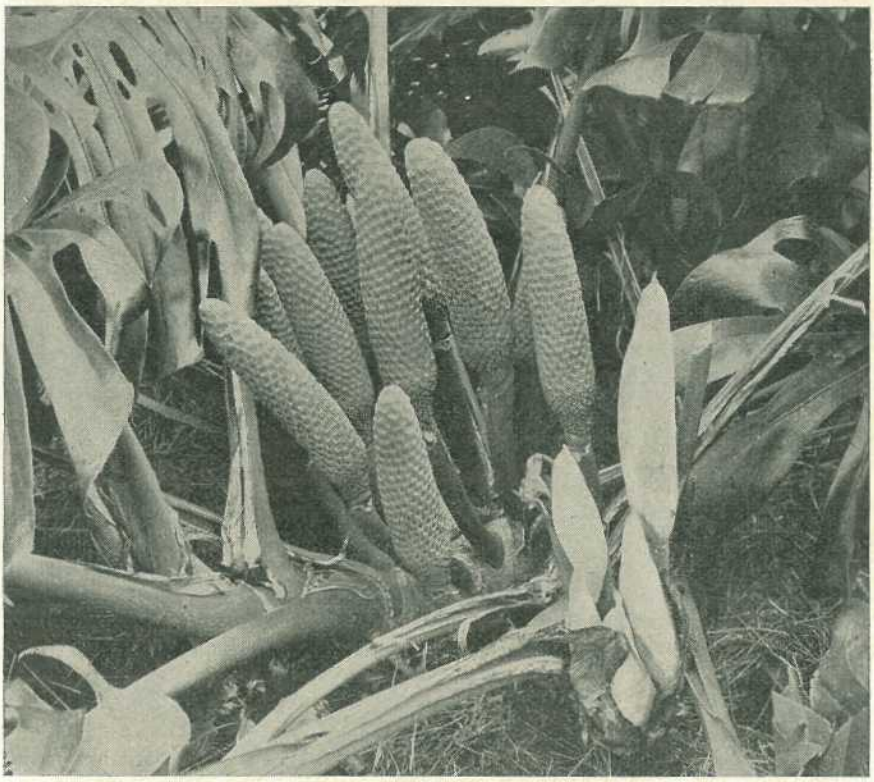

PLATE 20.—MONSTERA DELICIOSA FRUIT, BUDERIM MOUNTAIN, QUEENSLAND.

THE QUEENSLAND NUT IN THE TROPICS.

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

THE native habitat of the Queensland nut (*Macadamia ternifolia*) is entirely sub-tropical, and in those latitudes it thrives naturally in the virgin jungles. It will therefore be readily understood that in planting the tree in open situations under the fierce tropical sun of North Queensland coastal regions, a wide departure is made from normal conditions.

In the early stages of growth trees often suffer under these foreign conditions. The excessive heat of the sun provides the greatest hardship, and frequently proves fatal with the young seedlings. Even in shaded seed-beds seedlings have been noticed succumbing from the effects of the late afternoon sun striking them beneath the shelter.

At times also heavy losses are experienced with trees up to about five years old. During the hot months of the year sun-scalded foliage is frequently met with; in fact, an unaffected tree is the exception.

During January and February of this year, when excessively hot and dry conditions prevailed, numbers of trees were killed through sun burning of the main stems, the characteristic injury being the drying out of a ring of bark about 2 inches wide just above ground level.

Shade appears to be an absolute essential for success in establishing this tree under tropical conditions. In raising the seed it appears necessary to shade the bed from all but the early morning sun. After transplanting, shading of the trees is needed, and for this some cover crop should be considered. Plots of nut trees have been noticed making good healthy growth whilst overgrown with weeds, but although such a growth has given good results it cannot be recommended in place of a farm crop. Of the latter a leguminous crop of fairly robust growth should receive the first consideration. A crop of such a nature, after having served its purpose as a protective covering for the young orchard, may be ploughed under during the late autumn or simply allowed to remain on the ground and rot down, and thus improve the humic content of the soil—a very necessary matter for consideration under tropical conditions, where leaching and burning out of humus is both rapid and heavy.

Occasionally nut trees have been noted set out in banana plantations, and this method of establishing the orchard has much to recommend it. The growth of the young trees must be watched, however, as the type of shade provided by a banana plantation is inclined to induce spindly growth, any tendency to which must be checked by regulation of the shade.

In regard to the transplanting of the young trees Mr. B. Barnacle, a Queensland nut enthusiast of Cairns, has found the best results are obtained if the plants are moved when not less than 15 inches high, and at the commencement of a period of growth. If transplanted in the dormant stage they remain dormant for a considerable time, and when growth does start it is often of a stunted nature.

Up to the present time all the seed and young trees planted in North Queensland have been obtained from the southern part of the State. Probably, with the raising of stock from locally produced nuts, trees more acclimatised to tropical conditions will be obtained.

FROST PREVENTION BY ORCHARD HEATING.

By R. L. PREST, Instructor in Fruit Culture.*

IN Queensland destructive frosts are not nearly so frequent as in some other States or in other parts of the world. Nevertheless, serious losses are occasioned at times to early fruiting varieties by late frosts, and though, generally, the expense attached to orchard-heating is too high, it would at times be well worth the expense of occasional heating in those orchards where late frosts periodically occur.

Frost Formation.

With regard to the principles of frost formation, everybody knows that this phenomenon occurs when the temperature falls below 32 deg. Fahrenheit. What is known as a white frost is the accompaniment of a deposit of white ice crystals on exposed surfaces. A black frost is characterised by the absence of white crystals and is usually regarded as being the more severe in the causation of damage to plant life.

During the day time the heat from the sun comes to the earth in the form of waves, a method of heat transfer which is known as radiation. By the same process of radiation the earth loses heat continuously both day and night, but during daylight the amount of heat absorbed is greater than that given off into space, and the temperature of the earth becomes higher than that of the air in contact with it. As soon as this occurs, the layer in contact with the earth surface becomes warmer than the air at higher elevations. Heated air is lighter than cold air, and as soon as the air in contact with the earth's surface becomes warmer than that above or surrounding it, it is forced upward, and colder air rushes in to take its place. Circulation is thus established, in which the cool upper air is continually replacing the heated air near the ground. By sunset the air to a height of several hundred feet has been warmed. After sunset no heat is received from the sun, and the earth rapidly cools and becomes colder than the layer of air in contact with it. Heat is then conducted from the air to the ground, and the surface layer of air soon becomes colder than the air a few feet above. In this instance, however, the cooled air being heavier than the warmer air higher up, the tendency is for the same air to remain in contact with the ground all night. Since air conducts heat very slowly, atmospheric cooling does not extend to great heights, as a result of which the temperature of the air 300 feet above the ground changes but little during the night. Thus, over a flat piece of ground on a clear calm night there is a relatively thin layer of cold air near the ground with an increase of temperature up to an altitude of several hundred feet, above which the air becomes colder the higher one ascends. There is thus formed a sort of atmospheric ceiling, the existence of which is of very great importance in the prevention of frost damage to plants by the creation of artificial heat.

Prevention of Frost Injury.

Various methods have been advanced from time to time as a means of preventing frost injury. The old method which is now considered to be more or less obsolete was the causation of dense clouds of smoke

* In a radio broadcast from National Station 4QG, Brisbane, and 4RK, Rockhampton, compiled from available information on the subject.

overlying the area to be protected. This method was known as smudging. The modern method is to heat the cool stratum of air immediately overlying the orchard, so that the temperature does not fall below 32 deg. Fahrenheit, the point at which frosts occur and cause damage.

With regard to the importance of the so-called atmospheric ceiling, it will be readily understood that if this ceiling did not exist and the air got colder from the ground upwards as soon as the lower stratum of air was heated it would rise to unlimited heights, and cold air would continually rush in to take its place. With the existence, however, of a body of air above the ground in which the temperature increases up to a height of several hundred feet the rise of the heated air is checked when it reaches a height at which the air temperature is equal to its own.

Supposing, then, that the temperature at ground level was 32 deg., and it was desired to raise the temperature by two or three degrees, it would probably be necessary only to heat a volume of air a few feet high.

For the purpose of creating heat various fuels have been used, such as wood, coal, coke, kerosene, crude oil, &c. Of these methods crude oil burned in specially constructed heaters is probably the most efficient. Among the advantages is that in suitable burners many fires can be set going in a short space of time, and in this connection it should be borne in mind that many small fires provide a better protection than a few big ones.

When there is a danger of frosts occurring several nights in succession the expense and labour are, of course, increased. In localities where wood is plentiful it is often used, and this is the method most used in Queensland up to the present time. The disadvantages of using wood, however, are the labour involved in obtaining it, as a number of fires are required per acre of orchard; the time occupied in lighting the fires, especially if the wood is wet or damp—and time is an important factor when the alarm bell indicates that there is danger of frost and the fires must be got going as quickly as possible.

Coal and coke have been used, but the great drawback here, also, is the time occupied in lighting, as kindling has to be used.

Oil fuel is easy to handle, easy to light, and easy to maintain at an even temperature. If the temperature is raised unnecessarily high, as indicated by the thermometer, some of the burners can be easily extinguished.

Types of Heater Used.

In Australia two types of heaters have been used with satisfactory results. The coke, coal briquettes, or charcoal heaters, which are simple and cheaply constructed of heavy guage iron, consisting of two parts, the cylinder with grate which contains the fuel, and the top which fits on the cylinder, comprising a draught cone, stack, and damper. Each heater is capable of holding approximately 20 lb. of fuel, which burns from four to five hours at a cost of 4½d. to 5d. per heater, varying according to the cost per ton. From 45 to 50 heaters of this type are required per acre.

Bucket heaters of all kinds burning low-grade oils have been used with unqualified success. Useful burners may be made from 2-gallon oil or paint drums, usually obtainable from hardware dealers. Dampers, which may be circular or triangular, should be made to fit over the tops of the burners, so that burning may not be excessive, the wick, which

can be made from any old rag or cloth, may be hung on the damper. Lids should be provided so that the heaters can be extinguished at will. Lighting is accomplished by the use of torches which drip burning fuel into the heaters. Such torch consists of a container with a spout and a wick so placed that the fuel will fall fairly freely, the lighted wick igniting the torch fuel as it flows out.

When Fruit Trees are Most Susceptible to Frost Damage.

The Commonwealth Meteorological Bureau will supply data showing the degree of cold which will probably be endured by different fruits up to thirty minutes.

The most susceptible period for frost damage is usually after the petals have fallen and the fruit is set. Should temperatures lower than 30 deg. Fahrenheit be expected, frost protection measures should then be contemplated. The lowest temperatures usually occur between midnight and 5 a.m. Alarm thermometers are placed where they will register orchard temperatures. The type generally recommended has been the "U" tube maximum and minimum thermometer connected with an electric bell system so arranged that an electric current passes through the mercury column, completing the circuit, and thus ringing the bell. This type does not always prove reliable, and in order to be on the safe side a type of alarm ringing the bell when the circuit is broken should be used.

Complete success in orchard heating is not attainable without an adequate number of heaters of sufficient fuel capacity and proper accessory equipment. Equipment, itself, however, merely renders success possible, but does not assure it. The individual whose personal efficiency is high may save his crop with rather inferior equipment, while his neighbour with much better euipment may fail. The essential of success is sufficient heat at the proper time. To provide the necessary heat the grower must be fully prepared at all times during the period of possible danger and must understand how to handle the firing under his own conditions with the type of heaters at his disposal. An excellent precautionary practice is the lighting of a few heaters after they are in the field and supposedly ready for emergency use. It is advisable to burn new heaters an hour or two as a means of getting them into condition to light readily when required.

The heaters should be placed so as to give a uniform distribution of heat. It is advisable to have a row of heaters, one to each tree, outside of the orchard on the side from which the air is drifting. The orchard heating problem consists, in part, of replacing the heat lost to the drifting air, but mainly in making up losses from radiation. As radiation occurs uniformly throughout the orchard, the ideal manner of lighting the heaters would be to leave no unlighted rows. It is better to have a heater to every other tree in every row than to place them one to a tree in alternate rows. Convenience and speed in lighting and ease in filling must, however, be taken into consideration in placing the heaters. Thermometers should be set up, torches filled and placed together, with a reserve supply of fuel in a convenient place.

APPLE STOCKS IN THE STANTHORPE DISTRICT.

By H. ST. JOHN PRATT, Instructor in Fruit Culture.

ABOUT the year 1924 it became apparent that the growing of apples was not a good commercial proposition in the Stanthorpe district. The cost of the land and its preparation for an apple orchard was out of all proportion to the returns received, and it was obvious that something was amiss. Some of the reasons were very apparent, chief amongst them being:—

(1) Many orchards had been planted in unsuitable land.

(2) The trees planted were of inferior quality.

(3) The trees had not been planted deep enough.

(4) The pruning adopted by many of the growers was quite unsuitable to the district.

(5) The growing of vegetables between the trees was grossly overdone, and at the trees' expense.

(6) The trees were allowed to bear at too early an age.

(7) No manuring with artificial fertilizers or green crops was being practised.

All of these reasons could be termed cultural and fairly easily remedied, and during the last decade to a large extent they have been inasmuch as—

(1) The speculative planting of orchards has ceased to be a paying proposition and growers have become careful as to the selection of an orchard site.

(2) The Department of Agriculture and Stock evolved grade standards for apples and other fruit trees, and no trees of inferior quality are allowed entry into Queensland from other States, or allowed to be sold by local nurserymen.

(3) The deeper planting of trees was shown to be more advantageous and now is generally practised.

(4) This has been remedied by Departmental instruction.

(5) Growers have ceased this practice to a great extent, realising the futility of it.

(6) Common sense has prevailed.

(7) Through a few growers demonstrating the value of the practice on the recommendation of the Department, it has become universal among the more progressive growers.

By 1929 the cultural methods had improved very considerably, and there were some very fine orchards in the district, but still it was apparent that the trees where they had had the very best of attention were in many cases disappointing, and could be improved on.

The Fruit Branch then directed its attention to the stock question—Was the Northern Spy, which was the stock almost universally used, the best for this district?

Mr. Ward, now chief Horticultural Officer of Victoria, had in 1923 or 1924 urged that seedling stocks should be tried out against Northern

Spy, and some growers had given them a trial with divergent results. In some cases where trees on seedling stocks had proved superior to the Spy stocks the growers were quite convinced that the problem was solved; in other cases, however, the seedling stocks they had procured were a failure, and seedling stocks were condemned.

Although the use of many of these seedling stocks had not solved the problem, and in many cases proved unsatisfactory, yet they showed that the stock problem was a real one, and left little doubt but that the Northern Spy could be improved on.

At that time some pomological experts in the other States were of the opinion that the solution of the problem was the use of seedling stocks; others, on the other hand, expressed themselves as being quite satisfied with the Northern Spy.

Then the Department's attention was drawn to the Empire Marketing Board's Research Station at East Malling, Kent, where they had been specialising in vegetative propagation. The claim of the vegetatively raised stock as against the seedling stock being that, once the required stock is evolved, it can be reproduced by vegetative propagation indefinitely without deterioration. The Doncin stock was an example, it being in general use in Europe in 1600 A.D.

Different stocks have been evolved and raised vegetatively at East Malling suitable for the various types of soil in different localities and varieties of apple. The ultimate size of the tree can be regulated, the age at which it will come into bearing, as well as other important factors such as the quality and size of the fruit, &c.

The seedling stocks, on the other hand, show great variation—which is only to be expected since each seed is a separate identity—in growth, time of coming into bearing, crops of fruit, rooting system, some being shallow rooting and others deep; and, last but not least, disease resistance.

The Department requested the Empire Marketing Board to forward a number of stocks that they considered worthy of a trial under Queensland conditions. The varieties received were Nos. I., II., IX., XII., XIII., and XVI. The arrival of these stocks in Queensland coincided with a visit from Mr. R. G. Hatton, Principal of East Malling Research Station, who was on a tour of the apple-growing globe. On Mr. Hatton being advised as to the stocks his station had sent, he expressed the view that probably we would find one or more stocks from these varieties suitable to our local conditions, his brief visit and ignorance of local conditions precluding him from being dogmatic as to which would prove the most suitable.

These East Malling stocks were, in February, 1930, planted out in an experimental plot where a trial of Granny Smiths, Delicious, and Jonathans on seedling stock *v.* the same varieties on Northern Spy had already been commenced.

In 1932 a number of stocks were worked over with Granny Smith and Jonathan varieties and the balance turned into stool beds—the method adopted for the propagation of further stocks of each variety.

In 1933 a number of the worked stocks were planted out and now have been in their permanent location close on two years.

As previously stated, the East Malling root stocks received were Nos. I., II., IX., XII., XIII., and XVI. They should be classified as follows:—

No. IX.	.. ..	Very dwarf.
No. II.	.. ..	Semi-dwarf.
No. I.	.. ..	Vigorous.
No. XIII.	.. ..	Vigorous.
No. XII.	.. ..	Very vigorous.
No. XVI.	.. ..	Very vigorous, and more so than XII.

This classification is under English soil and climatic conditions.

Under Queensland conditions it will probably be found that each variety will have to come down one in its classification. Very dwarf, No. IX., being only suitable for close planting in the kitchen garden. Vigorous, No. I., becoming semi-dwarf. Vigorous, No. XIII., becoming semi-dwarf. Very vigorous, Nos. XII. and XVI., becoming vigorous.

Apple trees on the various stocks having been planted out for close on two years, the following points have been noted:—

No. XII. is a very vigorous grower, having put on from 6 to 7 feet of growth between grafting the stock in October and the following May, and an average of from 6 feet 3 inches to 6 feet this, the following season. It has also a very desirable root system with excellent anchorage.

No. XIII. also appears to be a very vigorous grower, having put on 5 feet 8 inches of growth the second season.

No. XVI. is proving, so far, slower than either XII. or XIII.

No. IX. is very small and unsuitable for Queensland.

Since the Stanthorpe problem apparently is that the trees are too small and not vigorous enough, and so they cannot carry a big enough crop—and since Nos. XII., XIII., and XVI. are vigorous stocks—then it might appear that all that has to be done is to work the trees in future on either of these stocks and the problem is solved.

If that were so it would be quite an easy matter, but there is a lot of other work to be carried out also. Some of the further work to be done with the East Malling stocks is to find out which stock is the best for each of our standard varieties—our best varieties are not grown to any extent in England nor theirs here, and if they were, what would apply thereunder their conditions would not necessarily apply here in Queensland. As an instance, at East Malling, No. II. stock proved dwarfing for one variety, vigorous for another, and very vigorous for a third.

Also the colour and quality of the fruit has to be taken into consideration, for, we know that in England the fruit from the very dwarfing No. IX. is larger and superior in colour and quality than the other stocks, whereas with the very vigorous No. XVI. there is a tendency to small fruit of a poor colour. Further reasons why we must not be too hasty in forming an opinion as to the best stock to use are that No. XIII. makes a very vigorous start but afterwards slows down somewhat and Nos. XVI. and I. start away rather slowly—certainly more slowly than XIII.—but become more vigorous as time goes on.

One decided advantage with the East Malling stocks is that they are very easy to propagate.

Although seedling stocks are liable to a good deal of variation, yet there are great possibilities in the vegetative propagation of stocks from seedlings of outstanding merit as regards root systems, growth, crop-production, quality of the fruit, and resistance to disease. By this means stocks can be reproduced with the parent stock's characteristics. With this end in view, especially good seedlings from the district, generally old trees that have outlived their mates and still are bearing good crops, are being propagated vegetatively.

We may find two or three even better suited to our local conditions than the East Malling stocks, and although we may be unsuccessful yet it is well worth trying, for no stock is a perfect one, and the best to-day may be only second best in the very near future.

In 1932 the Committee of Direction decided that they too would engage in research work in conjunction with the Commonwealth Bureau of Scientific and Industrial Research, and they have an officer working in the district.

The Department of Agriculture has rendered considerable assistance by supplying this officer with a large number of their East Malling stocks and also promising ones of local origin.

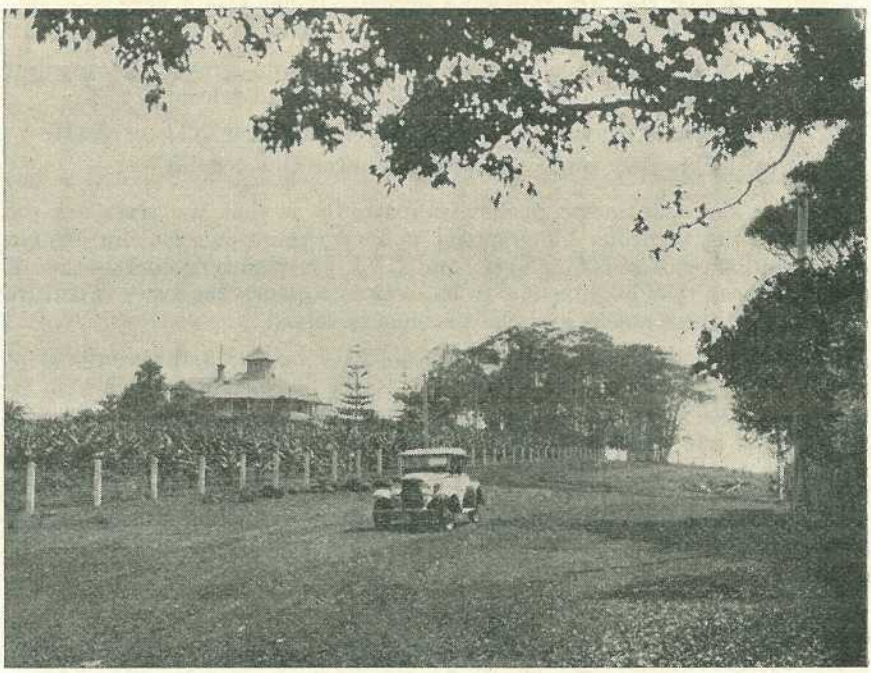

PLATE 21.—AN ORCHARDIST'S HOME AT BUDERIM MOUNTAIN.

Buderim is a rich fruitgrowing and dairying region about 60 miles north of Brisbane. Within the lifetime of a single generation of Queenslanders, the district has emerged from the primitive to the practical—from pathless jungle and rain forest to productive citrus and banana groves, coffee and ginger plantations, and pineapple gardens in cultivated orderliness.

CODLING MOTH.

The Australian Agricultural Council has received the following report from the Standing Committee on Agriculture dealing with codling moth.

Entomological Situation.

FOR many years the codling moth has been controlled effectively by the application of repeated lead arsenate sprays throughout the season. Many minor methods, such as the trapping of larvæ in bandages, the destruction of fallen fruit, and thorough sanitation of packing sheds and stores, have also been used, but generally merely to supplement the arsenate sprays.

Although effective and economically practicable, spraying with lead arsenate is both costly and very laborious, so efforts have been made for the past thirty years or so to find a substitute which is cheaper and easier to use. Moreover, lead arsenate sprays have not been completely effective under all circumstances. Individual workers have reported various sprays to be more satisfactory, but the general opinion is that lead arsenate is still the most satisfactory spray from the entomological point of view.

Public Health.

In recent years much attention has been paid to the lead and arsenic residues left on sprayed fruit. Following the example of Great Britain, a number of countries have made laws prohibiting the sale of fruit carrying more than a trace of arsenic. In Great Britain the maximum permissible quantity of arsenic is the equivalent of 0·01 grains of arsenic trioxide per pound of fruit. This makes ordinary spraying with lead arsenate practically impossible.

Amongst the earliest substitutes for arsenicals to be used were various fluorine compounds. In the United States of America, at least, the fluorine compounds are now looked upon with almost as much disfavour as the arsenicals, and the sale of fruit with more than a trace of fluorine is forbidden.

Research.

Efforts to devise methods of controlling the codling moth without the use of sprays are being continued, but it is generally felt that sprays give the greatest promise of success. The main work on codling moth control throughout the world can be divided under two headings; (i.) efforts to find satisfactory substitutes for arsenicals to be used as sprays, and (ii.) efforts to devise satisfactory methods of removing the arsenical residues from picked fruit.

Leaving fluorine compounds out of account, the most promising substitute for arsenical sprays are oil emulsions (particularly "white oils") and nicotine, which are often used in combination. In many of the experiments the substitutes are used only for the late sprays, lead arsenate being used in the earlier part of the season. A large number of other kinds of insecticides are, however, being tried out.

Appointment of Committee.

In all the Australian States some experimental work on the control of codling moth is being carried out. For the most part, this consists of trying out insecticides which have been developed elsewhere, and of adapting spray programmes to local conditions. The question of

co-ordinating and developing the investigations has been considered by the Standing Committee on Agriculture which decided that the Commonwealth Bureau of Scientific and Industrial Research should take action for the establishment of a representative committee to survey the whole position and make recommendations to the Standing Committee on the whole matter. This action is accordingly being taken.

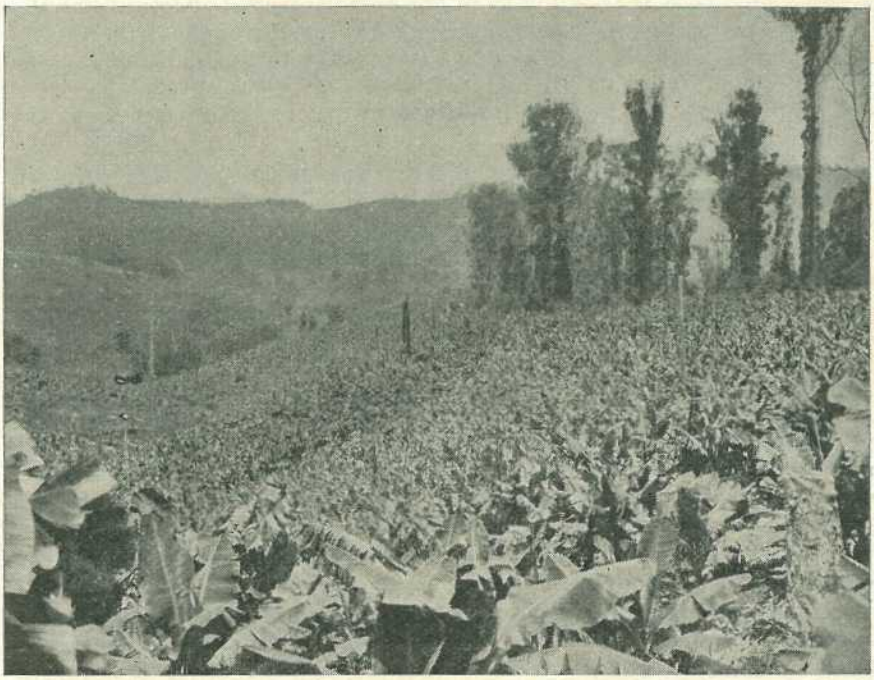

PLATE 22.—BANANA PLANTATION, SOUTH QUEENSLAND.
This plantation and surrounding ridges were covered originally by dense jungle.

CITRUS INDUSTRY—MARKETING ORGANISATION.

THE Australian Agricultural Council at its meeting in Canberra last month carried the following resolutions concerning the citrus industry:—

The States are prepared to adopt uniform standards and to raise the standards progressively as knowledge justifies such action, providing no State is required to reduce its existing standards.

The committee is of the opinion that the production problems of the industry must be dealt with.

This committee is of opinion that an Australian citrus board should be established.

The committee is of opinion that the board should be constituted as recommended by the conference of the industry.

The committee is of opinion that the functions of the board should comprise export control, and advisory functions on similar lines to those contemplated for the reorganised Australian Dairy Produce Board; the

question of additional functions to be deferred pending the receipt of further recommendations from the sub-committee of the industry, which has been appointed to prepare the functions of the board.

The committee considers that, when the Australian citrus board exercises any authority in regard to the citrus fruit produced in any State, such State should have representation on the board.

This committee foresees very great difficulty in attempting to collect any excise duty by any means known to it, but feels that the matter should be deferred for further consideration.

For a considerable time past the problems of the citrus industry have been under consideration. Since the issue of a report by the development branch in 1930, attention has been given to the necessity for developing additional market outlets, improving the quality of oranges produced in Australia, and effecting a satisfactory organisation of the industry. Achievements to date leave much to be desired.

A severe blow was dealt to the industry when the New Zealand market was closed to Australian citrus fruit, with the exception of oranges from South Australia. The facts of this action are well known. Following upon the partial loss of the New Zealand market the Commonwealth Government instituted the system of guarantee of out-of-pocket marketing expenses, commencing with the 1933 export season. In 1935 the amount expended in this guarantee was approximately £3,000, while it is anticipated that the cost in respect of the 1934 export season will be £20,000. In addition, a grant of £10,000 was made available by the Commonwealth Government for the assistance of mandarin growers, and the New South Wales Government supplemented this grant to the extent of approximately £8,500.

In regard to future plantings it would appear desirable, in view of the nature of the industry's problems, that there should be some definite understanding. For example, States having oversea exportable surpluses at present might refrain from encouraging in any way the extension of plantings; while States not at present having oversea exportable surpluses might refrain from such encouragement as would lead to the production of an exportable surplus.

In addition to the above matters, it is considered that action should be taken:—

(*a*) To determine the orchards and/or areas which are producing fruit below a reasonable standard of quality;

(*b*) To ascertain the financial position of the growers concerned, including the nature and extent of their debts (this could be done in each State in connection with the Rural Debt Adjustment Plan);

(*c*) To formulate a satisfactory plan for dealing with the orchards and areas concerned. This might mean elimination of hopeless areas or reworking of trees where such a course would be economically justified.

The nature of the producers' debt position would have an important bearing on decisions as to whether or not it was worth while maintaining an individual in production, and it would be necessary to have this information in order that creditors might be negotiated with if the entire or partial destruction of an orchard were considered to be the only sound course economically.

Internal Marketing Problems.

These comprise organisation, and the enforcement of grade standards. The question of organisation is referred to below. On the other point, it is considered that grade standards for the domestic trade should be raised in some States, and that the standards should be made uniform in all States. If this action were taken and the standards were strictly enforced, the inefficient areas would quickly be disclosed.

The review and enforcement of the standards for domestic consumption is vital to any scheme for the rehabilitation of the industry. It is therefore desired that the States will indicate the steps they have taken or propose to take, on the above recommendation, as far as domestic standards are concerned. Discussion is also invited on the subjects of standards for packing, and the channels through which fruit can be sold.

Export Marketing Problems.

These also comprise organisation and grade standards, and in addition the question of inducement for export. As far as export standards are concerned, the problem is different from that concerning domestic standards, because of the necessity to ensure satisfactory preservation during transport. The Commonwealth Government has provided a sum of £2,000 per annum for five years to enable the Council for Scientific and Industrial Research to undertake investigations in the factors affecting the keeping quality of oranges during storage. As this work progresses it is hoped that it will be possible to amend and improve the existing export standards.

Organisation.

The problems of financial assistance for the industry and inducement for export are involved with the question of organisation. The recent conference of representatives of the citrus industry, in dealing with the plans for the reorganisation and stabilisation of the industry, decided that an all-Australian organisation should be formed, and a resolution in the following terms passed:—

> "That an Australian citrus association be formed, composed of four members from New South Wales, two each from South Australia and Victoria, and when Queensland and Western Australia desire to join there shall be one member from each of those States. The chairman of this proposed organisation shall be appointed by the Commonwealth Government.'

It was decided that a sub-committee should be set up to formulate details of the constitution and activities of the proposed board, so that the Government would be in a position to consider these details when dealing with the general recommendation of the conference. A sub-committee, consisting of General Heane, Mr. Moses (New South Wales), Mr. Schwennesen (Victoria), and Mr. Metters (South Australia), was appointed by the conference, and it has been arranged that this sub-committee will meet at an early date under the auspices of the Fruitgrowers' Federation of New South Wales. The report of the sub-committee will then be sent to the Commonwealth Government for consideration.

The functions of the organisation, which, if formed, might be termed the Australian citrus board, could include collaboration with the

Commonwealth and State Governments on all the problems of production and marketing referred to above. It must be emphasised that the mere establishment of such a board would not solve the problems of the industry. If we are to aim at orderly marketing, we must be prepared to eliminate low-grade fruit. If that is done, the establishment of a Federal organisation on the lines proposed should be a decided step forward.

This important and difficult matter was submitted for the Council's consideration. It was suggested that the various aspects might be considered in the following order:—

(1) Domestic marketing—Improvement and enforcement of grade standards; standards for packing; determination of channels through which fruit can be sold.

(2) Export standards—Commonwealth investigation (explanation for information of Council).

(3) Production problems—Future plantings; sale of nursery trees; determination of most suitable citrus stocks; plans for dealing with low standard orchards and areas.

(4 Organisation—Establishment of Australian citrus board; functions of the board (final determination to await further report from the industry sub-committee); finance for the board, and for the encouragement of export and rehabilitation of the industry.

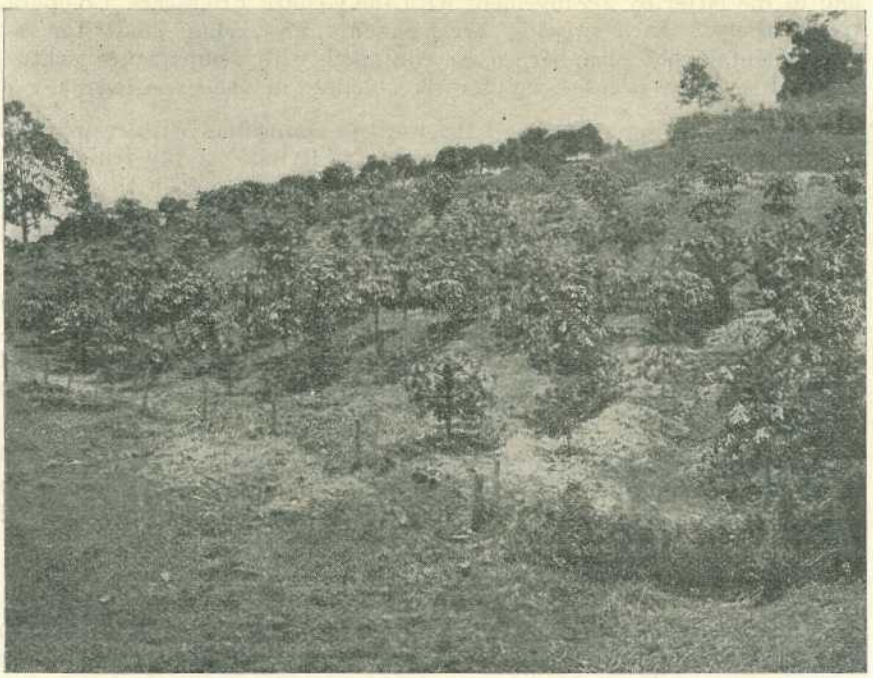

PLATE 23.—PAPAW PLANTATION AT BUDERIM MOUNTAIN, N.C. LINE, QUEENSLAND.

TRANSPORT OF ORANGES.

FOR some years past the Council for Scientific and Industrial Research has been conducting investigations into problems connected with the preservation and transport of oranges. The investigations, which were under the control of a Citrus Preservation Committee, were of a restricted nature owing to the fact that only a small sum of money was available for the purpose. Nevertheless a great deal of valuable information has been accumulated regarding maturity at time of picking in relation to storage life, the handling and conditions of storage of oranges, particularly Victorian oranges.

Experimental Work.

Consequent on the approval given by the Commonwealth Government for a grant of £2,000 per annum for five years for citrus preservation work, action was taken by the Council of Scientific and Industrial Research, in consultation with the States concerned, to prepare a programme of work for extending the investigations of the Citrus Preservation Committee. The programme provides for investigations to be conducted on uniform lines at three centres, namely, Newcastle, Melbourne, and Griffith. In Melbourne and Griffith experimental cold chambers are already available, in the former place by the courtesy of the Victorian Department of Agriculture at the Government Cool Stores, and in the latter by arrangement with the Griffith Producers' Co-operative Society. In Newcastle arrangements are being made for an experimental cold chamber to be equipped with temperature control apparatus which is necessary for the purpose of the experiments.

It has been agreed that all the work in connection with respiration tests (which give a measure of the "rate of living" of the fruit) shall be done in Melbourne. The influence of variable factors in the orchard on keeping qualities will be studied principally at the Council's Citricultural Research Station, Griffith, where special facilities are available for that purpose.

The importance of including fruit from both the Murray Valley and Adelaide Plains districts of South Australia has not been overlooked, but as cold storage facilities for experimental work are not available in Adelaide, it has been arranged that the fruit from these districts shall be brought to Melbourne for storage.

In order that results from experiments in the various centres shall be directly comparable, uniform methods have been agreed on with regard to the amount of fruit to be used for the experiments, dates of picking, temperature of storage methods of examination, and so on.

Keeping Qualities.

The programme includes a comprehensive scheme of investigation into the preservation, &c., of navel oranges. Investigations on the influence of orchard factors on keeping qualities will include such matters as (*a*) the influence of stock on keeping qualities, (*b*) the influence of strain on keeping qualities, (*c*) environmental factors such

as extent of irrigation, effect of different methods of cultivation, &c., and (*d*) maturity of fruit at time of picking.

Experiments will also comprise investigation into types of sweating, processing, and wrapping.

As regards common oranges, experiments will be carried out with three export varieties, namely, Joppa, Silletta, and Parramatta, which will be picked at each of three different stages of maturity, and will be stored at uniform temperatures.

Important aspects of the agreement which has been reached are (*a*) the consolidation which has been affected in the various phases of the work in the different centres, and (*b*) the close co-operation which has been established between the Council of Scientific and Industrial Research and the Departments of Agriculture in New South Wales, Victoria, and South Australia. The responsibilities of the Council, on the one hand, and the Departments of Agriculture in the three States on the other, have been clearly set out, and work is now in progress.

Advisory Technical Committee.

It has been decided that the investigation shall be under the general direction of an advisory technical committee consisting of representatives of the Council of Scientific and Industrial Research and the three Departments of Agriculture, and, moreover, that a general co-ordinating committee (which will meet only at infrequent intervals) shall be appointed mainly for the purpose of obtaining the help of growers and others concerned with the citrus industry, and to facilitate transport and other arrangements. This general committee will include representatives not only of the Council of Scientific and Industrial Research and of three State Departments of Agriculture, but also of the Federal Citrus Council, the Australian Citrus Export Association, the Overseas Shipping Representatives' Association, and of the Australian Railways.

Control of Fruit Fly.

As a result of a resolution passed at a meeting of the Commonwealth Citrus Investigation Committee held in Melbourne in September, 1934, a proposal was put forward to the Prime Minister by the Premier of New South Wales to send an officer abroad with a view to obtaining parasites of the fruit fly and the white wax and white louse scales. The Premier of New South Wales pointed out that the officers of the entomological branch of the Department of Agriculture were of the opinion that in all probability fruit fly could be controlled by biological methods. Three species of parasites have been introduced from Hawaii, but so far they have not been recovered in the orchards. There are other parasites in India and West Africa. Although repeated attempts had been made to obtain these parasites from different countries, this had not so far been possible, and it was considered desirable that a trained entomologist should visit Ceylon, India, and West Africa in order to collect parasites and forward them to Australia.

The Fruitgrowers' Federation of New South Wales strongly supported the proposal and has made a sum of £250 available towards the expenses. The New South Wales Department of Agriculture will

pay the salary of the officer, and the Premier of New South Wales asked the Prime Minister if the Commonwealth Government would contribute a sum of £450.

The proposal made by the Premier of New South Wales has been supported by the Standing Committee on Agriculture, and the Commonwealth Government has agreed to contribute the sum asked for. The officer has already left Australia.

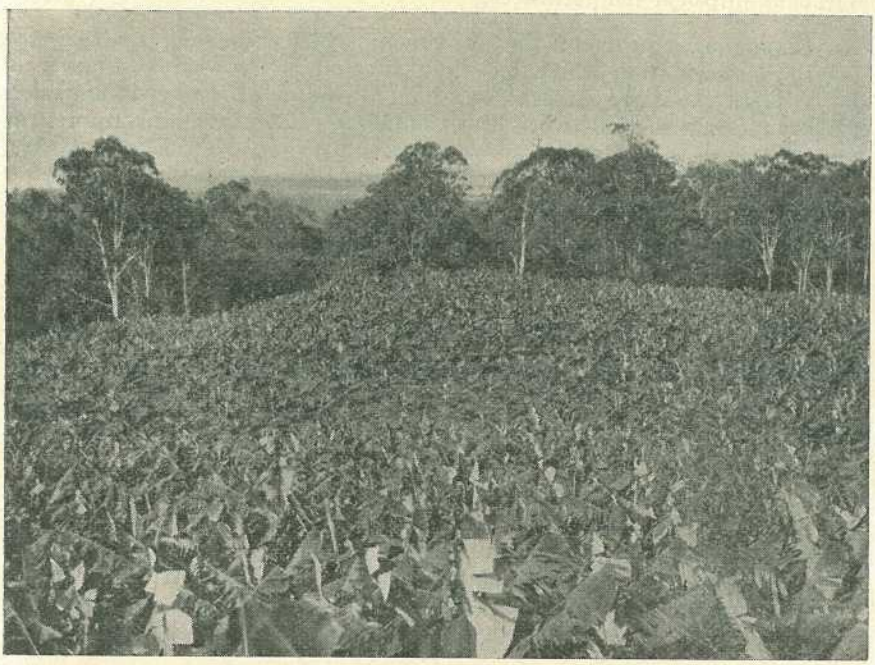

PLATE 24.—BANANA PLANTATION AT BUDERIM MOUNTAIN, N.C. LINE, QUEENSLAND.

WHAT THE YELLOW WRAPPER MEANS.

If your Journal is enclosed in a yellow wrapper, it is an indication that your subscription has expired with the number so covered.

Kindly renew your subscription without delay. Write your full name plainly, preferably in block letters.

Address your renewal of subscription to the Under Secretary, Department of Agriculture and Stock, Brisbane.

PROSPECTS OF SUCCESS WITH ENGLISH TYPE SHEEP IN QUEENSLAND.

J. L. HODGE, Instructor in Sheep and Wool.

IF proof were needed the results of experiments in fat lamb raising conducted by Officers of this Department go far to show that, generally speaking, the farmers of the State have been neglecting an avenue of profit. When it is stated that 98 per cent. of the sheep in Queensland are of the merino breed it shows to what extent Queensland has lagged behind other States in this highly profitable undertaking. There is no doubt that a great proportion of our farming areas is suitable for the production of export lambs, and it behoves our farmers to give more attention to this branch of the sheep industry with the object of attaining a fair share of the export profits from Australia.

The portion of the State most suitable for the growing of fat lambs from English type sheep is to be found on the Darling downs and those areas adjacent, but there is no reason why graziers further afield should not engage in the industry with profit to themselves, providing they cultivate. Cultivation must be regarded as a prime necessity everywhere where fat lambs are the object. This is not to say that a crop of fat lambs may not be raised on natural grasses, but to do so is more or less in the nature of a fluke and the practice is not to be encouraged.

The relatively high price of farm lands, too, obtaining in the districts mentioned makes it incumbent on the farmer to cultivate if adequate returns on principal outlay are to be received.

Taken all round nothing is better than lucerne in this regard, and it is wonderful the country on which it will grow if care is taken to work a seed-bed of fine tilth. All the cereals make first-class feeding crops for ewes and lambs, and there is, of course, a chance that a crop may be harvested after the feeding-off process. Adequate provision should also be made for winter feeding, as the fat lamb must receive no check from birth to slaughter.

In past years the high price ruling for merino wool has proved a deterrent to the fat lamb business inasmuch as farmers were induced to dispose of valuable crossbred ewes. This policy has proved wrong, and now one of the difficulties with which this branch of sheep husbandry has to contend is the difficulty in getting the right type of crossbred

PLATE 25.—SHROPSHIRE RAM.

ewe to form the breeding flock. The ideal ewe for the purpose is got by crossing one of the long wools, such as Lincoln, Romney Marsh, or Border Leicester, with the big framed strong woolled robust type of merino ewe. The purebred Corriedale ewe of strong type is, too, another excellent ewe for the purpose. Here I would like to mention that the majority of those farmers breeding Corriedales are tending to get their flocks too fine in the wool for this breed of sheep, with consequent lack of size and constitution.

In the matter of suitable ewes for the fat lamb business, there is a profitable undertaking awaiting those graziers situated not too far from

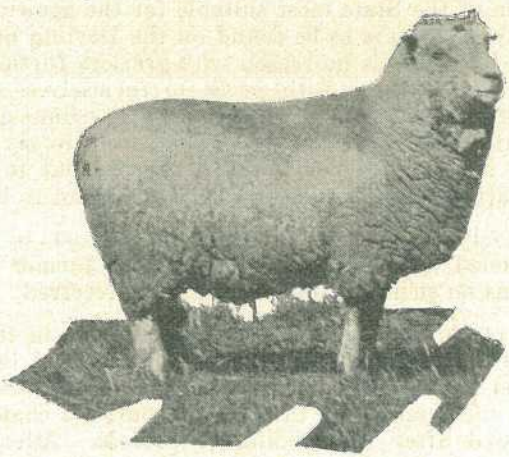

PLATE 26.—SOUTH DOWN RAM.

the Darling Downs if they would join long woolled rams of British breed with their cast for age ewes with the object of sending same in lamb to the Downs for sale. A ready market awaits ewes so mated, and, apart from profit, a useful purpose would be served and needed help given to the industry. Having reared or acquired the necessary crossbred ewe or Corriedale, it is recommended that one of the Downs type of ram be used. Of these the Southdown, the Dorset Horn, and the Shropshire have proved successful. The demand overseas is for a shapely early matured lamb free from leginess. When, as is often the case, merino ewes have to be used for the purposes of a breeding flock, the choice of rams may come from the Border Leicester, the South Down, the Dorset Horn, or the Romney Marsh. These four rams of British breed may also be used with advantage when purebred Corriedales form the breeding flock.

In districts where, on account of wet conditions, sheep would not ordinarily be depastured profitably, the Romney Marsh stands alone. Apart from other reasons this may be accounted for by his ability to withstand fluke and footrot.

A short description of some of the breeds mentioned may be of interest.

The South Down is a short junky sheep with mousy face and points, short on the leg, and very symmetrical. The wool from this breed is not to be recommended. The Border Leicester is a bold upstanding animal, beautifully square above the hocks and knees, with bare face and points. The wool crosses excellently with the merino.

The Dorset Horn is a large sheep carrying very masculine horns, placed well forward. He has very fine conformation and his lambs are early maturing. The wool is not of good quality. The Romney Marsh or Kent, as his name indicates, came from the marshes in Kent and it is probably, to this early environment, that we may trace his qualities in heavy rainfall areas. He is of bold symmetrical type, carrying himself well, has a black nose, and grows a lengthy type of wool, which crosses splendidly with our merino.

The Lincoln is a very large sheep, somewhat given to coarseness and carrying a coarse fleece of great length. He is of most value in Queensland when used on merino ewes to produce crossbreds suitable as mothers in the fat lamb industry. The Shropshire is a nicely built sheep with black face and points. He gets nice shapely lambs, but an objection to his use may arise if any of the progeny are left on the farm. His fleece is not a good one. The Corriedale, kept pure, is a good general utility farmer's sheep and the fleece is a profitable one.

It is extremely difficult to state a preference with regard to these British sheep and their crosses, but for general utility purposes, and taking the value of the fleece into consideration, it is thought that the farmer will not go far wrong if he uses the Border Leicester sire. Apart from the lamb produced, there is a distinct advantage to be gained if, as in the case of a bad season, the lambs are not fit for marketing. The Border Leicester cross sheep is profitable at any age.

This does not apply in the case of the South Down cross. The lamb from this cross must have the best of everything to fulfil all conditions appertaining to a fat lamb. Once checked he never picks up again, and if it is necessary to keep the lamb to a more mature age the resulting clip is not to be compared with the Border Leicester or the Romney Marsh cross. Undoubtedly at the present time the South

Down cross lamb makes the fashionable carcass, and if the farm is such that it will never let the owner down the South Down is to be recommended. The Dorset Horn cross matures quickly and well, but here again care must be taken to see that the whole drop is fit for

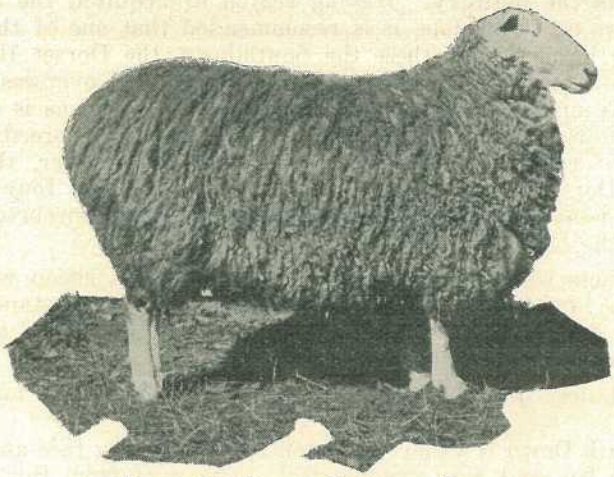

PLATE 27.—BORDER LEICESTER RAM.

slaughter within a given time. The choice of breed depends to a great extent upon local conditions. Experiments carried out by the Department of Agriculture and Stock during last year and in the early part of this year resulted as follows, as far as prices received for the lambs were concerned:—

No. of Sales.	No. of Lambs.	Total Value.	Prices.	Average.
		£ s. d.		
	BORDER LEICESTER CROSS.			
15	965	889 10 6	24/- to 12/3	18/5
	SOUTH DOWN CROSS.			
15	474	424 12 0	24/- to 11/-	17/11
	DORSET HORN CROSS.			
12	440	376 4 9	21/- to 13/-	17/1
	ROMNEY MARSH CROSS.			
2	18	14 14 3	17/3 to 14/-	16/4
	LINCOLN CROSS.			
6	182	134 17 9	17/6 to 12/-	14/9
	SHROPSHIRE CROSS.			
1	31	29 9 0	19/-	19/-

Total, 2,110 lambs of all breeds realised £1,869 8s. 3d. Average, all lambs per head 17s. 8d.

The Shropshire cross lambs were in only one sale, and that a good one, and therefore for comparative purposes the result should be discounted.

For the export trade it should be the object of growers to produce a lamb of 32 lb. prime fat and straight off the ewe at from four to five months. For local consumption the trade will take them heavier and pay in proportion.

There is no doubt whatever that Queensland farmers can produce the right type of lambs for export and, further, there is no doubt that there is no quicker money than that received for fat lambs in the sheep industry. From all points of view the farmers who will cultivate would be well advised to enter this most lucrative industry.

TRANSPORT OF PIGS IN CRATES.

The transport of single pigs in crates is a matter of considerable importance to both buyers and sellers of stud pigs. To ensure safe delivery the pigs must be loaded in strongly-constructed crates of the correct dimensions. If the pig is going on a very long journey and requires a feed or a drink en route, a trough must be provided at the head of the crate. Crates must be constructed so as to stand rough handling, and yet they must be light in weight to keep freight costs at a minimum. A door should be built in one end of the crate.

Well-constructed crates are fairly expensive, a crate suitable for a six-months-old pig costing about £1 1s. and one for a mature pig costing about £1 15s. If the cost of the crate were added to the price of the pig the total cost would often be prohibitive to the purchaser, so the usual arrangement is for vendors to quote the price for the pig and to loan the crate on the understanding that the purchaser will return the crate promptly and in good order with freight prepaid. Unfortunately, this arrangement is not always satisfactory to the vendor, for there are numerous cases in which the purchaser, apparently overlooking his obligation, fails to return the crate. Possibly he thinks it is only an old crate and hardly worth returning, but actually it is worth £1 or more, and he has received it on loan. Not only is it desirable to return the crate but it should be returned promptly, for a breeder has only a limited number of crates and if they are too long away from his farm he is considerably inconvenienced in the delivery of his orders.

Stud breeders complain frequently of crates being returned in a damaged condition, and it is common to see a crate with the front battered off to take the pig out when there was a perfectly good door at the back of the crate for the purpose.

Purchasers should also remember that unless they advise the vendor by letter as to date when the crate was loaded for return journey and advise probable date of arrival, vendors are put to considerable inconvenience in making unsuccessful inquiries at the railway station, thus losing time and money hunting for a crate that has probably not been returned. If these above matters were given a little more consideration—and after all they are really matters of ordinary decency—vendors and purchasers of stud pigs would be much happier.

Officers of the Department of Agriculture and Stock will gladly inform breeders on any of these matters and will supply details re preparation of suitable crates. It is also suggested that when pigs are being forwarded to shows for exhibition and sale, they should be transported in single crates, This expedites completion of arrangements for sale and is a very great advantage, as the return of crate can then be arranged for without inconvenience.

It is undesirable that vendors should refrain from supplying pedigrees until empty crates are returned, and this also leads to endless trouble. If the contract of purchase includes empty crates being returned, freight paid, then the purchaser should see to it that he fulfils his part of the contract just as the vendor does in supplying the pig. The purchaser should also remember that he merely has the loan of the crate to save expense of purchase, hence it is only fair that its early return should be attended to promptly.—E. J. SHELTON, Senior Instructor in Pig Raising.

Sheep Feeding.

By JAS. CAREW, Senior Instructor in Sheep and Wool.

SHEEP feeding is a problem presenting so many disadvantages and difficulties that a complete solution is not, under some conditions, economically possible. In certain circumstances, however, a solution is possible, but must be associated with favourable conditions, good management, and necessary reserves.

The necessity of a suitable ration is just as important for maintaining sheep as for other classes of live stock; in fact, more so, owing to the extra strain of growing and carrying their fleece. When the grass is green on our grazing country, sheep will do well on the natural pastures alone, and add to their store of physical reserves. These reserves will help them over periods of scarcity, or, if not too extended, during times when the pastures are dry. Feed during the winter months throughout the greater portion of the State, if not scarce, is usually dry and hard.

Seasonal Influences.

Where autumn and winter rains cause a growth of clover and herbage of different varieties, the mixture provides a well-balanced food supply suitable for fattening and for the requirements of breeding ewes and growing lambs, but, unfortunately for Queensland, our most useful rainfall occurs usually during the summer months.

In areas where frosts are prevalent, and which do not respond to winter rains, a great disadvantage is suffered, for the frosts dry the grass to such an extent as to leave it deficient in protein and minerals, as well as rendering it difficult to digest. The digestibility of foods is far more important in many instances than their actual nutritive value indicates, and for that reason plenty of good water adds to the value of a deficient pasture.

There are times when grasses and other growths are scarce and not sufficient to keep the sheep going, in which case the existing food must be supplemented.

Each locality, or even holding, has its own peculiar set of circumstances, and the feeding method must be in keeping with what food is available.

Segregate the Weak from the Strong.

Usually, as dry weather conditions continue some sheep will hold their condition better than others, resulting in a proportion becoming weak while others remain strong and well able to battle on. A big advantage will be secured in drafting off the weak sheep for special attention, for it is among these that the losses will occur if allowed to remain with the flock. By segregation the stronger sheep will be given a better chance without expense to the owner, at least for the time being. There will be, in the circumstances, little or no choice of paddocks; to save the weak sheep feeding will therefore be necessary.

To do this economically it is best to confine them to a convenient area sufficiently small that they have no inclination, after the first day or two, to search for food other than that given to them. The enclosure suitable should be not more than 20 acres for 1,000 sheep, and provided with suitable feeding facilities according to the method to be adopted, and a supply of good water with easy access. For a bulk ration, lucerne

hay at the rate of about 2 lb. per head per day, is about the best and most suitable, as it can be fed on the ground if there is no rack ready for the purpose. It should be of good quality, otherwise a considerable waste will occur. Other kinds of hay are, of course, also very useful. When sheep are fed on hay or when there is rough grass of low feeding value available, the sheep will require a protein-rich concentrate, and this is most conveniently fed in the form of cubes or nuts. Whole maize is also an advantage, being rich in carbohydrates, but should not be fed with the nuts. When feeding with a mixture that is easily taken up by the sheep, some of them will take all one type and others the other type, with the result that very few of them get the balanced concentrated ration. By feeding cubes and whole maize on alternate days, all the sheep will soon take to either variety when hungry. If fed on a suitable feeding ground (a clay pan preferably) the sheep can pick up whole maize or cubes very quickly; therefore they should be spread in circles or deep wavy lines to give all sheep an equal chance of getting their share.

The Importance of Licks.

In addition to this food a good lick should be supplied, as dry grass is sure to be deficient in minerals. The chief mineral requirements are salt, lime, and phosphoric acid; therefore, any lick containing these ingredients in the correct proportion will be an advantage.

The quantity of salt or other mineral contained in the drinking water is an important factor when compounding a lick. The more salt in the water the less is necessary in a lick, even to eliminating it entirely, in which case meals can be added in order to induce the sheep to take their requirements of lime and phosphoric acid. Both of these ingredients are present in finely ground Nauru phosphate in fairly even quantities; and also in bone meal, which should be sterilized before being used in a stock lick. Bone meal also contains a proportion of protein, which gives it an added advantage. No lick, however, should be expected to take the place of a food, but it is reasonable to expect it to give an added advantage to the food available. In supplying the mineral deficiency the lick will help to tone up the system, improve the digestive organs, create a better appetite, and cause a greater amount of food to be consumed and put to better use.

The chief minerals must be supplied in fairly well-balanced quantities, otherwise a craving will still continue. The idea of salt or salt and lime supplying the deficiency and fully satisfying the craving is not correct, for phosphoric acid is just as important as other minerals under varying sets of circumstances. As phosphoric acid is one of the chief elements deficient in our grasses when dry, and in shrubs and trees as proved by analysis, its inclusion in a lick is important and it is the most economic way to supply it. In South African experiments it proved valuable in increasing the supply of milk and caused an increased amount of roughage to be consumed. When sheep are on dry grass or when feeding on scrub, a good lick should consist of the following:—

30 lb. coarse crude salt free from large lumps.
25 lb. finely ground Nauru phosphate.
25 lb. Calphos or sterilised bone meal.
10 lb. Wheat, maize, or decorticated cotton-seed meal.
5 lb. Protein meal.
5 lb. Epsom salts.

After mixing thoroughly it should be moistened with molasses.

Many stock licks are manufactured in Queensland, all of which must be registered for sale here, and have the active ingredients stated on a label attached to the container. If an owner is acquainted with the analysis of water the sheep are drinking from and the feeding value of the pasture, he should be able to form a fair idea of the suitability or otherwise of a lick.

When salt (sodium chloride) is needed not more than 50 per cent. is necessary, while the phosphoric acid (P_2O_5) should show at from 10 to 15 per cent., and the lime (CaO) at a little less, both of which can be supplied in the form of bone meals or phosphates.

Trough Feeding.

Should trough feeding be the method adopted, it will be necessary to provide sufficient space according to size and type of sheep.

Rams will require from 18 to 20 inches, ewes about 7 inches, and lambs a little less.

All materials for trough feeding should be mixed and placed in the troughs before the sheep are allowed in. As most of the ingredients will be easily taken, they will require to have a safe controlling material included in the mixture, for which finely ground Nauru phosphate can be used to advantage. Bulk food in the form of lucerne chaff concentrates and minerals can be supplied in the one mixture which can be as follows:—

Lucerne chaff	33 lb.
Maize or wheat-meal	66 lb.
Decorticated cotton-seed meal	33 lb.
Bran	33 lb.
Protein meal	33 lb.
Finely ground Nauru phosphate ..	66 lb.
Salt	8 lb.

This class of feeding is intended to be given at a regular hour each day in order that the sheep get a fair foundation, allowing only a few ounces per sheep at the first feeding, with a little Nauru phosphate. When the sheep are taking to it freely, increase the ration and the Nauru phosphate until they get 8 oz. per day, and the full quantity of Nauru phosphate which can, if necessary, be increased to control the feeding. After having their ration they will usually have a drink and wander over the paddock until the next ration is due.

There are several concentrated products on the Queensland market which are manufactured for convenience in feeding in the form of nuts, cubes, and cubettes, all of which come under the Queensland Stock Foods Act, which requires to have the principal ingredients stated and shown on a label attached to the container.

Hereditary Unsoundness of Horses.

By A. F. S. OHMAN, M.V.Sc., Government Veterinary Officer, Toowoomba.

WITH the approach of the National Exhibition and the interest shown in horses to be exhibited there and at country centres, it has been thought of value to discuss this subject briefly. Furthermore, during the visits of the Government Stallion Boards to the various centres, it has been evident that most owners are ignorant of what constitutes hereditary unsoundness. This article may, therefore, prove of some value to them, and to stockowners generally.

Undoubtedly in farming districts the equine population is in the ascendant, possibly brought about by the fact that the cost of mechanical power has proved itself almost prohibitive to the small farmer.

In the case of the horse, the feed problem resolves itself into a domestic one, in so far that the necessary fodder can be produced on the farm and a reserve amount held in store.

The possession of a good stallion assures the perpetuation of the team. The acquisition of only a few foals annually suffices to provide the material with which to build up the team which may have been depleted by natural losses or by accident.

Unsoundness may be defined as "The existence of disease or alteration of structure which does or will impair the horse's natural usefulness."

For the purposes of this article it is proposed to deal with the following defects which constitute hereditary unsoundness:—Sidebone, ringbone, bone spavin, bog spavin, curb, thoroughpin, roaring, cataract, stringhalt, and osteo-porosis (bone disease or nasal disease).

Sidebone.

The examination of the extremity of the leg of the horse will disclose the pedal bone which is enveloped in the hoof. Attached to each side of it is a wing of cartilage which is of a flexible nature and capable of expansion. Nature has provided it as a means of allaying excessive jarring of the limb, which in the case of a heavy draught horse is considerable. It is situated at the back and sides of the extremity of the limb and above the heels. Under normal conditions of development the cartilage can be manipulated easily, and it is found to be elastic either when the limb is resting on the ground or when the foot is lifted.

The term "sidebone" is applied to the condition prevailing when the flexible side cartilage ossifies—i.e., when it shows signs of developing into bone. The extent of the ossification may vary within fairly wide limits, and can show as just a small pea-like enlargement or a complete ossification where the part becomes rigid and firm totally preventing any expansion at the heels. Occasionally the cartilage becomes replaced by bone in light horses, but the condition is usually encountered in heavy draught horses.

The cartilages most commonly affected are those of the fore limbs. Occasionally the cartilages of the hind limb are affected. Animals regarded as being most predisposed to the condition are those with short shoulders, thick heels, upright blocky feet, short pasterns, and narrow heels.

Upright blocky feet and short pasterns are particularly prone to the condition. Wide heels give great elasticity, and lengthy shapely pasterns provide some of the flexibility so necessary when horses are continually in action on hard metal roads.

Lameness may occur as the result of sidebone, but under suitable conditions an animal may work for many years although possessed of an ossified side cartilage. By utilising the animal in soft ground the working life may be considerably lengthened.

Ringbone.

To this condition the term "buttress foot" is frequently applied, and it can be encountered in both fore or hind feet. It consists of an exostosis or outgrowth of bone in the vicinity of the coronet and upwards towards the fetlock joint. At a point in the proximity of the fetlock it is termed "high ringbone."

Ringbone may be insidious in its onset. A definite lameness may be shown, but it is not characteristic. Gentle manipulation of the part may evince pain in the early stages.

As the condition advances local changes occur leading to a marked alteration in the conformation of the part and leaving no doubt as to the nature of the affection. The skin at the coronet becomes very much thickened, and a slight hard swelling may appear which gradually enlarges, and in time the whole pastern joint may be encircled with a ring of bony outgrowth. Animals with small blocky feet and short pasterns are more prone to the condition.

Bone Spavin.

This is the term applied to the enlargement so often encountered on the inferior third or the antero-medial portion of the hock—i.e., on the inner surface of the hock and directed somewhat slightly to the front.

It can best be defined as an exostosis or throwing out of bone on the inner or lower part of the hock arising from inflammation of one of the small bones of the hock joint and terminating generally in an anchylosis or a stiffening of one or more of the gliding joints of the hock.

Bone spavin is said to be found most frequently in animals in which the pelvis is broad, and in consequence of which there is greater slope of the leg above the hock.

Animals with sickle or cow hocks are very susceptible. In animals with broad hocks the bones present a much greater articular area over which the concussion received at the joint is distributed.

The affection usually runs an insidious course. At first in many cases lameness is not very apparent, and what is noticed is that the hock is not flexed with the former freedom. Later there is a marked stiffness in the joint, and still later a pronounced lameness, particularly when the animal is first brought from the stable. After exercise the lameness may disappear.

Incomplete extension of the joints below the hock leads to pressure being placed almost entirely on the toe, so the toe of the shoe becomes worn. As a later result of inaction of the heel we find the foot becomes upright and blocky, and the frog atrophies or wastes and is carried up and out of function.

When the animal is turned sharply towards the sound side there is obviously greater pressure thrown upon the inner aspect of the affected limb, and this tends to accentuate the lameness on account of the pain to which the animal is subjected.

Hunters are often susceptible to bone spavin, through the great strain imposed on their hock joints when jumping.

Bog Spavin.

This is the term applied to the condition in which the synovial membrane of the hock becomes unduly extended. An inflammatory condition may occur in the capsule of the joint with an abnormal secretion of synovia or joint oil. As the synovia accumulates the membrane forms a bulging and it is visible on the front and internal aspect of the hock joint.

Usually it is a dropsical condition and the swelling is cold and fluctuating. On palpation pain is not evinced and lameness is rare. the only cases being those in which the distention is so large as to interfere mechanically with the action of the hock.

Curb.

This is a sprain or injury of the strong calcuneo-metatarsal ligament which joins the calcis or point of the hock to one of the metatarsal or small shin bones.

It appears as a convex swelling on the upper third of that portion of the hind leg between the fetlock and the hock.

Certain kinds of hocks are more predisposed to curb than others. "Sickle Hocks" or hocks "tied in below" are prone to this malformation.

The presence of curb is noted by examining the animal from the side, and a comparison of the hind leg will usually determine the condition. Further, the examiner should palpate the seat of curb by standing with his back to the horse's head and the palmar aspect of the forefinger run down the course of the ligament, the tip of the finger being directed downwards.

Thoroughpin.

This is the term applied to the distention of one of the joint sheaths which overlaps the posterior surface of the hock. It appears as a soft fluctuant enlargement which may be on both the inside and outside aspect of the limb.

The enlargement may assume enormous proportions and become exceedingly hard, especially while the limb is supporting weight. In cases thoroughpin produces an obstinate lameness.

Thoroughpin may coexist with bog spavin, but the two are never directly connected with each other. Each is a distension of a separate synovial sac.

Roaring.

This is a condition which is set up possibly as the result of the paralysis of the nerve which supplies the muscles of the larynx. In almost all cases it is found to be associated with the left side of that organ.

Many theories have been advanced respecting the cause of roaring, but the etiological factor is still a matter for conjecture. By some it

is said to be due to pressure on the nerve supplying the left side of the larynx and by others to a disease of the nerve.

There is some ground for the suggestion that pressure on the nerve is the cause of the condition when it is remembered that on the left side the larynx is ennervated by the recurrent laryngeal nerve which passes beneath a number of organs in close proximity to the gullet. On the right side the nerve supply is direct.

On either side of the larynx is a small ventricle or pouch which moves in conformity with the natural breathing process. When the nerve supply is impaired the muscles are affected and uncontrolled, and the small pouch is at liberty to flap about under the influence of inhaled air. Thus we find the pouch obstructing the intake of air and the accompanying whistling or roaring noise evinced. Under severe exercise the condition is aggravated and distress occurs.

Cataract.

This is an affection of the lens of the eye. It gradually asumes a greyish-blue appearance and finally a milky white colour. Slowly it becomes opaque with creeping blindness.

Often the onset is insidious, and to the casual observer the condition may for a long time go unnoticed. A shyness of certain objects, a constant pricking of the ears and undue lifting of the feet suggest oncoming blindness.

Stringhalt.

This is a symptom of an obscure lesion whose pathology is still a mystery. The closest observation on innumerable affected animals has given no clue to the location or the nature of the causative lesion. The theories of different veterinarians might be repeated *ad infinitum* without finding two of them similar, which fact clearly exemplifies the mysteriousness of the condition.

The condition is one wherein the hind legs are unduly flexed towards the belly in a somewhat accentuated spasmotic fashion, and perhaps kept flexed for some time and with difficulty replaced on the ground. The animal assumes a straddling gait behind and experiences extreme difficulty in moving backwards or pivoting quickly on the hindquarters.

Osteo-porosis (Bone Disease, Nasal Disease).

This is an hereditary disease of bone. It is chracterised usually by a shifting lameness commonly affecting the hind limbs, and unaccompanied by symptoms of local inflammation. At times it may be mistaken for rheumatism. Difficulty may be experienced in rising preceded by a marked leg weariness after work.

The head bones or more particularly the facial bones may show signs of swelling, and often this is considered one of the diagnostic symptoms. Swellings of the joints may occur. In cases of blood stock it is often found that spontaneous fractures occur during exercise or racing and it is in thoroughbred stock that osteo-porosis is most prevalent.

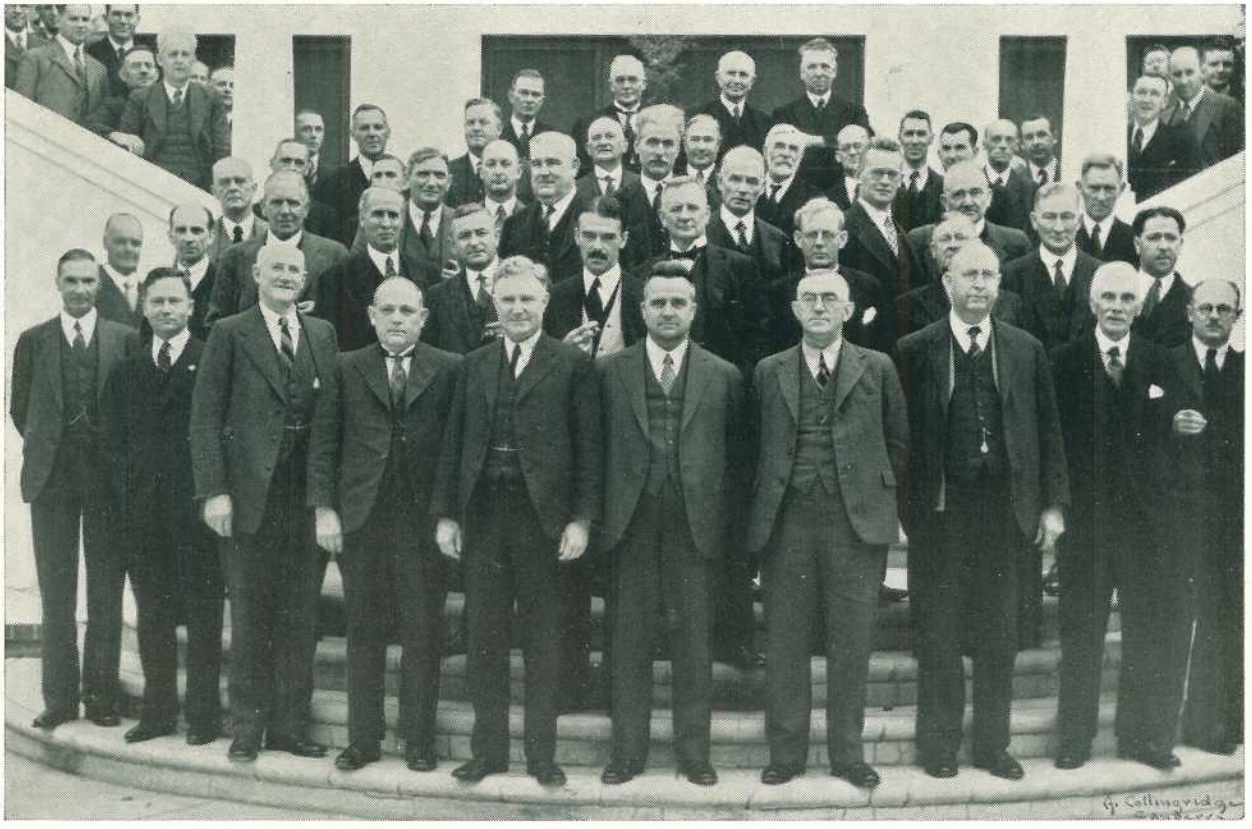

Photo.: B. Collingridge, Canberra.]

HISTORIC GATHERING AT CANBERRA.

Federal and State representatives at the Conference on Commonwealth Finance and the Conference of the Australian Agricultural Council, held at Canberra, 27th to 31st May, 1935.

Front row, reading left to right:—Hon. T. Paterson (Minister for the Interior), Mr. J. H. Stanley (Under Secretary, Treasury, Queensland), Hon. G. Ritchie (Deputy Premier, South Australia), Hon. A. A. Dunstan (Premier, Victoria), Right Hon. Earle Page (Acting Prime Minister), Hon. B. S. B. Stevens (Premier, New South Wales), Hon. W. Forgan Smith (Premier, Queensland), Hon. P. Collier (Premier, Western Australia), Hon. E. Dwyer Gray (Deputy Premier, Tasmania), Mr. H. A. Mullet (Director of Agriculture, Victoria).

Others in the group include (second row) Mr. R. Wilson (Department of Agriculture and Stock, Queensland), Sir David Rivett (Council for Scientific and Industrial Research), Right Hon. Sir George Pearce (Minister for External Affairs), Hon. E. S. Spooner (Assistant Treasurer, New South Wales), Hon. R. G. Casey (Commonwealth Treasurer), Hon. H. E. Manning (Attorney-General, New South Wales), Hon. Frank W. Bulcock (Minister for Agriculture, Queensland); (third row) Mr. G. Lightfoot (Council for Scientific and Industrial Research), Hon. Hugh Main (Minister for Agriculture, New South Wales), Mr. F. E. Ward (Director of Agriculture, Tasmania), Senator A. J. McLachlan (Postmaster-General and Minister in Charge of Developments and Scientific and Industrial Research), Hon. E. Hogan (Minister for Agriculture, Victoria), Hon. T. C. Brennan (Acting Commonwealth Attorney-General), Hon. Frank Wise (Minister for Agriculture, Western Australia), Mr. G. L. Sutton (Director of Agriculture, Western Australia); and other chief departmental officers of the Federal and State Services.

[*Face page 95.*

Australian Agricultural Council.

FIRST BUSINESS SESSION.

THE Australian Agricultural Council, which was formed in December last, held its first business session at Canberra during the week ending 4th June.

The Assembly, which included State Ministers of Agriculture and members of their advisory, scientific, and administrative staffs, was the most important in the history of Australian agriculture. Discussions covered a very wide range of subjects, and, as a result, many phases of production and marketing problems were clarified, and the way was cleared for closer co-operation of Commonwealth and State Departments in all major matters affecting the welfare of the primary producers of Australia.

A NEW OUTLOOK ON AGRICULTURE.

One of the most important results of the Session was the development of a new outlook on Australian agricultural and related problems. Consequently, a really national plan for the improvement of efficiency in production and regulation of marketing is in immediate prospect.

Every member of the Conference—representative as it was of the Commonwealth and State services as well as the Governments of the day—was actuated by a desire for concrete achievement. Apart from work actually done and immediate aims definitely achieved, a firm, broad basis for continuous progress in other matters of moment was laid.

SUMMARY OF DECISIONS.

Following is a summary of the chief decisions of the Council:—

Wheat.

Marketing.—"That this Council recommends that the present interpretation of Section 92 of the Constitution regarding marketing, quarantine, and transport be clarified and confirmed and that the matter be remitted to a Committee of Attorney-Generals of the Commonwealth and States for determination of the appropriate means whereby this should be done."

Wheat.—"This Council is of opinion that legislation for organised marketing of wheat should be introduced and passed by the Commonwealth Parliament and the Parliaments of three or more wheat-exporting States as was done regarding butter."

F.A.Q. Standard.—Agreement was reached that present method of determining f.a.q. standard for wheat is unsatisfactory, and recommendation by Mr. Sutton, Director of Agriculture, Western Australia, for an alternative method confirmed. The Council decided to defer action until reports have been received from the Standards Association and a New South Wales officer investigating the problems abroad.

Dairying.

Control Board.—The Council decided to alter the name of the Dairy Produce Export Control Board to "Australian Dairy Produce Board"; that the Australian Dairy Council be disbanded; that the powers of the

latter be transferred to the remodelled Board; that various export levies be consolidated; that the Board comprise one representative of proprietary butter factories, one representative of cheese manufacturers, four representatives of co-operative butter factories, six producers' representatives, and an independent chairman.

Butter Substitutes.—Legislation requiring margarine and margarine-like substances made in whole or part from imported oil to be marketed in white colour was recommended by the Council.

Quality of Butter.—Active steps determined upon to raise the quality of butter, especially by a system of administrative control in respect of cleanliness on farms, grading of cream, and technique and cleanliness in factories.

Uniform Export Brands.—Action decided upon to reduce the large number of brands. The question of a common brand to be referred to the new co-ordinated Board.

Other Industries.

Citrus Industry.—The States intimated their willingness to adopt uniform standards provided no State is required to reduce existing standards. An Australian Citrus Board to be established, its functions to be export control, advisory functions regarding quality and research, and others to be determined.

Potato Industry.—A Federal Potato Advisory Committee to be formed, comprising two representatives of each State. The Committee's functions to be to advise the Australian Agricultural Council on matters affecting the welfare of the industry, to disseminate propaganda regarding the need for organised marketing, to distribute crop and marketing information and statistics.

Apple Industry.—The States to investigate the relation between production and marketing and to report to the Australian Agricultural Council.

General.

Pedigree Stock.—The Council endorsed the principle of Governmental assistance to importers of pedigree stock to embrace Clydesdale and Suffolk Punch horses, beef and dairy breeds of cattle, mutton breeds of sheep, and Berkshire, Large White, Middle White, and Tamworth pigs. A scheme to be prepared in consultation with the Commonwealth Bank and Shipping Companies.

Wire Netting.—The Council agreed with the principle of advances to settlers for purchase of wire netting and the Department of Commerce was asked to draft a scheme.

Soil Drift.—The Commonwealth Bureau of Scientific and Industrial Research to appoint a special officer to investigate the problem.

Wild Pests.—All delegates agreed to raise the matter with their respective Governments with a view to combined action to fight the menace.

Food Preservation and Transport.—The Australian Agricultural Council adopted in principle a proposal that the Commonwealth Bureau of Scientific and Industrial Research Food Preservation Research Laboratories should be centralised in Sydney. The Commonwealth Bureau of Scientific and Industrial Research will discuss the matter further with the Queensland Government with a view to making satisfactory arrangements for retaining the work on chilled beef in Brisbane.

Alsatian Dogs.—The Council decided that action should be taken to exclude Alsatian dogs from areas where dingoes are known to exist.

Grasshoppers.—The Council accepted a recommendation that the Commonwealth Bureau of Scientific and Industrial Research be requested to undertake investigations into the habits and ecology of the plague grasshopper, particularly with a view to obtaining definite information regarding the breeding grounds and conditions which lead to plague conditions. The devising of methods of prevention and destruction are also contemplated.

Mycological Institute.—The Council decided that Australia should contribute £500 for 1935-36 to the Imperial Mycological Institute, whose duty is the identifying of plants, &c.

Reports Received.—The Council discussed numerous economic and scientific reports which related to tobacco, seed testing, codling moth, and other products.

CHEAP RUG FOR DAIRY COWS.

Where proper shelter is not provided for stock, not only is their resistance to disease reduced, but much food material is wasted in "warming the wind," or in other words, meeting the increased demands of an exposed body.

This fact has an important application for dairy farmers. A cow's food is only devoted to production after the animal has satisfied its needs for nourishment and heat. In assisting the cow to conserve the lastmentioned, shelter belts in the form of trees and hedges have considerable utility on the dairy farm, especially in colder districts and situations, and for the same reason the rugging of the animals during, at any rate, a portion of the winter is well worth while.

Many farmers would like to rug their cows, but cannot afford to purchase the market article. The farmer can, however, make his own cow rugs for little more than the cost of two or three cornsacks or other heavy bags, a ball of twine, and a sewing needle, plus his own ingenuity. Two bags, or three for larger cows, will make an effective rug if utilised as follows:—

Split the bags down the seams and join together and place on the cow. Next cut off a strip from 10 to 18 inches wide so that the rug will not hang too low. This need not be wasted; it is folded, and when sewn to the rug provides the strap for the thighs, this being the only strap used. The front is now fitted by turning up the front corners and sewing them to the sides of the rug. This strengthens the rug and obviates the necessity for cutting off the spare portion which the cow would tread on. The two turned-back portions are then measured and sewn to fit fairly tightly to the cow's neck. The back strap is fitted 12 to 15 inches below the rump level, and the rug is complete.

This home-made rug will keep the cow warm, and after a few days' wear, when the oil, &c., from the cow's body has worked into the rug, it will also be waterproof. The rug can quite easily be slipped off and on over the cow's head, and it is advisable to remove it daily except on rainy or very bleak days. The cow's name painted on the rug over the rump with tar prevents confusion in replacing the rugs.

A trial on one or two cows will prove the efficacy of these rugs, the animals soon showing their appreciation in a practical manner.—A & P. Notes, N.S.W. Dept., Agric.

Queensland Weeds.

By C. T. WHITE, Government Botanist.

INDIAN JUJUBE OR CHINA APPLE (Zizyphus mauritiana).

Description.—A large shrub or small tree, branches clothed with a dense velvety or thin felt-like clothing of hairs and numerous recurved prickles, a prickle usually subtending each leaf and flower cluster. Leaves ovate, elliptic or somewhat rounded, mostly about 2 inches long on a leaf-stalk or petiole of less than ½ inch; green above, whitish beneath with a felt-like covering of hairs, prominently 3-nerved from the base, the nerves very conspicuous on the under surface. Flowers in clusters in the leaf-axils, clusters ½ to ¾ inch across, individual flowers small, about 2 lines across, and borne on slender pedicels when fully opened, greenish white with a fœtid odour. Fruit yellow, about the size of a cherry, usually of rather a pleasant slightly acid flavour.

Distribution.—A native of Mauritius, India, and South-western China; introduced into many tropical countries.

Botanical Name.—*Zizyphus* from Zizouf, the Arabian name of one of the members of the genus; *mauritiana,* a native of Mauritius.

Common Names.—Usually simply called jujube, but the United States authorities, having in view the economic possibilities of the true Chinese Jujube (*Zizyphus jujuba*), preface the name Indian to it. In North Queensland it is mostly known as China Apple.

Uses.—Writing of this tree in U.S. Dept. of Agric. Bull. 1215, C. C. Thomas states:—"It has now been introduced into the East Indies, Australia, and the Mediterranean region. In Egypt it is called 'ennab.' On the island of Mauritius a large number of horticultural varieties have been evolved. The species tolerates even a warmer climate than does the Chinese jujube. The fruit is quite acid in flavour and should prove of value as a tart fruit in the warmer sections of Florida. It has been introduced by the Department of Agriculture into Southern Florida, where there are a number of trees in bearing. The fruits vary in quality, some of them being delicious, others developing butyric acid in the process of ripening. This species is a positive acquisition to Florida horticulture. It will prove a desirable fruit for dooryards because of its unfailing habit of fruiting."

Botanical Reference.—*Zizyphus mauritiana* Lam. Encyl. Meth. Bot. III., 319 (1789). Synomym *Z. jujuba* Lam. non Mill.

Acknowledgment.—My thanks are due to Mr. A. Rehder, Curator of the Arnold Arboretum, for verification of the nomenclature of the species of jujube naturalised in North Queensland.

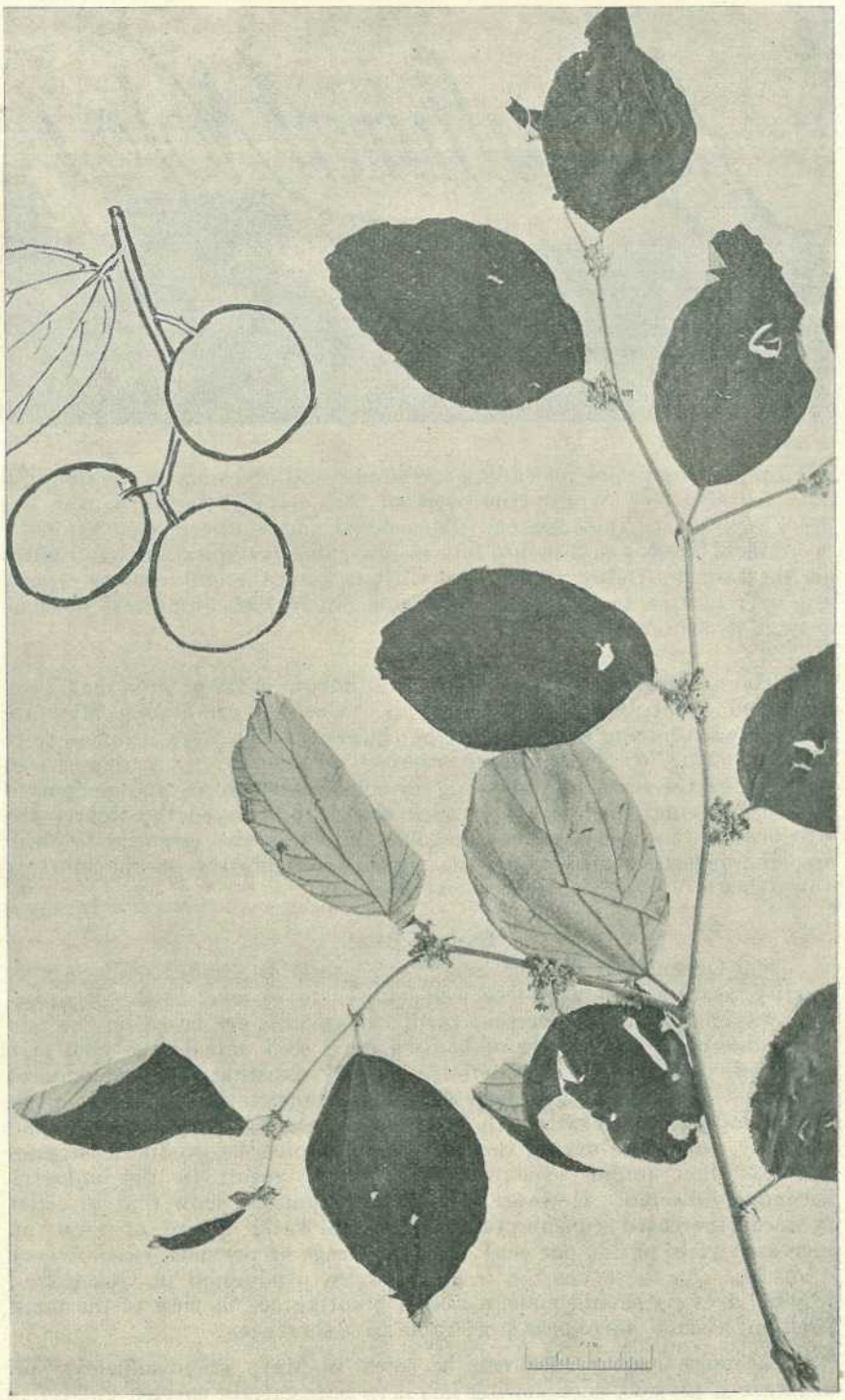

PLATE 28.—INDIAN JUJUBE OR CHINA APPLE (*Zizyphus mauritiana*).

THE dry conditions prevailing in the pastoral areas are now extending to the coast. Apart from isolated falls, very little useful rain has been experienced since March. The central and southern coast benefited by falls of from ½ to 2 inches late in May, but precipitation was lighter on the Downs—Dalby, Oakey, and Clifton being the only centres reporting over half an inch. Light falls from 8th to 10th June were of some benefit to winter crops.

Wheat.

The general sowing is delayed, although a large area has been prepared awaiting suitable conditions. Crops sown during May are looking well, having benefited by the showers, which were insufficient to enable sowing on soils lacking reserves of moisture. A dry season emphasises the value of fallowing to conserve moisture and permit of seasonal sowing, for the longer such sowing is delayed the lighter the prospective return. An occasional long fallow is also essential to clean up land infested with weed pests which are definitely on the increase throughout the older settled wheat districts.

Canary Seed.

The Queensland Canary Seed Board supplies graded seed of high quality, and growers would be well advised to be loyal to the organisation responsible for the present tariff rates which are based on the cost of production. The selling of badly-graded seed outside the pool at a price below the cost of production is merely assisting the opponents of organised marketing who benefit by the importation of seed. The Board endeavours to satisfy the demand in relation to both quality and quantity, and while urging that adequate supplies be produced, stresses the fact that undue over-production would result in the industry becoming unsound. However, recent investigations show that in order to meet increased consumption for the 1935-36 season at least an increased yield of 33⅓ per cent. on the average of previous years is very desirable. As there has not been an excess production in Queensland to date, growers should make a liberal planting, as, in view of the tariff position, a small surplus is preferable to a shortage.

Although canary seed can be sown in May, when sufficient soil moisture is present, such sowing has been successfully carried out up to

the end of September during abnormal seasons. It is advisable to wait until a rapid germination can be assured, drilling in approximately 8 lb. of seed per acre so as to lightly cover the seed.

Tobacco.

Harvesting of the main tobacco crop was proceeded with during June throughout the northern areas. In the Mackay district seasonal conditions have been very favourable to growth and good yields are being secured, while the quality of the cured leaf is also satisfactory.

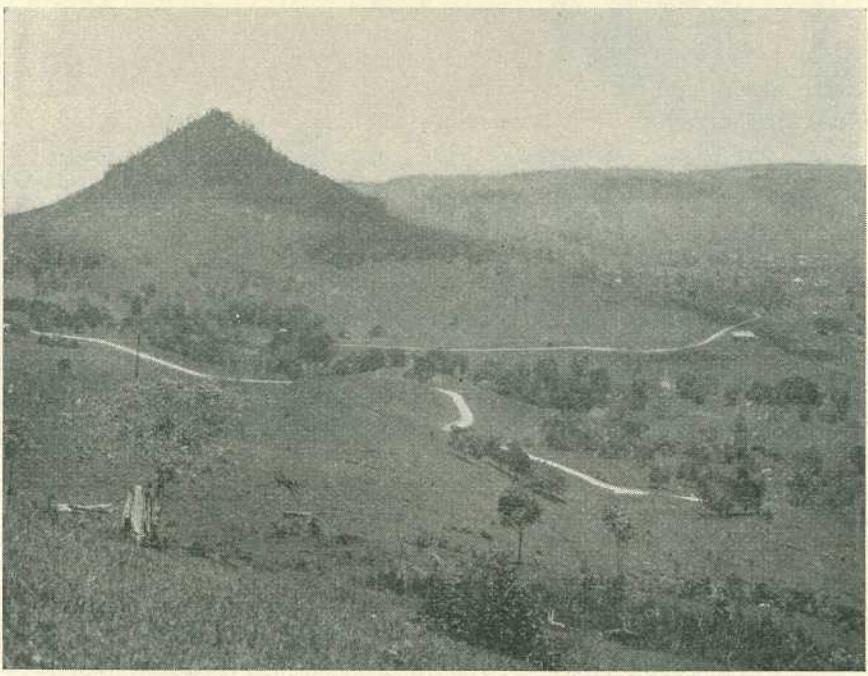

PLATE 29.—THE PINBARREN VALLEY ON THE NEAR NORTH COAST.

Increased interest is being taken in tobacco-growing in the south-west districts, and owing to the better attention given to the ripeners of the leaf during harvesting, combined with improved methods in curing, the price per pound received will be much better than in previous years. Many growers intend to apply fertilizers during the coming season.

The State's crop is now estimated to yield 1,400,000 lb., which considerably exceeds the previous season's yield, while the quality of the present crop is also superior.

Tobacco lands are still available for selection in the Mareeba, Dimbulah, Herberton, Cooktown, Bowen, and Townsville districts.

Growers are reminded that section 19 of the Tobacco Industry Protection Act provides for the compulsory removal of old tobacco plants within one month from date of harvesting. This is necessary to assist in the prevention of pests and diseases, especially in districts where early sowing is practised.

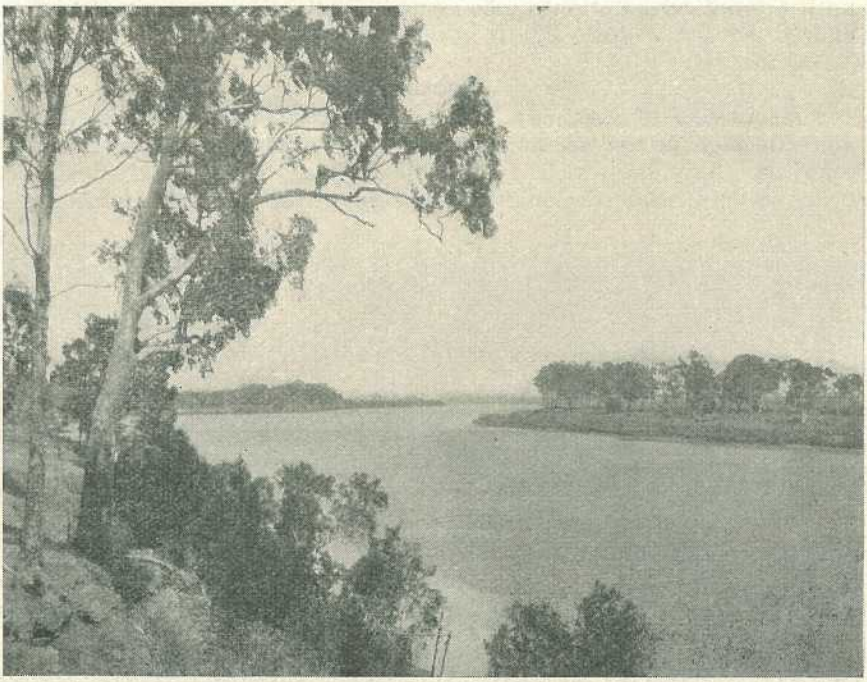

PLATE 30.—THE BURNETT RIVER AT BUNDABERG.

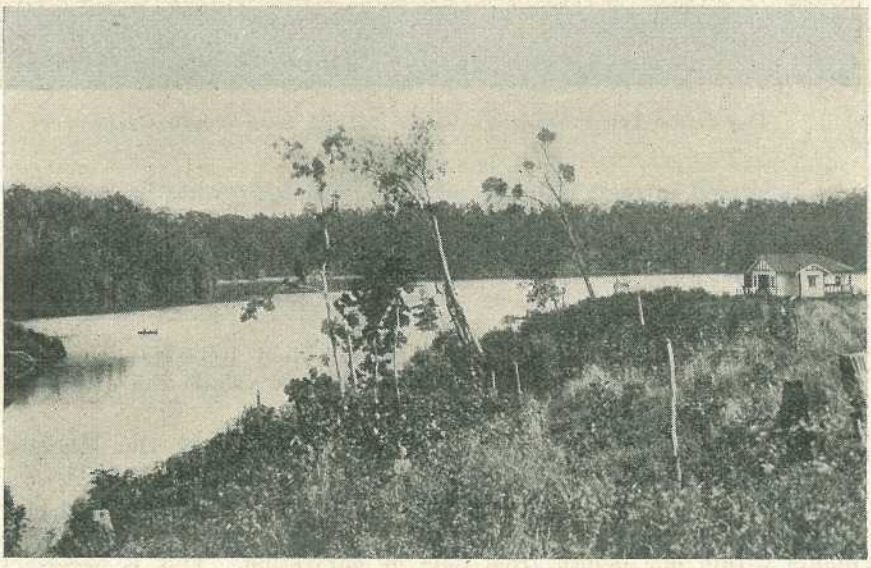

PLATE 31.—ON THE SHORE OF LAKE EACHAM, ATHERTON TABLELAND.

Markets.

Ruling rates for produce are in excess of those prevailing at a similar period of last year, particularly for hay and chaff owing to the increased demand from the western districts. The quality of some consignments reaching the West leaves much to be desired, while the freight to stations remote from the railways is practically prohibitive.

Maize is still selling at under 4s. per bushel owing to the heavy deliveries now being made from the late crop. Queensland potato-growers are now securing a greater share of the local market, and the excellent prices received indicate that this crop is among the most profitable to grow at present. Up to £10 10s. per ton was recently paid for Queensland-grown Carmens, while seed potatoes from across the border have realised over £13 per ton. Careful attention to cultural details, spraying, and the grading of the crop are factors in successful potato production.

Sugar.

Practically all cane areas were favoured by light rains early in June. These have served to assist the young plant cane which has, to date, germinated very satisfactorily. They will also assist in maintaining the grown crop in a satisfactory condition, although the low atmospheric temperatures which have been general throughout the North preclude vigorous growth. Doubtless, little further growth may be expected before September, and the mills are now in a position to gain a more accurate forecast of probable tonnages. Estimates have been reduced in only a few instances, while several mills have advanced their original forecast by a slight percentage. It is pleasing to report that no serious frosts have been experienced to date.

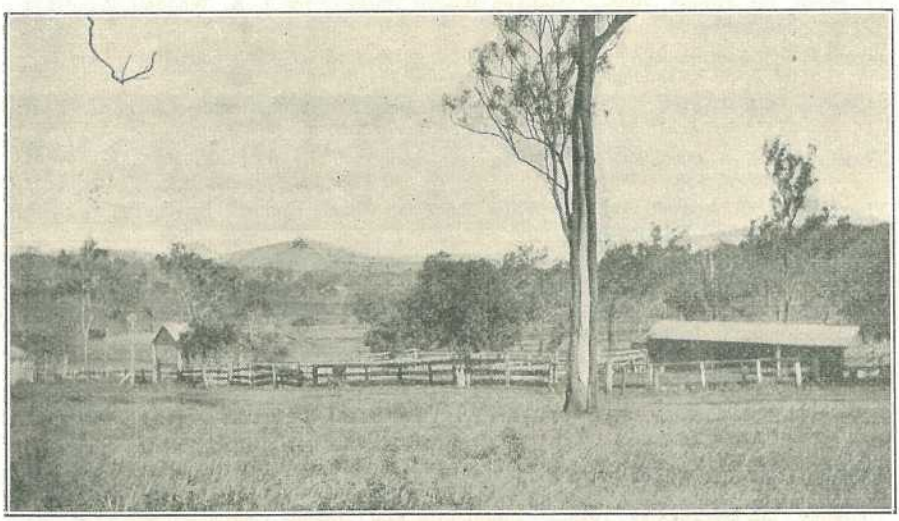

PLATE 32.—DOWN THE VALE.
A scene in the Fassifern District.

AGRICULTURE ON THE AIR.

Radio Lectures on Rural Subjects.

Arrangements have been completed with the Australian Broadcasting Commission for the regular delivery of further radio lectures from Station 4QG, Brisbane, by officers of the Department of Agriculture and Stock.

On Tuesday and Thursday of each week, as from the 2nd July, 1935, a fifteen minutes' talk, commencing at 7.15 p.m., will be given on subjects of especial interest to farmers.

Following is the list of lectures for July, August, and September, 1935:—

SCHEDULE OF LECTURES.

BY OFFICERS OF THE DEPARTMENT OF AGRICULTURE AND STOCK, RADIO STATION 4QG, BRISBANE (AUSTRALIAN BROADCASTING COMMISSION).

Tuesday, 2nd July, 1935—"Does Pig Raising Pay," by L. A. Downey, Instructor in Pig Raising.

Thursday, 4th July, 1935—"Potato Spraying Experiments," by R. B. Morwood, M.Sc., Assistant Plant Pathologist.

Tuesday, 9th July, 1935—"Economic Factors in Pig Production," by E. J. Shelton, Senior Instructor in Pig Raising.

Thursday, 11th July, 1935—"Lemon Growing in Queensland," by R. L. Prest, Instructor in Fruit Culture.

Tuesday, 16th July, 1935—"Breeds that Pay," by P. Rumball, Poultry Expert.

Thursday, 18th July, 1935—"The Marketing Difficulties of Citrus, and How to Overcome Them," by J. H. Gregory, Instructor in Fruit Packing.

Tuesday, 23rd July, 1935—"Sheep Management and Feeding under Drought Conditions," by J. Carew, Senior Instructor in Sheep and Wool.

Thursday, 25th July, 1935—"Hints on Handling Bees," by H. Hacker, F.R.E.S., Entomologist.

Tuesday, 30th July, 1935—"Further Remarks on Animal Nutrition," by E. H. Gurney, Agricultural Chemist.

Thursday, 1st August, 1935—"Banana Weevil Borer," by J. A. Weddell, Assistant Entomologist.

Tuesday, 6th August, 1935—"Care and Management of Growing Chickens—Part I." by J. J. McLachlan, Poultry Inspector.

Thursday, 8th August, 1935—"Care and Management of Growing Chickens—Part II.," by J. J. McLachlan, Poultry Inspector.

Tuesday, 13th August, 1935—"Selling Our Scenery," by J. F. F. Reid, Editor of Publications.

Thursday, 15th August, 1935—"When the Cows Come Home," by J. F. F. Reid, Editor of Publications.

Tuesday, 20th August, 1935—"Avocado Growing," by H. Barnes, Director of Fruit Growing.

Thursday, 22nd August, 1935—"Harvesting and Marketing Tomatoes," by J. H. Gregory, Instructor in Fruit Packing.

Tuesday, 27th August, 1935—"The Necessity for Culling and Its Advantages," by J. L. Hodge, Instructor in Sheep and Wool.

Thursday, 29th August, 1935—"Bush Hay," by N. A. R. Pollock, Senior Instructor in Agriculture.

Tuesday, 3rd September, 1935—"Fungicides and Disease Control—Part I.," by J. H. Simmonds, M.Sc., Plant Pathologist.

Thursday, 5th September, 1935—"Fungicides and Disease Control—Part II.," by J. H. Simmonds, M.Sc., Plant Pathologist.

Tuesday, 10th September, 1935—"Fungicides and Disease Control—Part III.," by J. H. Simmonds, M.Sc., Plant Pathologist.

Thursday, 12th September, 1935—"Salt Bushes," by C. T. White, Government Botanist.

Tuesday, 17th September, 1935—"Chloris Grasses," by S. L. Everist, Assistant to Botanist.

Thursday, 19th September, 1935—"Manures and Fertilizers," by E. H. Gurney, Agricultural Chemist.

Tuesday, 24th September, 1935—"Brains in Farming," by J. F. F. Reid, Editor of Publications.

Thursday, 26th September, 1935—"Kilkivan to Kingaroy—An Epic of Pioneer Settlement," by J. F. F. Reid, Editor of Publications.

SCOUR IN YOUNG PIGS.

White or Yellowish Scour in poung pigs, often a very persistent type of dysentry or diarrhœa, is one of the most dangerous of diseases of newly born, suckling, or weaner pigs. It is a very common complaint and, as such, has a variety of causes, most of them probably being associated with the food supply.

In very young pigs the disease is usually brought on through some derangement in the food supply of the sow, her food may be too plentiful, too rich, or it may have been suddenly changed from one class to another. Too much food is just as harmful as too little. Food that is too watery, fibrous, or unpalatable may induce the trouble. A sudden change in the weather may be a cause; cold westerly winds, especially after heavy rain, are often disastrous. Pig shelters, sties, houses, may be cold and draughty; or they may be ill-ventilated, stuffy, and insanitary. Musty, mouldy, stale and sour foods, very hot or very cold soup with an excess of fat, buttermilk, skim milk or whey, adulterated with an excess of water, decaying vegetable matter—these are all common causes.

Two cases came under notice recently; a picture theatre required a two-weeks' old sucker to train for a special pantomime. A suitable sucker was obtained and special instructions were given to keep the little fellow on the "hungry side," following the food rule—little and often. The picture-show man thought the little fellow could do with a "good blow out," so he fed him up, and, of course, blew him out. This little pig did not go to market.

Another lady rang up to say she was bottle-feeding a piglet two-weeks old, but he had developed severe dysentry and was very sick. When the cause was explained she remarked, "Oh, goodness; thank you very much; I've been giving him half a cupful at a time." The cause was very evident.

In recent years, it has been demonstrated after careful research, that there is a form of diarrhœa in young pigs described technically as "nutritional anœmia," a trouble common where the winters are very long and cold and where the sows are housed indoors for long periods, and have not the benefit of sunshine, its violet rays, and so forth. In these cases the young pigs and anæmic, they are sickly, weakly, and have no stamina; and as the trouble is a nutritional one, unless it is instantly corrected, the loss may be very heavy.

There are scores of cases too where pigs kept under the very best of conditions in sunny climes suffer frequently because they are given too good a time and suffer digestive disorders which lead to bowel derangement. This disease is not usually of parasitic origin, except in weaners, slips, and stores, in which migrating parasites may have set up digestive troubles.

Lack of mineral matters in foods, otherwise of good quality and fed in proper quantities, is regarded as a common cause. One writer, T. G. Joyce, says "apparently the store of iron they possessed when they were born has been used up in making blood as they grow and a fresh or added supply is needed." It was this phase that induced investigations to attempt the feeding of iron and other necessary minerals through the sow, in the hope that the chemical content of her milk would be improved. It is evident, however, that if the milk of the sow is deficient in iron, she herself must be suffering, and probably the dosage given has been just sufficient to make up her own bodily requirements and the feeding of excess is unproductive.

Mr. Joyce tells us that the attempts made to apply iron solutions to the sow's udders, or anywhere the little pigs might lick, have not been altogether successful because the young pigs do not seem to like the bitter taste of the iron. It has been found that iron preparations containing traces of copper are more effective. It is recorded that the mixture of iron and copper drugs does not keep well, hence small quantities only should be prepared. In all cases, a preliminary treatment in which each pig suffering or in contact, is given one or two teaspoonfuls of castor oil is advised.—E. J. SHELTON, Senior Instructor in Pig Raising.

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 Book of the Australian Illawarra Shorthorn Society, the Jersey Cattle Society, the Friesian Cattle Society, and the Guernsey Cattle Society, production charts for which were compiled for the month of May, 1935 (273 days period unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORNS.				
MATURE COW (OVER 5 YEARS), STANDARD 350 LB.				
Greenfields Lorna	S. Henry, junr., Gympie	16,097·55	529·61	Darcy of Springdale
Rhodesview Queenie 8th	W. Gierke and Sons, Helidon	10,181·52	427·699	Birdwood of Blacklands
Happy Valley Ivydene	R. R. Radel, Coalstoun Lakes	10,268·9	426·905	Molly's Hero of Glenthorn
Hillvale Star (268 days)	Mrs. J. H. Weber, Peak Crossing	10,674·1	413·213	Drafter of Greyleigh
Aurora Dora II. (267 days)	L. T. McCauley, Mundubbera	9,241·25	374·194	Hugh's Prince of Blacklands
Waverley Model	R. Scott, Toogoolawah	10,443·8	367.465	Count of Burradale
SENIOR, 4 YEARS OLD (OVER 4½ YEARS), STANDARD 330 LB.				
Lovely V. of Alvaglen (272 days)	G. H. Knowles, Nanango	10,879·45	395·085	Duke of Alvaglen
Lottie of Bellwood	S. J. Currant, Gunalda	7,887·3	333·644	Triumph of Oakvale
JUNIOR, 4 YEARS OLD (UNDER 4½ YEARS), STANDARD 310 LB.				
Happy Valley Sunday 2nd	R. R. Radel, Coalstoun Lakes	10,101·25	431·125	Happy Valley Doncaster
Rhodesview Beauty 7th	W. Gierke and Sons, Helidon	9,150·65	351·523	Colonel Rose of Rosenthal
Dnalwon Fairy Floss III.	B. J. Nothling, Witta	7,737·6	236·373	Sir George of Dnalwon
Millstream Nita	W. J. Barnes, Cedar Grove	9,070·96	326·634	Magnet of Kurrawong
SENIOR, 3 YEARS OLD (OVER 3½ YEARS), STANDARD 290 LB.				
Hillfield Duchess 15th	S. J. Lester, Mulgowie	8,800·20	323·626	Endeavour of Greyleigh
JUNIOR, 3 YEARS OLD (UNDER 3½ YEARS), STANDARD 270 LB.				
Star II. of Alfavale	W. H. Thompson, Manumba road, Nanango	13,604·41	618·37	Reward of Fairfield

SENIOR, 2 YEARS OLD (OVER 2½ YEARS), STANDARD 250 LB.

Millstream Dolly	W. J. Barnes, Cedar Grove	7,784·85	339·59	Oakvale Captain
Valencia Dahlia II.	W. Turner, Riverleigh	7,362·1	282·721	Excelsior of Alnebank
Pansy of Lynfield	F. E. Birt, Sexton	6,587·25	259·848	Lavender's Pride

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

Sunnyview Fairy Bell	J. Phillips, Greenview, Wondai	8,183·18	356·047	Lovely's Commodore of Burradale
Sunnyview Fairy Fly	J. Phillips, Greenview, Wondai	8,549·4	347·815	Lovely's Commodore of Burradale
Blacklands Folly III. (264 days)	A. Pickels, Wondai	6,594·52	298·924	Orama of Blackland
Sunnyview Lulu (267 days)	A. E. Vohland, Aubigny	7,277·6	268·968	Lovely's Commodore of Burradale
Arley Polly V.	B. J. Nothling, Witta	6,806·5	264·297	Greyleigh Syntax
Homelea Irene	J. Savage, Humphrey	6,835·0	259·614	Expert of Springdale
Red Plum II. of Lynfield	F. E. Birt, Sexton	6,176·2	259·195	Lavender's Pride
Empress II. of Lynfield	F. E. Birt, Sexton	7,073·0	258·421	Lavender's Pride
Hillfield Susie 15th	S. L. Lester, Mulgowie	5,969·07	230·864	Mountain Home Royalist

JERSEY.

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

Oxford Bluebird	E. Burton and Sons, Wanora	9,354·95	543·995	Trinity Ambassador
Trecarne Rosella	T. A. Petherick, Lockyer	8,871·79	518·188	Trinity Officer
Westbrook Loxetta 12th	S. V. Abbott, Derrymore	8,718·37	424·669	Carnation Scots Noble
Trinity Victoria	F. P. Fowler and Sons, Biggenden	7,145·0	422·716	Lord Ettrey of Banyule
Langside Duchess	G. W. Young, Inverlaw	8,324·5	400·064	Masterpiece Yeribee of Bruce Vale
Inasfayl Juliette	McGeehan Brothers, Kairi	7,960·4	376·852	Werribee Starbrights Masterpiece II.
Langside Twylish Triplicate	G. W. Young, Inverlaw	7,312·7	353·837	Masterpiece Yeribee of Bruce Vale

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

Lottie of Calton	J. Collins, Tingoora	13,770·63	684·424	Prince Clair of Calton
Trecarne Rosella 4th	T. A. Petherick, Lockyer	9,401·52	545·900	Trinity Officer

Production Recording—*continued.*

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
	JERSEY—*continued.*			
	JUNIOR, 4 YEARS OLD (UNDER 4½ YEARS), STANDARD 310 LB.			
Glenview Audrey Twylish	F. P. Fowler and Sons, Coalstoun Lakes	8,580·0	577·993	Carlyle Larkspur 2nds Empire
Inasfayl Sweet Larkspur	McGeehan Brothers, Kairi	6,955·5	419·365	Werribee Starbrights Masterpiece II.
Langside Ruthinia	G. W. Young, Inverlaw	6,455·25	364·781	Masterpiece Yeribee of Bruce Vale
Trinity Irondele	J. Sinnamon and Sons, Moggill	6,192·43	358·368	Pilgrim of Oaklands
Langside Lassie	G. W. Young, Inverlaw	6,780·9	347·708	Masterpiece Yeribee of Bruce Vale
Matilda of Paradise	A. L. Walker, Don	5,946·25	328·467	Retford Earl Victor
Carnation Princess	W. Spresser and Sons, Redbank	5,275·03	313·881	Carnation Renown
	SENIOR, 3 YEARS OLD (OVER 3½ YEARS), STANDARD 290 LB.			
Oxford Aster Daisy	E. Burton and Sons, Wanora	8,277·17	516·314	Trinity Ambassador
Carlyle Larkspur 23rd	F. Maurer, Darra	7,786·90	100·222	Woodside Vasilikas Volunteer
Lady Betty of Homeleigh	A. L. Walker, Dawn	6,333·0	360·123	Orleigh Golden King
G. N. Hazel	Cox Brothers, Maleny	5,733·0	345·689	Retford Royal Atavist
Carnation Gentle	W. Spresser and Sons, Redbank	6,118·24	340·386	Carnation Daisy's Hero
Lady Horden of Paradise	A. L. Walker, Dawn	5,534·2	330·023	Retford Earl Victor
	JUNIOR, 3 YEARS OLD (UNDER 3½ YEARS), STANDARD 270 LB.			
Oxford Joyful Maid	E. Burton and Sons, Wanora	9,223·06	550·951	Trinity Ambassador
Trecarne Jersey Queen	T. A. Petherick, Lockyer	6,399·08	387·483	Trecarne Golden King
Oxford Ena	E. Burton and Sons, Wanora	6,387·29	374·760	Oxford Robin
Oxford Alwyn (258 days)	E. Burton and Sons, Wanora	5,202·84	330·351	Oxford Robin

SENIOR, 2 YEARS OLD (OVER 2½ YEARS), STANDARD 270 LB.				
Oxford Queen Daffodil (268 days)	E. Burton and Sons, Wanora	6,755·9	414·451	Trinity Ambassador
Trecarne Rosella 6th	T. A. Petherick, Lockyer	5,729·74	354·368	Trecarne Golden King
Bellgarth Dawn	D. R. Hutton, Cunningham	5,979·68	332·611	Bellefaire Blondes Bellringer
Avocaview Lynda Belle II.	H. B. Roberts, Maleny	5,520·0	305·028	Rhondda Palatine Lad
Waltham Farm Flirts Lady	McGregor Brothers, Yalangur	6,794·15	304·938	Greenstock Gentle Boy
JUNIOR, 2 YEARS OLD (UNDER 2½ YEARS), STANDARD 230 LB.				
Brooklands Royal Cake	W. Conochie, Sherwood	8,345·1	473·535	Retford Earl Victor
Waltham Farm Duchess	McGregor Brothers, Yalangur	5,970·43	354·258	Trecarne Reminder
Glenview Brunette	W. S. Kirby, Byrnestown	5,472·5	323·461	Trinity Officer
Oxford Snow Queen	E. Burton and Sons, Wanora	5,130·58	318·583	Oxford Royal Renown
Langside Fifty Fifty (267 days)	G. W. Young, Inverlaw	5,040·45	300·315	Masterpiece Yeribee of Bruce Vale
Trinity Golden Wedding	J. Sinnamon and Sons, Moggill	5,001·82	281·504	Some Hope
Trinity Royal Meadow	J. Sinnamon and Sons, Moggill	4,981·17	277·782	Some Hope
G. N. Lubra	Cox Brothers, Maleny	5,356·2	274·416	Retford Royal Atavist
Carnation Victorious	W. Spresser and Sons, Redbank	4,530·95	274·163	Vinchelez Golden Victory
Bremerside Dell	J. Newman, Caboolture	4,689·0	271·586	Kelvinside Aristocrat
Carnation Paxie	W. Spresser and Sons, Redbank	4,665·04	269·861	Vinchelez Golden Victory
Pensilva Fern II.	McGregor Brothers, Yalangur	5,217·76	259·654	Kelvinside Favourites Raleigh
Selsey Linda	Queensland Agricultural High School and College, Gatton	4,637·1	258·92	Werribee Jupiter
Carnation Victory's Pride	W. Spresser and Sons, Redbank	4,016·29	248·922	Vinchelez Golden Victory
FRIESIAN.				
MATURE COW (OVER 5 YEARS), STANDARD 350 LB.				
Towlerton Zara	F. C. Noller, Kumbia	13,280·13	491·499	Domino Belter King
Inavale April Flower	A. O. Stumer, Boonah	12,107·6	408·066	Cardyline Mascot
Brigalow Dinah	A. O. Stumer, Boonah	10,511·8	358·168	Inavale Ideal
SENIOR, 3 YEARS OLD (OVER 3½ YEARS), STANDARD 290 LB.				
Brigalow Gem II.	A. O. Stumer, Boonah	9,801·05	369·054	Inavale Victory
Burnbrae Alcartis Pontiac (271 days)	P. Wason, Kingaroy	10,802·25	348·673	St. Albans North Star

Production Recording—*continued.*

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
	FRIESIAN—*continued*			
	JUNIOR, 3 YEARS OLD (UNDER 3½ YEARS), STANDARD 270 LB.			
Brigalow Dazzler II.	A. O. Stumer, Boonah	9,459·71	348·081	Inavale Victory
	GUERNSEY.			
	SENIOR, 3 YEARS OLD (OVER 3½ YEARS), STANDARD 290 LB.			
Laureldale Rosette	W. A. K. Cooke, Witta	7,691·95	397·978	Linwood Favour
	SENIOR, 2 YEARS OLD (OVER 2½ YEARS), STANDARD 250 LB.			
Linwood Chimes	A. S. Cooke, Witta	8,292·2	373·104	Linwood Monitor
Laureldale Violet	W. A. K. Cooke, Witta	6,545·1	292·741	Linwood Favour
Laureldale Myrtle	W. A. K. Cooke, Witta	5,614·1	264·391	Linwood Favour
	JUNIOR, 2 YEARS OLD (UNDER 2½ YEARS), STANDARD 230 LB.			
Laureldale Fairy	A. S. Cooke, Witta	5,248·1	244·856	Linwood Favour

TUBERCLE-FREE HERDS.

The following herds have been declared free from tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free :—

Owner.	Address.	Number in Herd.	Expiry Date.
H. H. Dight	Warwick	37	24/10/35
R. A. Slaughter	Clifton	16	31/10/35
Paterson and Paterson	Croxley, Oakey	78	28/11/35
Grimmett and Son	Sherwood	64	1/12/35
Clayton Brothers	Tinana	95	20/2/36
E. H. Heale	Riverdale, Kureen	34	22/2/36
C. Sentinella	Graceville	43	1/3/36
G. T. Fleming	Edge Hill, Cairns	28	16/3/36
D. R. Hutton	Cunningham	53	22/3/36
Mrs. F. Thomason	Highleigh, *via* Cairns	131	28/3/36
McGeehan Brothers	Kairi	104	3/5/36
J. B. Keys	Gowrie Little Plains	36	21/5/36
McGregor Brothers	Yalangur	45	28/5/36
E. G. Harlow	Kuranda	33	7/6/36
David Hope	Kuranda	61	7/6/36

ABORTION-FREE HERDS.

The following herds have been declared free of contagious abortion (Bang's disease), in accordance with the requirements of the scheme of certifying herds abortion-free :—

Owner.	Address.	Number in Herd.	Expiry Date.
H. H. Dight	Warwick	37	24/10/35
Grimmett and Sons	Sherwood	61	1/12/35
F. P. Allan	Stonleigh Dairy, Oxley	63	1/2/36
Clayton Brothers	Tinana	95	20/2/36
C. Sentinella	Graceville	43	1/3/36

WHITE CEDAR BERRIES POISONOUS FOR PIGS.

The Government Botanist (Mr. C. T. White) emphasises the danger of poisoning to domestic stock, and especially pigs, from the White Cedar (*Melia dubia*) berries, which are found very commonly on coastal Queensland and Northern New South Wales. In a statement issued recently he said that during the day the Department of Agriculture and Stock had received specimens of a number of berries from the Stock Inspector at Bowen, who said that skins of the berries had been found in the stomachs of pigs, which had apparently been poisoned by eating them. After an examination he had determined them to be the berries of the White Cedar, a tree very common in coastal Queensland and Northern New South Wales.

Judging from the number of specimens of these berries sent in during the fruiting season each year, he considered that many farmers were apparently unacquainted with the tree and the danger of allowing it to grow near pig yards and sties. The plant grew to the size of a large tree, with finely divided foliage, more or less deciduous in winter, sprays of lilac-coloured flowers, and bunches of yellow berries or stone fruits, which it bore in great numbers. The effect of the poison was narcotic, affecting the whole of the central nervous system. No specific antidote was yet known. Outside Australia the tree was widely distributed in India and the Malay Archipelago. Although the berries were so poisonous to pigs and some other domestic stock, fruit-eating birds, such as the flock pigeons, could eat them with impunity.

STUD PIG REGISTRATIONS IN THE HERD BOOKS OF THE AUSTRALIAN STUD PIG BREEDERS' SOCIETY, YEARS 1911 TO 1935.

Date.	Berkshire.	Middle Whites.	Large Whites.	Large Blacks.	Tamworth.	Poland Chinas.	Duroc. Jerseys.	G.O.S.	Chester Whites.	Wessex Saddlebacks.
1911	217	192	..	..	..	..	..	..	..	..
1912	73	61	..	5	..	..	..	..	..	..
1913	103	22	4	..	..	..	..	..	..	..
1914	286	125	22	..	14	..	..	..	..	..
1915	229	166	4	13	21	..	..	..	..	..
1916	254	69	53	1	4	14	..	..	..	..
1917	269	249	15	..	17	17	..	..	..	..
1918	684	316	11	..	13	14	1	..	..	..
1919	828	292	10	..	22	4	..	..	..	..
1920	365	140	8	..	22	3	..	..	..	..
1921	414	155	12	..	36	11	..	..	..	..
1922	613	220	5	..	51	10	..	..	..	..
1923	666	246	12	..	47	22	..	..	..	..
1924	585	263	9	..	61	28	..	..	..	..
1925	594	282	18	17	95	33	7	4	..	..
1926	998	352	60	22	145	82	29	61	..	..
1927	959	307	96	33	180	94	44	59	..	..
1928	515	135	113	13	160	75	53	55	..	..
1929	487	181	168	24	136	66	84	62	..	..
1930	690	142	309	34	198	52	133	119	4	..
1931	663	209	347	41	292	68	136	99	12	..
1932	563	136	226	28	237	14	44	45	8	2
1933	507	198	449	31	286	25	19	16	..	5
1934	456	187	540	29	221	15	8	11	..	6
1935	523	312	824	19	242	8	5	7	1	9
Totals	12,541	4,957	3,315	310	2,500	655	562	538	25	22

Total 25,425

Compiled from official figures by E. J. Shelton, H.D.A., Senior Instructor in Pig Raising.

In Memoriam.

GEORGE ROBERT PATTEN.

The death of Mr. George R. Patten, Senior Analyst in the Department of Agriculture and Stock, which occurred on the 6th June, is recorded with great regret.

The late Mr. Patten was born in 1880, and was a native of New South Wales. He received his first appointment in the Public Service of Queensland in 1902, when he became junior assistant chemist at the Bundaberg Sugar Experiment Station. In 1905 he was appointed first assistant chemist at that station. Five years later he was transferred to the Agricultural Chemist's Branch of the Department of Agriculture, Brisbane, as third assistant chemist, and advanced eventually to the position of senior analyst of that branch.

Mr. Patten's publications, many of which have appeared in this Journal, cover a wide range. He compiled a summary of experiments conducted with sugar-cane, and of soil and other chemical analyses from 1902 to 1923. The compilation was published afterwards by the Bureau of Sugar Experiment Stations as Bulletin No. 4 (1924), with a commendatory note by the late H. T. Easterby (then Director of the Bureau), in which he remarked:—"This summary entailed a great amount of time and elaborate work." He was a joint author of numerous bulletins and advisory leaflets on soil chemistry and cognate subjects, and among the more notable of these publications were "Soils of the Stanthorpe District" and "Tung Oil Fruit." He made many complete and very detailed analyses of rock specimens for other Departments and the Queensland University. He was a foundation member and honorary secretary of the Queensland Branch of the Australian Chemical Institute, and was honorary treasurer of the Institute at the time of his death. Among other activities associated with his work, he filled the office of a lecturer and examiner at the Queensland Technical College.

The late Mr. Patten was an accomplished musician and was a member of the old Brisbane Liedertafel for many years. Latterly he was associated with the Brisbane Apollo Club. He was a man of infinite kindness, possessing a warm-hearted, genial, cheery nature, happy in the performance of good works. He was interested especially in young people, and study groups from the secondary schools on their instructional visits to the departmental laboratories found in Mr. Patten a most obliging, courteous, and untiring demonstrator. His premature death came as a great shock to his colleagues, causing deep sorrow to them and to his wide circle of friends outside his official life.

The interment took place at the South Brisbane Cemetery on Saturday, 8th June. The large assemblage at the graveside was testimony of the high esteem in which he was held, and included the Minister for Agriculture and Stock (Hon. Frank W. Bulcock), Messrs. R. Wilson (Assistant Under Secretary), E. H. Gurney (Agricultural Chemist), A. E. Gibson (Director of Agriculture), Dr. H. W. Kerr (Director, Bureau of Sugar Experiment Stations), Messrs. R. Veitch (Government Entomologist), W. G. Wells (Director of Cotton Culture), C. J. McKeon (Director of Tropical Agriculture), many other departmental officers and representatives of the professional, commercial, and social circles of Brisbane. To his sorrowing widow and other bereaved relatives deep sympathy is extended.

Answers to Correspondents.

BOTANY.

Selected from the outward mail of the Government Botanist, Mr. Cyril White, F.L.S.

Rasp Wood.

J.A.T. (Brigalow)—

The specimens represent a species of *Haloragis*, or Rasp Wood, several species of which occur in Western Queensland. Some of them are minor weeds in cultivation, but we never heard of their being quite so bad as, apparently, this is on your property. The plant has the virtue, however, that it is quite a good fodder, and one species growing in the Warrego district, very similar to the one you sent, is looked on as a very valuable sheep fodder. It has the peculiarity of making the urine of sheep red or saffron colour. Observant men have told us that the sheep that feed on this plant are free from fly trouble, but this, we think, wants confirmation.

Boonaree.

D.M.C. (Mackinlay, N.W. Qld.)—

Your specimen represents *Heterodendron oleæfolium*, commonly known in parts of Western Queensland as "Boonaree." Sometimes it is called "Western Rosewood." It is a shapely tree, eaten readily by stock. The leaves, however, contain a prussic-acid-yielding glucoside, and if hungry stock are allowed to gorge themselves on it trouble may ensue. It is very rarely that any losses are experienced with the plant in Queensland, but a year or two ago there was a rather serious one in the Roma district, when hungry sheep had been allowed to gorge themselves on the leaves of this tree freshly felled and then went straight away and had a drink of water.

Cassia. Golden Shower.

M.J.K. (Brisbane)—

One of the most beautiful autumn-flowering shrubs in Queensland gardens is the common Cassia (*Cassia bicapsularis*), a native of tropical America, but one which has taken most kindly to the Queensland climate. It produces an abundance of seed, and plants raised from seed planted in the spring grow to shrubs 5 or 6 feet high, and bearing an abundance of flowers the following autumn. The plant lasts for a number of years, and older specimens—say, seven or eight years old, and left unpruned—attain the size of small trees. The plant responds very readily to pruning, and can be formed into a very bushy shrub or a small umbrageous tree as desired.

During the summer months one of the most beautiful flowering trees of Queensland gardens is the Indian Laburnum, or Golden Shower, botanically known as *Cassia fistula*. It is a native of India and Ceylon, but has taken most kindly to the Queensland climate, and when in flower the trees are a mass of large golden-yellow flowers borne in pendant racemes a foot or more long. In the neighbourhood of Brisbane pods are very freely produced, but in North Queensland the flowers are followed by long cylindrical pods a foot or more long, bearing numerous seeds packed transversely. Between each seed is a layer of sweetish flesh that is eaten as a mild purgative. In consequence the beans are sometimes known as "cascara beans," but they do not belong to the same family, and are in no way related botanically to the tree which produces the cascara of commerce. It belongs to the same family of plants which produce senna leaves; hence, no doubt, the purgative character of the sweetish substance surrounding the seeds.

Garlap Nut.

S.A.P. (Townsville)—

The specimen is certainly not the Garlap tree. It is *Sesbania aculeata*, the Sesbania Pea or Gulf Pea, a very common plant in North Queensland. The seeds of this plant were evidently in the soil in which the Garlap nut was planted. The Garlap nut is a native of the Solomon Islands and New Hebrides, and is one of the finest edible nuts known. It possesses, however, a very hard shell.

Mackay District Grasses Identified.

Dow's Creek Project Club (via Mirani)—

The specimens have been determined as follows:—

(1) *Eleusine indica*, Crowsfoot Grass. Common in Queensland as a weed of cultivation along roadsides, &c. It is eaten readily by stock, and has a high food value. However, it contains a prussic acid-yielding glucoside, and if eaten in quantity by hungry stock might cause trouble.

(2) *Rhynchelytrum repens*, Red Natal Grass. An introduced grass, native of South Africa, but now very abundant in coastal Queensland. It is not usually looked upon as of much consequence as a fodder, though it is useful in the form of "chop-chop."

(3) *Sporobolus Berteroanus*, Parramatta Grass. A native grass usually rejected by stock.

(4) *Panicum maximum*, Guinea Grass. A very useful pasture grass relished by stock, and very nutritious. It is fairly commonly cultivated in Queensland.

(5) *Themeda australis*, Kangaroo Grass. A native grass, palatable and nutritious when young, but becoming rather coarse at maturity. It disappears rapidly under stocking, and for this reason is often plentiful inside railway enclosures, when it has long since disappeared from the adjoining paddocks.

(6) *Setaria pallidifusca*. Usually known as Pigeon Grass. It should be quite a useful grass.

(7) *Heteropogon triticeus*, Giant Spear Grass. A coarse native grass, concerning whose properties little is known.

(8) *Digitaria marginata*, Summer Grass. Common in Queensland as a weed of cultivation. Stock seem to be fond of it.

(9) *Axonopus compressus*, Broad Leaved Carpet Grass or Mat Grass. For second-class country this grass is of some value, but if it invades paspalum pastures it soon becomes dominant, and considerably reduces the carrying capacity.

(10) *Paspalum orbiculare*. A native grass common in coastal Queensland. It is of little value as a fodder.

Bamboos.

"Sap" (Townsville)—

The best bamboo to plant around Babinda would probably be the common bamboo, cultivated everywhere in Queensland. This is *Bambusa arundinacea*. It is best propagated from off-shoots from the big stools, although these are sometimes very difficult to get out. He could establish them from sections of the stem, putting, say, one node well below the soil, and another somewhere about soil level, and keeping them moist, although clumps would be formed quicker from the off-sets. Another bamboo, not so robust as the common one, but slightly more handsome, is *Bambusa gigantea*. This is not so frequently seen, but it has bright yellow stems, each section with a rather thin streak of green down it. Some of the smaller ones might serve the purpose in view, and of these perhaps the best would be the black bamboo, which people prize so much for fishing rods. This is *Phyllostachys nigra*. All these three species are cultivated in Queensland, and probably your local Botanic Gardens would be able to supply suckers. Our experience here has been that bamboos are rather disappointing in preventing erosion. They certainly will do it under ordinary circumstances, but very heavy floods with a great rush of water will undermine them and carry them away. Some other grasses might serve your purpose better, and would be somewhat quicker of growth. *Arundo Donax*, the Spanish reed, cultivated in Queensland in both plain green and variegated varieties, we think would be worthy of trial.

Wild Salvia.

J.D. (Rathdowney)—

Your specimen is Wild Salvia (*Salvia coccinea*), a native of the warmer parts of North and South America, but now established as a weed in many parts of the world. It is quite common in many parts of Queensland, and has come under suspicion as causing abortion in cows. The plant has this reputation abroad, as well as in Australia. The use of oils of the common pennyroyal and other members of this family as abortifacients is well known. The plant is harmful, in any case, if eaten in quantity.

South Burnett Grasses Identified.

G.H.K. (Barambah)—

(1) *Chloris divaricata.* A native grass widely spread over the State. In the Maranoa district and other parts of Western Queensland it is regarded as an excellent fodder.

(2) *Panicum decompositum.* A native grass sometimes known as "barley grass." It is palatable for stock in the young stage only, as it soon becomes hard and papery.

(3) *Digitaria marginata,* Summer Grass. A common weed of cultivation. Stock are rather fond of it.

(4) *Cynodon Dactylon,* Common Couch Grass.

(5) *Panicum decompositum.* See No. 2. A number of forms of this plant are found in Queensland.

(6) *Capillipedium parviflorum,* Scented Top. A native grass common in forest country. In some parts of Queensland it is looked upon as an excellent fodder.

(7) Leaves only. Flowers required for identification.

(8) Leaves only. Flowers required for identification.

(9) *Chloris ventricosa.*

(10) *Eragrostis leptostachys,* Paddock Love Grass. A common constituent of the average native mixed pasture.

(11) *Chloris divaricata.* See No. 1.

(12) *Aristida* sp. A species of three-awned or three-pronged spear grass.

(13) *Eragrostis parviflora,* Weeping Love Grass.

(14) *Triticum æstivum,* Wheat.

(15) *Bromus uniodoides,* Prairie Grass.

(16) *Stenotaphrum secundatum,* Buffalo Grass.

(17) *Echinochloa crus-galli,* var. *edulis,* White Panicum.

(18) *Chloris Gayana,* Rhodes Grass.

(19) *Avena fatua,* Wild Oats. Although this was labelled Algerian oats, it does not agree with description and figures of that species, but seems rather to be wild oats.

(20) *Sorghum leiocladum.* A native sorghum for which we have not heard a common name.

(21) *Eriochloa* sp. Most of the Eriochloas are good fodders. They are often called early spring grasses or dairy grasses, but neither of these names is particularly appropriate.

(22) *Dichanthium sericeum,* Blue Grass. One of the best of our native grasses.

(23) *Rhynchelytrum repens,* Red Natal Grass. Very common in coastal Queensland. Generally rejected by stock, except when chaffed up.

(24) A form of *Themeda australis,* Kangaroo Grass.

(25) *Pennisetum alopecuroides,* Swamp Foxtail.

(26) *Themeda australis,* Kangaroo Grass. In its young stages is quite a good fodder, but it becomes harsh and unpalatable at maturity.

(27) *Arundinella nepalensis.*

(28) *Chloris virgata,* Feather Top Grass. This is closely allied to Rhodes grass, and is sometimes called feather top Rhodes. However, stock generally reject it, although it is reported to be of some use in the form of hay.

(29) *Carex inversa.* A sedge, not a true grass.

(30) *Panicum decompositum.*

(31) *Eragrostis cilvanensis,* Stink Grass. Common as a weed of cultivation in the warmer regions of the world. It is not regarded as of much consequence as a fodder, although working horses have been said to eat it.

(32) *Setaria glauca,* Pigeon Grass.

(33) *Eragrostis elongata.* A love grass.

(34) *Juncus communis.* A rush, not a true grass.

(35) *Echinopogon nutans.* Rough bearded grass.

(36) *Fimbristylis deparyserata.* A sedge, not a true grass.

(37) Leaves only. Impossible to determine in the absence of flowers.

(38) *Eleusine indica*, Crowsfoot Grass. Usually found as a weed of cultivation on roadsides, &c. Stock eat it readily, and it is quite nutritious. However, it contains a prussic acid-yielding glucoside, and if eaten in quantity by hungry stock would probably cause trouble.

(39) *Chloris divaricata.*

(40) *Paspalidium flavidum.*

(41) *Heteropegon contortus*, Bunch Spear Grass. Quite a good fodder in its young stages, although at maturity the sharp seeds are rather dangerous.

Grasses Identified.

H.T. (Proserpine)—

(1) *Sorghum fulvum.* A native sorghum, very abundant in your district, and on the islands of the Whitsunday Group.

(2) *Aristida ramosa.* A three-pronged or three-awned Spear Grass.

(3) *Rottbœllia formosa.*

(4) *Eriachne* sp. Nos. 3 and 4 are native grasses, for which we have not heard local names.

(5) *Brachiaria foliosa.* A native grass sometimes known as leafy panic grass. It generally favours rather shady situations.

(6) *Arundinella nepalensis.* A very coarse grass, very widely spread in Queensland. We have not heard a suitable local name given to it.

(7) *Hackelochloa granularis.* A small grass full of grain; should be nutritious.

(8) *Dactyloctenium ægyptium*, Coast Button Grass.

(9) *Cymbopogon* sp.

(10) *Panicum Mitchelli.* A native panic grass—most of the native panic grasses are useful fodders in the average mixed pasture.

(11) *Eulalia fulva*, Brown Top Grass. Widely spread in Queensland, and usually looked upon as a good fodder.

(12) A mixture of *Pseudopogonatherum contortum*, the smaller plant with the brownish seed heads, and *Bothriochloa decipiens*, bitter or pitted blue grass or red grass, which has rather silvery seed heads. The latter is an inferior species which has become dominant in some of the coastal pastures of Queensland and New South Wales, considerably reducing their carrying capacity.

(13) *Cenchrus echinatus*, Mossman River grass or burr grass.

(14) *Panicum maximum*, Guinea Grass.

(15) *Tridax procumbens.* A very common weed in Queensland, a native of Tropical America. We have not heard a common name for it.

(15A) *Anisomeles salvifolia.* Both this and the preceding bore the same number, but this is evidently the plant referred to as No. 16 in your letter.

(17) *Leucas linifolia.* A common tropical weed naturalised in North Queensland.

(18) *Flemingia involucrata.* A native legume; should be fairly nutritious.

"Carpet Grass." "Hula Grass."

R.S. (North Arm)—

Of the two grasses the one with the narrow leaves is *Axonopus compressus*, the narrow-leaved mat grass or carpet grass. This grass has been established in Queensland for a number of years past, and has a definite value for second-class country, such as a good deal of that between the North Coast railway line and the coast. The only disadvantage of it is that it gets into the ordinary paspalum pastures, becomes very difficult of eradication, and very much decreased the carrying capacity of the pasture.

The other grass with broader, bright-green leaves and spikes of small yellow seeds is *Paspalum conjugatum*, variously known as mission grass, yellow grass, sour grass, and hula grass. It has been in North Queensland for a great number of years, but only in recent times has travelled south. The general opinion in North Queensland is that if it gets into paspalum country, particularly in tropical wet places such as some of the wetter and warmer parts of the Atherton Tableland, it will ruin the paspalum pasture. It is not generally regarded as having much value as a fodder wherever it grows, although we have seen working mules feed extensively on it in New Guinea in the absence of other suitable fodders, and work quite well on it.

No charge is made for this advice and we would be very pleased to name and report on any specimens you care to send from time to time.

Grasses Identified.

F.J.I. (Gooroolba)—

Your specimens represent:—

(1) *Aristida præalta.* A three-pronged or three-awned Spear Grass.

(2) *Sorghum halepense,* Johnson Grass. A very bad pest of cultivation, particularly difficult to eradicate because of its underground rhizomes. –

(3) *Eragrostis leptostachys,* Paddock Love Grass. A native grass rarely common in the average native mixed pasture, and usually looked upon as quite useful.

(4) *Chloris Gayana,* Rhodes Grass. A useful grass for subcoastal country, particularly on hillsides.

"Poison Corkwood."

H.I.N.R. (Cooroy)—

Your specimen represents *Duboisia myoporoides,* sometimes known as "poison corkwood." The plant is very poisonous, but usually is left untouched by stock. In one or two cases, however, we have observed stock punishing bushes. Some reference was made to this plant in the Press some eighteen months ago, a child having been poisoned by it at a place on the North Coast of New South Wales. It is sometimes called "soap-box," as you mention, although this vernacular is more generally applied to a different tree.

A Black Wattle.

A.B. (Charters Towers)—

It is very difficult to tell wattles from the leaf only, but we think the one you sent is a form of the Queensland Black Wattle, *Acacia Cunninghamii,* common along the Cape River and Torrens Creek, North Queensland. Many wattles, quite apart from the mulga and some of the best-known sorts, make excellent drought fodder for both sheep and cattle. We have not heard of the present species being used before, but have no doubt that it could be used successfully. As you state, impaction is a possible result, but the same remark applies to almost any foliage of wattles and other plants, particularly from the inland parts, as most of them are rather fibrous, but this is a risk that would have to be taken.

A Relative of Rhodes Grass—Chloris Barbata.

K.B.McR. (Mareeba)—

Your specimen is *Chloris barbata,* a grass widely spread over the tropical regions of the world. It is hard to say now where it originated, although we think it is regarded generally as a native of Tropical America, from whence it has spread practically to all tropical countries. It is closely allied to Rhodes grass, and was boomed as a fodder here some few years ago, but seems to have gone out of favour. It is very abundant in North Queensland, particularly in coastal areas from Rockhampton to Cairns, but we cannot say that we have seen stock eat it to any extent. Some of these *Chloris* grasses allied to Rhodes grass stock seem to favour when they are dried or made into the form of hay, rather than when they are green and luxuriant.

Zamia Poisonous to Stock.

R.S. (Port Douglas, N.Q.)—

All members of the Zamia family are dangerous. Quite a number of them occur in different parts of Queensland, some of them quite large. The one in your district is probably *Bowenia spectabilis,* a zamia or cycad of fernlike appearance and bearing a cone of nuts which fall all round the base of the plant. Trouble in this case may be caused either through eating the young shoots or ripe seeds when they fall from the plants. The poisonous nature of these plants has now been definitely proved by feeding tests. It is certainly dangerous to allow pigs to run in country where zamia nuts are in abundance. One of the species of zamia that occurs in New South Wales recently caused severe losses in travelling sheep. These sheep had been used to hand-feeding of maize and other concentrated foods. In travelling through a patch of zamia country they ate a number of the nuts, with the consequence that severe losses occurred.

Trees Suitable for the Charleville District.

T.C. (Charleville)—Trees that we think would succeed in Charleville:—

Celtis sinensis, the so-called Portuguese elm. This tree is deciduous but we do not think that this would matter as shade is not so important during the winter months, and it is well worth growing in Western Queensland. We think it would thrive there and it has the added value that the leaves are very good fodder for stock. Seeds and plants are not stocked by nurserymen, but may be obtained from the Botanic Gardens, Brisbane.

Sterculia diversifolia, currajong. Probably one of the best all-round trees for planting in your district.

Sterculia rupestris, the narrow-leaved bottle tree.

Melia dubia, the white cedar. It does quite well but is rather subject to borer attack.

Schinus molle, Pepper tree or pepperina.

Bauhinia Hookeri, Queensland ebony; one of the most beautiful native trees. There are some fine examples about Roma, but we do not remember having seen any about Charleville. It is well worth growing. Seeds and plants are not, as a general rule, obtainable through the ordinary commercial channels, but we think plants may be obtained from the Botanic Gardens, Brisbane, or from the nursery of the Brisbane City Council. It is rather slow-growing.

Following are some suggestions for trees to grow. We do not remember having seen them about Charleville, but we think they are well worthy of trial:—

Flindersia australis, Crow's ash. The same remarks apply regarding supplies as to *Celtis sinensis* and *Bauhinia Hookeri.*

Jacaranda mimosæfolia, the common jacaranda.

Calodendron capense, Cape chestnut.

Nephelium tomentosum.

Schottia brachypetala.

Ceratonia siliqua, carob bean.

Native Grasses and Fodder Plants.

R.V.O'B. (Cunnamulla)—

The remarks contained in your letter are appreciated, and we are glad that you find the wireless talks from the department interesting. Regarding books dealing with your country, we are afraid there is nothing very comprehensive. A useful little book is "Australian Grasses and Pasture Plants," by Fred Turner, published by Whitcombe and Tombs, price 4s. It is not a very comprehensive work, but a lot of the main Western grasses and fodder trees are mentioned, their distribution, analyses, &c. A most useful book by the same author, but probably now out of print, is "The Forage Plants of Australia," published by the Government Printer, Sydney, away back in 1891. Mr. Turner is still alive, although now a very old man. "The Grasses and Fodder Plants of New South Wales," by E. Breakwell, deals mainly with the grasses of the dairying region. It is obtainable from the Government Printer, Sydney, price 6s. 6d., or through any bookseller.

Regarding the timbers and their uses, you would find "The Timbers and Forest Products of Queensland," by E. H. F. Swain, a useful work. It is obtainable from the Government Printer, Brisbane, price 6s. 6d. paper covers, 11s. 6d. bound in cloth.

We would be very pleased to identify and report on any specimens you care to send. Of grasses, a whole stem doubled backwards and forwards so as to fit comfortably in a small piece of newspaper, should be sent. It is always a help if one or two additional seed heads can be included. Of herbage plants, and shrubs, trees, &c., a shoot a few inches long, bearing leaves, and, if at all possible, flowers or fruits, should be forwarded. Number each specimen and retain a duplicate, when names corresponding to numbers will be returned. No charge is made for this service.

White Dutch Clover. Guinea Grass.

R.S.P. (Yungaburra, N.Q.)—

It is rather difficult to identify clovers satisfactorily from single leaves, but we think there is little doubt the one you sent represents the common White Dutch Clover (*Trifolium repens*). It usually comes in about June, and lasts to about the beginning of November. We think it is undoubtedly the best clover, generally speaking, for Queensland conditions, particularly for sowing in the average paspalum pasture.

In reply to your inquiry regarding Guinea grass, seed is not usually stocked by nurserymen; this is mostly for the reason that the seed has very poor germinating qualities, and the percentage of germination is generally small. The only satisfactory method is to gather the seed straight off the plant and sow it right away. Guinea grass is fairly common in North Queensland in different places, and you should have no difficulty in establishing a small plot yourself, and getting your own seed supply from this.

Flame Thrower.

"INTERESTED" (The Head, via Boonah)—

1. A firm handling the flame thrower for destroying weeds is J.C.A. Products, 229 Adelaide street, Brisbane.
2. Its approximate cost is £12 15s.
3. Its approximate operating cost is 2s. per hour.
4. The fuel used is Diesel engine crude oil costing 7d. per gallon.
5. The company would probably be pleased to arrange for a demonstration on your farm.

Stagger Weed.

C.T. (Mount Larcom)—

The specimen represents a young plant of the stagger weed (*Stachys arvensis*). This weed is one of the commonest winter and early spring weeds of cultivation in Queensland. It has the peculiar effect of causing "staggers" or "shivers" in working stock. They recover, however, when taken off it. It has no effect on ordinary dairy stock, calves, or resting horses. It is only when stock are driven or excited in some way that the symptoms are manifested. It is often called mintweed, but is not to be confused with the mintweed or wild mint that has caused so much concern on the Darling Downs and some parts of Central Queensland.

Johnson Grass.

H.C. (Miles)—

We have no pamphlet dealing with prussic acid poisoning of cattle by Johnson grass. Johnson grass is worst in its young stages, and, like most members of the sorghum family, is least harmful when in full seed. There is always a risk in feeding directly on Johnson grass, and stock should not be allowed on to it when it is heavy with dew, or when the cattle are empty and very hungry. If cut and allowed to wilt and then fed, either long or chaffed, the danger is minimised. Generally, at this time of the year Johnson grass is in a very old stage, and not particularly suitable for cutting, but can be grazed off, provided reasonable precautions are taken.

Ten Most Intelligent Animals.

To settle once and for all the age-old debate as to which is the more intelligent—the horse or the dog—Dr. W. Reid Blair, Director of the New York Zoological Park, has graded what he considers the ten most intelligent animals as follows:—

1. Chimpanzee
2. Orang-utan
3. Elephant
4. Gorilla
5. Domestic dog
6. Beaver
7. Domestic horse
8. Sea Lion
9. Bear
10. Cat

General Notes.

Staff Changes and Appointments.

A number of officers of the Aboriginal Department who are stationed in the Torres Strait Islands and Palm Island and Missionaries in charge of coastal mission stations in North Queensland have been appointed Honorary Rangers under the Animals and Birds Acts and the Native Plants Protection Act. These are—

Messrs. J. N. Delaney, Superintendent, Palm Island Aboriginal Settlement; F. N. Julian, Deputy Superintendent, Fantome Island Lock Hospital; G. H. Schwarz, Missionary, Cape Bedford Mission, via Cooktown; W. W. McCullough, Missionary, Yarrabah Mission, Cairns; G. H. Wilson, Missionary, Mornington Island, via Burketown; P. R. Frith, Teacher, Mabuiag Island, Torres Strait; H. W. Armstrong, Teacher, Foid Island, Torres Strait; P. H. Currell, Teacher, Darnley Island; F. P. May, Manager, Aboriginal Industries, Badu Island, Torres Strait; L. R. Butler, Teacher, Murray Island.

This action has been taken in order to protect, as far as possible, plant and bird life on the Northern coast and islands adjacent thereto.

Mr. F. A. Atherton, Koumala, has been appointed Canegrowers' Representative on the Plane Creek Local Sugar Cane Prices Board, in place of Mr. E. J. Walsh, resigned.

The appointment of Mr. V. Martin as Assistant Cane Tester at Racecourse Mill has been cancelled from 12th July, 1935; Mr. St. C. G. Fanning, Assistant Cane Tester, has been transferred from Isis to Racecourse Mill from 12th July; Mr. F. A. van Lith, Assistant Cane Tester, has been transferred from Cattle Creek to Isis Mill; and Mr. H. Lawrie, of Fairfield, has been appointed Assistant Cane Tester at the Cattle Creek Mill as from 12th July, 1935.

Mr. W. H. Bechtel, lately Manager of the State Farm at Kairi, and Instructor in Agriculture, Department of Agriculture and Stock, will be attached to Atherton.

The following transfers of Officers of the Department of Agriculture and Stock have been approved:—

Messrs. T. S. Tuck, Slaughtering Inspector, from Coolangatta to Townsville; M. Custance, Slaughtering Inspector, from Townsville to Coolangatta; J. A. O'Neill, Inspector of Dairies, from Gayndah to Gladstone; and M. N. Muller, Stock, Slaughtering, and Dairy Inspector, from Gladstone to Mundubbera.

Plywood and Veneer Board Levy.

The Plywood and Veneer Board Levy Regulations published in the "Government Gazette" on 23rd February, 1935, empowering such Board to make a levy to provide for its administrative expenses, are extended by Regulation approved to-day, and shall apply to all pine plywood and veneer delivered between the 3rd May, 1935, and the 2nd May, 1936, by a grower in pursuance of an order allocated by the Plywood and Veneer Board.

Stanthorpe Hail Insurance Scheme.

Regulations under the Primary Producers' Organisation and Marketing Acts have been approved to-day which will empower the Committee of Direction of Fruit Marketing (constituted under the Fruit Marketing Organisation Acts, and deemed to be a commodity board in pursuance of section 29 of the above firstmentioned Acts) to conduct a ballot amongst fruitgrowers in the Granite Belt area upon the question of making a levy on the growers of apples, apricots, grapes, nectarines, peaches, pears, and plums to raise money for the establishment and maintenance of a fund for the purpose of effecting insurance against hail, and to be known as "The Stanthorpe Fruit Hail Fund." A number of growers have requested that a poll be taken on the question of the establishment of the fund and the making of the levy, and the regulations prescribe the procedure in connection therewith. Growers concerned for the purposes of such poll and entitled to vote shall comprise all those who declare that they expect to have apples and/or apricots and/or grapes and/or nectarines and/or peaches and/or pears and/or plums grown or growing for sale in the Granite Belt area during the period 1st October, 1935, to 1st April, 1936. The ballot will be conducted by the Committee of Direction of Fruit Marketing.

Weight of Battens on Hay Bales.

The Minister for Agriculture and Stock (Mr. Frank W. Bulcock), in referring to frequent complaints as to the excessive weight of battens used on bales of hay pressed in this State, called attention to Regulations under the Stock Foods Acts, which provides the total weight of battens shall not be greater than 10 per cent. of the gross weight of the bale. In order to achieve this and to provide for a more uniform pack, it is prescribed that the total number of battens per bale shall not exceed eight in number. Each batten must not be of greater length than the bale, and be not more than 3 inches wide and five-eighths of an inch thick. The Minister stated that necessary action would be taken to enforce this provision.

New Sanctuaries Proclaimed.

The Cooby Creek Reserve, in the Toowoomba district, has been declared a sanctuary under the Animals and Birds Acts for the protection of native animals and birds.

Orpheus Island, in the Palm Island group, has also been declared a sanctuary, and Mr. G. W. Morris, of Dunk Island, has been appointed an honorary ranger in respect of this island.

Mr. T. Broom, the lessee of Poole Island in Port Denison, Bowen, has also been appointed an honorary ranger under the Acts.

An Infectious Disease of Poultry.

By Order in Council issued recently in pursuance of the provisions of "*The Diseases in Poultry Act of* 1923" Infectious Laryngo-tracheitis has been declared a disease under the Act.

SISTER KENNY'S METHOD—CLINIC OPENED IN BRISBANE.

Thus "Pollyanna" in "The Queensland Producer"—

"There is no appeal to Queenslanders so great as that of a sick or crippled child, and one would give his last penny to try every possible means of obtaining relief. It is no use telling parents that no more can be done. There is always the hope that something new can be tried, and that 'something' will bring renewed health and strength.

"Only a few years ago, a friend's little girl developed arthritis, and the most distinguished physician of the day said to the parents in the most kindly way, 'I cannot do any more for your little girl; yet I know you will not believe me, and will go on spending your money!' They did go on spending, and kept themselves poor.

"It is the same to-day, and Sister Kenny's promise of help was sure to be rushed by hopeful fathers and mothers seeking for their children relief from that terrible enemy—infantile paralysis. Fortunately, a Government sympathetic to those in poor circumstances is financing the clinic, and the opportunity for relief is open to country as well as town residents.

"CENTRAL SITE.

"The clinic is in George street, two blocks from Queen street, and easily reached from the tramline in that main thoroughfare. The premises are an old two-storey house opposite the Executive Buildings. Sister Kenny is there at present, with Dr. Rountree, a fully qualified lady who was a resident medical officer in Townsville, and ten nursing assistants. One hundred children have already been registered, and it is said provision can be made for 260 patients. The children must be brought there daily, for there is no residence attached. Possibly as the clinic develops a residence with verandas and garden will be found for country people.

"The Home Secretary (Mr. Hanlon) must be praised for his benevolent effort to help suffering children, and readers of the 'Queensland Producer' will send the most loving thoughts to them with prayers for their recovery. One could write at length on the cases already brought in to the clinic—of little ones with maimed limbs, the dragging of little feet, limbs encased in irons, little bodies not able to sit or stand, little heads not able to be controlled. Please God, Sister Kenny has found some method of helping them!"

Rural Topics.

Country Town Libraries.

Writing to the editor of the "Sydney Morning Herald," a correspondent (C. G. C. Christie) had this to say:—

During the last few months I have had occasion to visit many country towns, and made it a point to visit the libraries available to the public. In almost every instance I found a total and deplorable disregard of one of the most important reasons for their existence—namely, as treasuries of local history and biography, a popular repository of anything procurable, whether printed page, manuscript, or picture that tells aught of the town and district pioneers. I found practically nothing to illustrate the social, intellectual, and religious movements amongst their people; no faithful records of incidents, sayings and doings, amusements, industries, manners, and customs. The garnering of such local matter need cost but little. In the meanwhile our store house of historical data, the Mitchell library, is dependent upon the meagre gleanings of one or two individuals who keep scrap books, which rarely reach any repository where they are available as historical records. The builders of country libraries should never forget that there is a duty encumbent upon them to gather together such data, as well as administering to the other immediate literary tastes of their subscribers. I would even go so far as to suggest that every library in the State should be affiliated with our State Public Library and be expected, in return for subsidies, to supply the chief Public Librarian, and in particular, the Mitchell Library, with local historical data.

What Mr. Christie has said of the country town libraries of New South Wales applies with equal force to Queensland. There are, however, some notable exceptions, including Dalby, Maryborough, Bundaberg, and Townsville.

The English and Australia.

Thus T. D. Burling, in the correspondence column of the "Sydney Morning Herald":—

When the Boer War was being fought some Boers asked, "Who are these Australians who are coming?" One old Boer replied, "They are awful monsters; eleven of them licked All England!" Well, there are millions of Englishmen who do not know much more about Australia. They know about our cricketers, tennis players, and have heard we have a big bridge. This week I was spending a day with an Australian, though he was born in Sheffield, and came out here forty years ago. He has had several trips home. He told me that in Sheffield at the largest business place the owner was absolutely bewildered when he informed him that we have in Sydney and Melbourne very much larger shops than any in England except London, and quite as large as any in London. One of the passengers coming out with him asked him would there be any decent hotels in which to board in Sydney. A number of immigrants have gone home and bitterly attacked Australia, and, of course, misrepresented it. I have much sympathy with those people, for they came out with a small capital, which they lost. They came out quite ignorant of Australian conditions. They went on the land totally ignorant of the difference between Australian farming and that of Cambridgeshire, England. They declared when back in England that false inducements were offered them from Australia House.

I meet hundreds of immigrants from England (not nearly so many during the last year or two); they arrive here with the idea Australia is much like England, only a little bigger. When they discover Perth is as far from Sydney or Melbourne as London is from Moscow, they are naturally bewildered. Then they hear about our States, and are absolutely dumbfounded when they find they are larger than Yorkshire. The very first lesson Englishmen contemplating coming to Australia should be on the geography. They should be told, first, that Australia is just about the same size as all Europe. The climate is best in the world. The population is far too small. That we produce other things besides wool. That Australia has fewer foreigners than any other part of the Empire, including Great Britain itself. That young people are the best to come to Australia. They should be told about our unionism, and it is not always easy to get a start, but young people, men or women, are safe to make good if they are willing to work. They cannot pick up sovereigns in the street, but it is as easy to spend money in Australia as in England, and just now not much easier to earn it. They should also be taught that in business, in trades and professions (miners, farmers, workers) Australians are up to a very high standard; therefore, competition is very keen. But Englishmen generally do not know Australia, and immigrants ignorant of Australian conditions are very heavily handicapped. It is not fair to them to come out so badly informed.

Dairy Hygiene Means High-quality Cream.

Seldom have the main essentials of dairy hygiene been more forcibly and more strikingly expressed than in the closing remarks of the Scotch lecturer to a class of veterinary students. "Gentlemen," he said, "all that you need to remember is that the cow produces milk and dung with equal facility. The whole secret of producing clean milk lies in keeping the two apart."

If the speaker's bluntness is excused on the score of his nationality, and the remarks interpreted in a general sense, it must be admitted that they contain a good deal of truth. Good butter, good cream, and good milk all depend upon the maintenance of a satisfactory standard of cleanliness.

Milk, as produced by a healthy and properly fed cow, is in itself absolutely pure, but between the process of milking and the delivery of the cream at the factory there are numerous opportunities for it to pick up all kinds of foreign materials and flavours.

The greatest danger lies not in the visible dirt, but in the microscopic sources of infection. It is such material that the lecturer includes in his expression. He reminds us in effect that the outside of a cow is comparatively unclean compared with the inside of the udder.

It is quite definite that the quality of butter depends primarily upon the quality of the cream supplied to the factory.

Over-ripe cream is caused by excessive acidity which develops when cooling is not practised after separation. To prevent, separate at a test of not lower than 45 per cent. and cool immediately afterwards. Store in a cool place and do not allow too long periods to elapse between deliveries to the factory.

Fermented cream results from the growth of certain gas-producing germs in the product. These organisms come originally from cow manure, and gain entry into the milk in the yard. Fermented cream is an indication that milk is being produced under unclean conditions.

Manure should be removed promptly from the cow shed. Strict attention should be paid to cleaning the plant and premises. Use boiling water for scalding utensils morning and evening. Wash each cow's udder and milk with clean hands. Cool the cream after separation.

Stale cream is caused by holding it too long at the dairy or by adding a small amount of left-over cream to the next can. The method of prevention is obvious.

Another defect arising from infrequent factory deliveries and caused by overstaleness, uncleanliness, and germ infection is that of rancid or cheesy cream. This class of product is usually condemned as unfit for butter-making. A thorough cleansing of buckets, separators, milking machines, &c., is recommended, together with better regulated deliveries.

An unclean flavour in cream is produced by faulty cleaning of milking machines, separators, and other utensils; by the use of old, broken and rusty vessels; using cloths for washing up, and by unclean methods in the dairy. Prevention lies in thoroughly washing all dairy utensils and in scalding them well in boiling water. This must be done immediately after each time they are used. Use clean, sound brushes instead of rags, and adopt cleanly methods throughout. Do not mix hot and cold cream. Wait until all is thoroughly cool first.

The grazing of cows on rank growth of some weeds, clover, lucerne, and other feeds may give rise to feed flavours in cream. If possible, allow such fodder immediately after milking. Then remove the cows to ordinary pasture. Cool and aerate the cream after separation.

Curdy cream occurs when the separated product is too thin—below 38 per cent.—and not kept cool. Cream should be skimmed to contain not less than 42 per cent. butter fat, be cooled immediately after separation, stirred frequently with a clean, tinned, metal stirrer and kept cool during storage.

Germ infection from swamps, dams, and low-lying paddocks is responsible for ropy cream. Cows should be prevented, as far as possible, from wading in such places; udders should be washed thoroughly before milking. Whitewash dairy and bails; scald utensils with boiling water to remove infection.

A tallowy flavour is due to sunlight shining on the cream. This sets up a chemical change, particularly with high-testing cream of 50 per cent. and over. The same defect may be caused by a germ infection. Keep the cream away from direct sunlight. Do not expose excessive surfaces of cream to the air for any length of time, and keep all utensils and surroundings clean.

Rusty cans and utensils and unclean tinware cause metallic flavours. Discard all defective vessels. Use only well-tinned seamless cans and buckets.

Milk and cream have an exceptional capacity for quickly absorbing all kinds of flavours, and should not be left in a room where the exhaust fumes from the oil engine or odours of the engine are prevalent. Keep the cream away from oil smells, such as that arising from oil on the floor or on the separator block; from smoke from the fire, any strong-smelling materials, chemicals, and disinfectants. A room with a clean pure atmosphere is the best for storing cream. Do not wash dirty utensils with water from the engine jacket.

WASHING UDDERS.

A "cowy" flavour is the result of an unclean condition of the bails, floors, yard, &c., not washing the udder, milking with dirty hands, milking unhealthy cows, or of using the milk too soon after calving. The udders and teats should be washed and milking done with clean hands. Bails should have concrete floors, and the yard should be kept clean. Never separate the milk from sick cows that have just calved.

Culture and Agriculture.

"How can he get wisdom that holdeth the plough, and that glorieth in the goad, that driveth oxen, and is occupied in their labours, and whose talk is of bullocks?"—Ecclesiasticus, xxxviii., 25.

Here is at once a riddle and a contemptuous estimate of the husbandman. It is not so long since the toiler on the land—the man who produces food and clothing, the only absolute human necessities—was held in disdain for the sluggishness of his mind and the narrowness of his intellectual vision. But the byword "clod," as denoting mental poverty, is leaving the language without leaving it poorer, and a counter-jumper is not less contemptible than a clophopper. The farmer of the day is the intellectual peer of the merchant, and the organisation of a modern farm demands qualities similar to those needed for the conduct of a modern business.

Mr. Frank Tate, formerly Director of Education in Victoria, is urging the establishment of a system of "regional" libraries. Regional libraries exist in England. They are libraries financed by the municipalities at small cost, and from them other and smaller libraries in country centres borrow books. Thus many libraries are supplied at a little more than the cost of one library. There is every reason to believe that the system would be a success in Australia. It is perhaps permissible to say here that we have a peculiar knowledge of the craving for good reading that exists in the country districts of Australia. Letters from readers of "The Australasian" tell of a desire for and an inability to obtain from libraries books which no public library in the world should lack—the works of Dickens and Thackeray among them. It is a crime against the community to leave such desire unsatisfied. The library in a Victorian mining village which sold its copy of the Encyclopædia Britannica to buy a set of Edgar Wallace is a caterer to the taste of the village.

A public library to some extent must cater in order to exist; but its main purpose is to elevate, and its highest function is to advise and guide readers and to develop culture by providing opportunity. There is a wide field and one promising a rich yield. The people who with vision unobscured by masonry witness the daily miracle of sunrise and the brief beauty of sunset, who live in nearness to Nature, are in a peculiar sense susceptible to culture; they need it; many of them ardently desire it. . . . It is not suggested that the establishment of an efficient library system will result in the discovery of many village Hampdens or mute, inglorious Miltons, but one desirable and inevitable consequence would be the betterment, morally and intellectually, of the whole community.—"The Australasian."

The Great Point in Clean Milk Production.

Speaking at a meeting of farmers brought together under the auspices of the Rochdale Agricultural Discussion Society (England) to hear a talk by Dr. Innes, the Medical Officer of the borough, on milk in relation to health, Mr. G. B. Wells endorsed the doctor's statement that the great point in clean milk production was that the workers must be interested and understand the various operations. One inefficient person could upset all the team work. Sterilisation of vessels was also of great importance. The adaptation of the farm copper for this purpose would yield good results if attention could be given to each vessel, and they had sufficient enthusiasm to do the work conscientiously.

Empire Provender.

A special correspondent of the "Sydney Morning Herald," writing from London on 1st June, had this interesting note on the demand in the Old Country for Empire foodstuffs:—

Empire foodstuffs are no longer unfashionable in London, and even the smartest hotels are often gratified to serve them. Hard work by a handful of courageous pioneers and the example set by a group of persons of high degree have produced results that are most surprising. Ordinarily, one can mention Australian butter and even Australian wine, or Canadian fruits or New Zealand mutton, or (for that matter) South African melons without a blush in the most exclusive restaurants. But on an occasion such as Empire Day, one does so with positive pride.

Last Friday (which, of course, was Empire Day) more than 20,000 Empire meals, each course of which was composed wholly of British, dominion, and colonial products, were served in the West End hotels and restaurants. Australian and South African burgundies, clarets, and hocks were supplied in profusion with these repasts. Nigerian melons, grape-fruit, and peaches; Indian curries and turtle; Canadian sweet corn and ham; Kenya coffee; toheroa soup and a score of edibles from the counties of England figured on the menus. It was a day, in fact, on which a concerted and successful effort was made to bring to the notice of Londoners and overseas visitors the virtues of eating with a patriotic appetite.

Even at Claridges, the home of princes and millionaires, the Empire note was struck with a bang. "Many dominion dishes are now served here regularly," said a member of the managerial staff. "There is no longer any need to go outside of Britain or the Empire to meet the requirements of the most exacting epicure. This is due to the enterprise of growers and producers, and to improved cold storage facilities, which make it possible to bring tropical fruits and perishables long distances to London."

It is due, also, if one might say so, to the destruction of those snobbish barriers which for so many years obstructed the sale of Empire products except in the cheapest cafes and public-houses. The Empire wines, for instance, which were given special prominence on Friday, were all selected from existing lists. It is not so long ago since a request for a dominion wine would have produced a supercilious refusal from the very head waiters who now recommend it.

The Journal Appreciated.

A Fernlees farmer writes:—" . . . Allow me to congratulate you on such a helpful Journal for the man on the land. I have found many of your articles on Queensland grasses and pasture management very helpful. There is no doubt but that the future prosperity of the country is bound up in better management of our national resources."

Oldest Donkey Dead.

"Lassie," said to be the oldest donkey in Great Britain, was found dead recently, and was buried in the paddock where it had been kept for years.

"Lassie" was forty-seven years, and belonged to Miss Mabel Bruce, of Westmoreland road, Bromley, England, a daughter of the late Mr. Justice Bruce. Miss Bruce and her sister were on holiday, near Paisley, in 1888, and heard that a local farmer was trying to find a home for a crippled donkey born in a gypsy camp, and left behind by the gypsies. The two sisters accepted the donkey, and took it to Bromley.—"The Veterinary Record."

"Yellow" Meat.

Answering a correspondent in "Modern Meat Marketing" (March, 1935, p. 118), Colonel T. D. Young, Veterinary Adviser to the National Federation of Meat Traders Association, England, remarked:—

There are many sheep affected with jaundice which, on slaughter, show what is referred to as yellow mutton, but there are many yellow carcasses of mutton which are not affected with jaundice, the colour being hereditary. Such carcasses are quite sound and fit for human food. Feeding has been suggested as a cause for the yellow colour, but butchers may buy a score of sheep all having been grazed in the same field and one sheep, possibly, will be the only one showing a yellow colour on slaughter.

In jaundice all the tissues are yellow, while in hereditary coloured carcasses, the fat only is yellow—e.g., as in Channel Island cattle (Jerseys and Guernseys). In jaundice, the kidneys and liver are generally abnormally black and the mucous membranes very yellow. A chemical test for bilirubin is conclusive in a disputed case, but practical meat inspectors can generally decide without such a test.

The Home and the Garden.

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.

FOOD FOR THE WINTER.

HEALTHY active children are more hungry in cold weather and need rather more food, especially more butter and other fat, than in hot weather; but this does not mean that they can safely consume an unlimited quantity. If a child begins to lose appetite and condition, and at the same time to pass very pale or even putty-coloured motions, he is suffering from fat-indigestion, and all fat must at once be omitted from his food until he recovers. Then it should be gradually resumed, but not in such large quantity. Children differ in their tolerance for fat, but they should be allowed as much as agrees with them during the winter. One reason is that fat produces heat, but the more important reason is that certain fats, especially butter and cod liver oil, are the principal source of two of the vitamins so specially necessary for growing children.

Vitamin D.

One of these, vitamin D, is produced by sunlight acting on the skin. In winter there is less fear of exposure causing sunburn, but it is still necessary to be cautious with babies and young children, to accustom their skin to sunlight gradually, carefully regulating the time of exposure. In older children, who have not been habitually overclothed, there is not much need for caution. But it would be most unwise to rely altogether on sunlight for this vitamin.

Vitamin A.

This is not all. Another vitamin, known as A, is a very important factor in the resistance to those infections, to which children are specially exposed in winter months. Therefore their diet should include foods rich in vitamins A and D. These are butter, cream, and eggs. There are few children who would not be the better for one egg every day. If you cannot afford this, scramble the eggs or make them into custard so that each child may have his portion.

Cod Liver Oil.

These foods are sufficient for most children, but some are not able to take enough of them. Therefore, all babies not breast fed and all children who are delicate should be given cod liver oil right through the winter. Some take the pure oil readily, but for many it is best given in the form of an emulsion, which should contain 50 per cent. of the oil.

Food not Medicine.

It must be clearly understood that we recommend cod liver oil as a food and not in any way as a medicine. We have nothing to do with

the advising of drugs or medicines. Our province is promotion of good nutrition and sound health by natural simple means.

It must not be thought that giving cod liver oil will make up for all the deficiencies of a child's diet. It certainly will not do this. All children under six years of age should take one pint of milk daily in various ways, and if the mother cannot afford to give so much to her older children, half-a-pint is the smallest quantity that can be recommended.

Vitamin C.

This vitamin is absolutely necessary for health. It is most abundant in uncooked fruit and raw lettuce. For most dwellers in this happy land tomatoes, oranges, pineapples, or other fruits are abundant right through the winter. Those who live in our sorely stricken West can obtain vitamin C by sprouting their peas and beans before eating them.

Vitamin B.

There is yet another vitamin which is dangerously deficient in ordinary diets. It is known as vitamin B, and is abundantly present in whole cereals, but totally absent in white bread and white flour. A valuable source of this vitamin is porridge made of whole wheatmeal, which is cheap and easily procurable. Oatmeal is more frequently used, but we believe it is not quite as good. Some like a mixture of both. Avoid all fancy breakfast foods, which are a silly fashion. Most of them contain little or no vitamin, and all are more expensive than their food value warrants.

Unless a large portion of porridge is eaten, something more is necessary. Brown bread is better than white bread, but it is not the same thing as wholemeal bread. This some find it hard to get, and all is not wholemeal bread that is called by this name. Therefore, we advise that each child should take daily a heaped dessertspoonful of cooking-bran. This is very cheap, for it can be bought for one penny a pound in Brisbane, and is so light that a pound goes a long way. It may be eaten mixed with a little milk, in porridge or soup, or some of it may be made into scones, and it should always be added to milk puddings.

We hope many Queensland mothers will take our advice, and that many children will enjoy a more healthy winter than they did last year.

IN THE FARM KITCHEN.

VALUE OF PINEAPPLE DIET.

Few people now dispute the fact that fruit is essential to health. Medical research has abundantly proved that many cases of malnutrition, particularly in the country districts of Australia, are caused by the absence of fruit from the daily diet. Digestive disturbances leading to disordered blood conditions are common symptoms of this deficiency, and local medical men are strongly urging the greater use of fruit. All fruits supply juices that aid digestion and help to keep the intestines free from harmful bacteria, contain vitamins, minerals and easily-digested energy sugars. But it is in our tropical fruits that Nature's medicines are most lavishly stored, and pineapples grown on warm hillsides continuously bathed in tropic sunshine, seem to have absorbed a full measure of the healthful properties contained in the life-giving rays of the sun.

The body cannot store some of the health factors required by it—they must be replaced every day, and this is why the pineapple should be a daily article of diet in every household. Two slices a day, fresh or canned, are all that is necessary. When the fresh fruit is plentiful—usually in the months of February, March, April

and July, August, September, October—and if distance does not prevent your purchasing, buy the fresh fruit. For the rest of the year purchase canned pineapple. Do the same all the year round if transport makes it impossible for you to procure the fresh fruit.

Natural Properties Retained in Canning.

Remember, fresh or canned, all the health benefits of pineapples are intact. Sir Wm. Arbuthnot Lane, one of London's leading dietetic authorities, after exhaustive inquiries relating to the properties of canned fruits, said no considerable proportion of the mineral salts is exhausted; the juice has definite nutritive value, the vitamins are, in most cases, left intact, and in some cases actually intensified.

Pineapples are undoubtedly one of nature's health correctives and healers. Their richness in vitamin A helps to prevent common colds and those eye ailments so prevalent amongst children, particularly in the inland districts of Australia. At the first sign of a cold or when colds are prevalent eat pineapples freely. Being rich in vitamin B they promote body growth. Owing to their vitamin C content pineapples are recommended by doctors as a precaution against pyorrhoea which, according to the "Medical Press and Circular," is largely a dietary affection.

Dr. J. R. Killian, a distinguished American scientist specilising in the study of nutrition, states that the fight against pyorrhoea and dental decay will be helped in the future by a liberal use of pineapple in the diet.

Pineapples are of great value in after treatment following tonsil removals and assist the stumps to heal. The pure juice is a proved reliable ferment for dissolving necrosed tissue in quinsy.

These benefits are available to all, as where the fresh fruit is unobtainable the canned pineapple—retaining as it does the properties of the freshly-picked fruit—may be used.

Its uses in the kitchen are legion. Slices fresh or canned, served with cold meat have an appeal which ensures their continued use, particularly with corned meat. To the busy housewife the pineapple presents an easy solution of the ever-present dessert problem. No dish is more quickly prepared or more appetising than grated pineapple, fresh or canned. Its popularity never wanes.

A fruit salad can be rapidly made by the use of pineapple, fresh or canned, and one or more of any fruits in season. For cooked desserts the pineapple may be served in a multiplicity of ways, and the following receipes are recommended:—

Pineapple Jelly.

Wash a good half-breakfastcupful of sago, put in a large jug with half-cupful water, 1 cupful sugar, 2 grated pineapples, and juice of 1 lemon. Put the jug in a pan of boiling water and stir until clear, then put in moulds until cold. Serve with custard or grated pineapple.

Pineapple Fritters.

Put flour in basin, add pinch of salt, baking soda, and cream of tartar, the usual quantities to each pound of flour, 1 tablespoonful sugar, and 1 egg to each pound of flour. Mix all together with milk, or half milk and half water, to a nice batter, dip in pieces of pineapple, and fry to a nice brown. Condensed milk may be used if fresh is not available for the batter, by mixing at the rate of 1 tablespoonful to a pint of cold water. This mixture of batter may be used for bananas, mangoes, or apples, or any fruit that is used for fritters.

Pineapple Pie.

Two cupfuls grated pineapple, 1 cupful water, 1 cupful sugar, 2 tablespoonfuls breaderumbs. Line pie-dish with paste, mix pineapple, water, sugar, breaderumbs, and yolks of 2 eggs, bake, and when cool beat up the white of eggs and put over pie.

Pineapple Turnovers.

Make a flaky pastry from 2 cups self-raising flour and half-cup dripping. Cut out shapes the size of a tea plate, put a spoonful of chopped pineapple and a little sugar on each fold, press over the edges of the pastry together, and bake in a brisk oven. The turnovers are better served with hot custard.

A delicious pineapple drink may be made in either of the following ways:—

Pineapple Syrup.

Keep the skins of your pineapples and boil slowly and well in plenty of water. Strain through cloth and add sugar to taste. This makes a delicious drink, and retains all the medicinal qualities of the pineapple.

Pineapple Water.

Peel a medium-sized pineapple and cut it into pieces, pound it to a pulp, and mix with it 1 pint of boiling syrup and the juice of 1 lemon, and let it all stand covered for two hours; now strain, and add 1 quart of water, and ice.

THE VALUE OF VINEGAR.

Every housewife has a bottle of vinegar in her store cupboard, and here are some ways of using it.

When boiling a fowl add a spoonful of vinegar to the water in the saucepan, and it will help to make the bird tender.

Do the same when boiling fish, and it will keep it white. Old potatoes, also, can be kept white by this means.

When put with rice, it keeps the grains separate. This is a good tip when boiling rice for curry.

In hot weather, if the joint does not look very fresh on arrival from the butcher, wash it all over with equal parts of vinegar and water, and then wrap it in a clean piece of muslin or old curtain wrung out in a solution of the same strength. Always hang the joint when possible, so that the air can get all round it.

If you think the joint will be tough when cooked, rub it with vinegar and let it stand an hour or two before cooking. It will help to make it tender.

If vinegar is used instead of water in mixing mustard it will keep fresh much longer and also improve the flavour of the condiment. If the flavour is too strong use half vinegar and half water in the mixing.

For toilet use, vinegar is equally beneficial. A cupful added to the bath will be found most refreshing, while the same amount in a foot bath of hot water will ease aching feet in a wonderful manner.

As a gargle, use vinegar, a tablespoonful in a glass of water. It relieves sore throats and acts as an antiseptic.

After washing the hair, rinse with warm water and a little vinegar. This removes all stickness and makes the hair soft and silky.

HOUSEHOLD USES.

It is helpful, too, in many household tasks.

If a few drops are added to a tin of blacklead, the blacklead will not dry up.

Windows rubbed with a cloth dipped in vinegar will take a brilliant polish.

For cleaning water bottles, take one part of salt to two of vinegar, put into the bottle and shake well, then leave to stand for a few hours. Give a final shake, and rinse in clean water.

Sponges which have become slimy should be soaked for several hours in a fairly strong solution of vinegar and water, and then rinsed thoroughly in two of three changes of water. They will then be like new.

If your polished mahogany table gets badly smeared and spotted, a little vinegar will remove the marks. Use an old table napkin and rub with equal parts of vinegar and water. Rub dry, and polish in the usual way, and your table will be wonderfully shiny again.

KITCHEN GARDEN.

Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. In fine weather get the ground ploughed or dug, and let it lie in the rough until required. If harrowed and pulverised before that time, the soil is deprived of the sweetening influences of the sun, rain, air, and frost. When the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans, lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, salsify, &c. As westerly winds may be expected plenty of hoeing and

watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower and take up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops.

The continued production of rhubarb may be greatly assisted by giving a heavy mulching of manure and hoeing it well into the soil. Keep the beds well watered, and give regularly a dressing of liquid manure, say, once a week.

It is not necessary to use forcing manures on the young stock, as plants are ruined if forced in the early stages of growth.

The rhubarb makes rapid growth during the autumn and spring, and when stalk cutting has been started liquid manuring and manuring may be given.

NOTES ON ROSE CULTURE.

The following notes on rose culture are taken from the Pacific Nurseries Catalogue (Messrs C. W. and A. C. Heers), Manly, Brisbane:—

Time for Planting.—From May until the end of September. For the coastal, excepting perhaps the Central and North, we specially recommend the later period, and, in support, advance the following reasons:—

Every horticulturist must admit that all roses, particularly in the coastal area of Queensland, invariably exhibit luxurious and succulent growth and wealth of bloom during the months of March, April, May, and early June. This being so, we contend that as the plants are full of flowing sap they are not in a fit condition for transplanting during that period. There are, however, odd seasons when plants ripen earlier. In such circumstances, we would not object to extra early planting, but consider May and June do not give the plants time to establish themselves sufficiently to withstand the approaching winter.

Roses planted during the earlier months readily respond to the warm periods which assuredly occur in the middle of our winter, only to be as surely struck by our colder and more frosty days during the latter part of the winter. This shock not only checks the growth, but actually kills the tender white jelly-like roots then in the forming. There can be only one result—a plant with stunted growth upon which the foundations of your future tree has to be built. Remember, if these plants are left undisturbed in the nursery they remain dormant.

On the other hand a thoroughly rested and ripened plant, transplanted during late July, August, or September, according to the trend of the season, is ready to break away into full and vigorous growth as the warmth of Spring appears, never to look back.

We readily admit that the rose, being a hardy plant, may even do well when planted early, but after much experience we prefer to pin our faith to late planting, in most parts of Queensland where our winter is so variable. Holding these views, we hope clients will follow our advice and plant late in the season, say, from the middle of July to the middle of September. However, from Rockhampton north, earlier planting may be preferable.

Roses planted during September and even October will do quite well; if planted this late they should, however, be provided with artificial shade and kept well watered until they are established.

It is gratifying to us to know that quite a number of clients, after acting upon our advice, write to say how pleased they are with their experience of late planting; so we reiterate—do not plant or prune roses too early in Queensland, especially along eastern slopes south of Bundaberg.

We must warn people that early planting is the cause of many failures, therefore, do not complain if you ignore our advice.

Selecting Varieties.—When making selections consult our brief descriptions and ascertain the variety's suitableness regarding its growth, style, colour, fragrance, and freedom of bloom. If you are not acquainted with the various varieties listed it will pay you to leave selection to us, mentioning any varieties you may already have. You will find a special list on the inside of the front cover, giving our choice in each colour.

Planting.—Roses should never be planted when the ground is sodden, as the soil glues together and excludes the air so necessary for the future welfare of the plant. Rather delay planting, and in the meantime bury the whole plant lengthwise,

cover completely with soil and await more favourable conditions. It is surprising how long plants may be kept by this method.

Although roses do well under almost any condition, it will always repay you to trench and drain the ground. However, should the ground be flat and unsuitable for drainage, it is better to dig it a foot deep and raise the bed. Such beds require hardwood or concrete borders, otherwise the outside plants dry out too easily. Work in a liberal supply of well-rotted cow or stable manure. This work should be done at least four weeks prior to planting. Plant so that the union will be just under the surface of the ground. In the case of light sandy soil it is an advantage to have the union as much as 2 inches below the surface. Never, on any account, place fresh manure or any form of fertilizer near the roots at the time of planting.

The roots should be evenly spread and so arranged as to give them a downward tendency; cover with about 3 inches of fine soil and press down firmly; fill in and give a liberal supply of clean water. Keep the earth away from the graft until the plant strikes; in the meantime, mulch with straw in order to protect union and keep the soil from caking. Cover the outside edges of straw with soil to keep it in position.

The mulch also creates an ideal condition for further waterings. Should the weather continue dry, it will be necessary to water at intervals, according to the conditions. Do not use fresh manure or artificial fertiliser near the roots when planting. Should the sun's rays become hot after planting, it is advisable to provide the plant with artificial shade.

Suckers.—Always keep a sharp lookout for brier suckers, which may from time to time sprout from below the graft. These are readily detected by their foliage, and if not removed they will in time kill the rose tree. *However, on no account must any new rose growth from the base be interfered with.*

Manuring.—Roses should be heavily manured at least once a year, well-rotted animal manure being the best. It should be spread over the bed and lightly forked in. Bone dust and other suitable fertilizers are also beneficial. Established rose trees are greedy feeders, and periodical light dressings of fertilizer, applied during damp weather, will give good results. Heavy soil needs occasional dressings of lime, which, however, should not be used within a month or so of fertilizers.

Pruning.—There is no phase of rose culture more difficult to impart than that of pruning. After accepting the broad principles generally laid down, make a close study of the habits and peculiarities of the various types of roses. Apply commonsense methods and observe and profit by the results obtained. We are opposed to early pruning in this State for similar reasons to those advanced against early planting. However, varieties with H.P. strain may, if the canes are sufficiently ripened, be shortened during March or April to from 3 to 5 feet from the ground—the weaker the shorter. This will ensure a wealth of bloom in the late autumn. For the annual overhaul the end of July and August is the best time. Hard pruning, as practised in cold countries, must not be generally applied here. The reason is not far to seek, as the periods of inactivity are short and uncertain. Make the prevailing conditions your guide as to how and when to prune. Assist the pruning problem by observing the following golden rules during the entire season:—

(1) Cut away dead, spindle wood; (2) always cut blooms and stems that have bloomed well back to a strong eye; (3) never allow seed pods to form on the bush. By these means you will encourage correct growth and freedom of bloom. There are odd varieties which resent the knife, Penelope for instance.

It is most important that plants be kept free from scale and other diseases, otherwise valuable portions have to be prematurely removed to the detriment of the plant. Exhibitors should prune harder than those growing for general purposes. Tea roses require lighter treatment than H.T.'s and H.P.'s.

To prune, cut away all dead, diseased, and spindling wood; thin out anything that is liable to crowd; cut back shoots to a strong eye, pointing outward in the case of uprights and inward on those of spreading habits; preserve any new strong shoots coming from the base (often misnamed water shoots) that may serve to replace any worn-out stems that should be renewed every three years or so.

As soon as the new growth appears, carefully rub off any shoot that is likely to overcrowd or grow in a wrong direction.

Climbers should be allowed their fling during the time they are establishing themselves. Train the strongest canes horizontally, about 24 inches apart, shorten the ends, and cut away all other wood. Provide for the renewal of these trailers every few years.

Aphis.—Nicotine sprays, such as Black Leaf Forty, are most effective. They may be kept in check by applying the hose freely.

Scale.—Spray with either red oil, kerosene emulsion, or any lime-sulphur mixture. Many roses are lost annually through scale.

Grubs, &c.—For all leaf, plant, and flower eating insects, spray with arsenate of lead as directed.

Mildew.—This is a stubborn fungus disease that has for many years past baffled our scientists. The rose, like all other life, no doubt requires a properly balanced food, and as analyses show that our soils are often deficient in potash and lime, it is not altogether surprising to find that, where good dressings of wood ashes have been applied, appreciable improvement in reducing the mildew scourge is apparent. Experiments are being conducted all over the world in search for a cure for mildew, and reports to hand show that potash used in its various forms gives results which are at least reassuring. For our part we can say that we have found the use of wood ashes, also spent carbide, beneficial. If these are not available, try giving each established tree say 4 to 6 oz. of sulphate of potash, in addition to lime, and observe the result.

Regular sprayings with liver of sulphur (1 oz. to 2 gallons of water), or 1 oz. bicarbonate of soda to 1 gallon of water, or Bordeaux, will ward off attacks. Remedies: Flowers of sulphur, 9 parts; arsenate of lead, 1 part; well mixed; applied with a bellows when the dew is on the foliage. Sprays: Sulphuric acid, 1 part to 800 parts of rain water, 1 oz. bicarbonate of soda to 1 gallon of rain water is a helpful spray. A drastic remedy is 2 tablespoonfuls of lysol to 1 gallon of water. Spraying should be done before noon. Always treat the underneath as well as the top of the foliage.

Failures.—Failures are generally attributable to one or more of the following causes:—

Having used fresh manures or fertilizer at time of planting. Allowing roots to be exposed after unwrapping. Lack of drainage or planting in soggy ground through excessive wet weather. Planting too near the edge of raised beds, too near shrubs, trees, and/or hedges; also in shady positions. Allowing plants to dry out after westerlies. Giving too much water during first fourteen days in cold weather. Heavy frosts just after planting or even when the plant is established. Planting too deep, planting too shallow, or planting too loose. Acidity in damp or poorly prepared soils. Chemical reactions from fertilizers previously applied to the soil. Plants being knocked by children or the thoughtless gardener. Dogs and cats are often the cause of plants dying or being damaged. The use of strong soap suds, &c. Planting too early or too late. Planting in same spot where a rose has been growing unless soil has been replaced.

TOMATO SEED SELECTION.

In selecting tomatoes from which seed is to be saved, only that from the best yielding plants which conform strictly to the characteristics of the variety, both as regards type of vine and type of fruit, should be chosen. Several fruit should be cut open to be sure of the quality. A plant should be chosen that produces a large number of average size tomatoes rather than a plant with two or three large fruits and a number of small ones. Care should be taken to see that the plant is free from disease, as several tomato diseases are transmitted by the seeds.

The best method of separating tomato seed from the surrounding pulp is as follows:—Cut the fruit in halves and scoop the contents into a bucket, and when the latter is about half full, fill up with water. Stand the bucket aside and allow the contents to ferment, which will take from two to six days, according to the warmth of the weather. A froth forms on top of the water when fermentation is sufficiently advanced. Wash the contents of the bucket on a fine sieve or a layer of hessian and the pulp will come right away from the seed, which must be spread out in a thin layer to dry. Rapid drying is important to prevent moulding. When dry, rub the seed in the hands to separate the individual seeds. Seed harvested in this manner has averaged 94 per cent. germination.

As already indicated, selection from a plant which is free from disease is important, but as a further precaution the seeds should be dipped for ten minutes in a solution of mercuric chloride, 1 part in 1,000 parts of water, before planting. Proper precautions must be taken with mercuric chloride where there are children or animals, as it is highly poisonous if taken internally.

TREES—THEIR VALUE TO A TOWN.

Dr. C. E. W. Bean, writing in the "Sydney Morning Herald," has this to say of trees and their value to a town:—

When some dreary township or metropolitan suburbs, seen from the railway, strikes you as a wretched, depressing place to live in, and presently some other town or suburb impresses you as a pleasant region, have you ever asked yourself what it is that makes the difference? If not, make a test in future, and in two cases out of three you will probably find that the chief difference lies simply in the presence or absence of trees. . . .

What can be done, chiefly by the efforts of a single public-spirited leader, can be seen by anyone who visits the beautiful city of Bathurst. Fifty years ago Bathurst was almost as large a town as it is to-day, with some rather fine public buildings, erected largely at Government expense. But in spite of them it was as ugly, drab, sprawling a place as are many of our country towns and suburbs.

A City of Trees.

But the then Mayor of Bathurst, Dr. T. A. Machattie, was a man of exceptional public spirit, foresight, and energy. When he expressed his belief that the wide empty streets of the bare, sunbaked town could be beautifully and usefully transformed by planting trees, he found most of the citizens apathetic, and some opposed on the ground that the trees would restrict the traffic. Seeing that in those sleepy days it was almost an "incident" if a dog walked across the road, and that of all places in the world the Australian country town was most likely to benefit by shade and beauty, the good doctor was not deterred. Eventually he created some public interest in the project by getting a holiday for the school children to see and help in the planting; and so the streets of Bathurst were in a few years lined with young trees. Further, the gaol was removed beyond the outskirts of the town, and the old gaol pulled down, and its grounds turned into a park (which the aldermen named after their mayor—Machattie Park), and planted with trees.

Of how an unattractive town may be transformed into a shady, beautiful resort simply by tree-planting, Bathurst is perhaps the best example. But Grafton, Albury, Orange, Tumut, and many other towns are also striking examples of this truth; and fortunately not only civic authorities, but private landowners, are becoming aware of it. A beautiful tree, or a background of them, gives not only shade and shelter, but beauty and distinction to the most unattractive cottage. So much is this recognised in some countries that when land is subdivided for building, a covenant is sometimes inserted insisting that trees must be left.

The farms of New South Wales are seldom beautified by trees to the same extent as those in other countries, or as those in Victoria and South Australia, where avenues of sugar gums are often seen lining the home paddock or the approach to the homestead. Australians who fought in the Somme country in France will remember that almost every farm there had its grove of trees, and the villages seen from a distance resembled woods. Yet of all homes the farm is most easily made beautiful with trees, since they may grow without fear from those public officials who, in the past, have been the greatest enemies of the street or garden tree—the electric lighting and postal authorities.

Trees on Our Roads.

Happily of late the attitude of these and other officials towards tree-growing has undergone an almost complete change, and many departmental engineers are now as keen as the artist and the architect to preserve the trees they used to destroy. The Main Roads Board is a leader in the movement, and the Government has lately given a fine example in the great care taken to preserve the trees and brush along the Oxley Highway in the north-east of New South Wales. And the great tree-planting by which this jubilee has been commemorated surely means that we are now well set upon the right road.

By tree-planting alone we could within a generation transform most of the ugliness of our towns and homes into real beauty; and all citizens may help towards this end by urging upon their local council, or the other authorities concerned, the support and continuation of that effort to end in the covering of our bare suburbs and townships behind screens of shady foliage; and by themselves keeping or planting garden trees where they suitably can; and by resisting all unnecessary tree-cutting as a policy of backwardness and ignorance.

What Dr. Bean says about the beautification of country towns in New South Wales applies with equal force to Queensland. Fortunately, we, too, have some notable examples of the fine public spirit which he extols. Toowoomba provides an outstanding example that might well be followed by lesser towns and villages.

Orchard Notes for August.

THE COASTAL DISTRICTS.

THE bulk of citrus fruits, with the exception of late ripening varieties, will now have been marketed, and cultural operations, pruning, spraying, &c., should be receiving attention. Where trees show indication of impaired vigour, pruning should be heavy, both in respect of thinning and shortening branches. Where trees are vigorous and healthy, a light thinning only will be necessary, except in the case of the Glen Retreat Mandarin, which in coastal lands is invariably disposed to produce a profusion of branches, with consequent over-production and weakening of the constitution of the tree in addition to the fruit being small and not of the best quality.

In dealing with trees which show signs of failing, investigation should be made near the ground level for indications of collar rot, and in the North Coast district particularly, for the presence of the citrus root bark channeller which may attack the roots for a distance of several feet from the base of the trunk of the tree. A very light application of paradichlorobenzene, buried a few inches under the soil in circles around the tree and the surface stamped firm, is considered efficacious in destroying the pest. The distance between the circles (shallow openings connected throughout) should not be more than 18 inches, and care should be taken to ensure that the crystals of paradichlorobenzene do not come into actual contact with the roots. It may be necessary to repeat the application at three to four weeks' intervals.

In those orchards where it is necessary to take precautions for the control of black spot, melanose, or scab, it should be remembered that it is essential that the fungicide be used at the correct time. In the case of the first two diseases mentioned, Bordeaux mixture of 3-2-40 strength, to which 1 per cent. of well-emulsified red oil has been added as a spreader, should be applied when the greater part of the blossom has fallen. In the case of scab the same spray should be applied somewhat earlier, that is, when about half the petals have fallen. Recent experiments have indicated that home-made colloidal copper used at the rate of 1 in 13 of water will prove an effective substitute for Bordeaux mixture on citrus, and possesses the advantage that it does not lead to an increase in scale insects. The latter sometimes increase rapidly after Bordeaux has been used, which necessitates special precautions being taken for their control.

Where for any reason healthy trees of vigorous constitution are unprofitable they should now be headed back—in fact, the whole of the top removed, leaving only a few selected "arms" of previous branches, all other branches being cut clean away at their base. Three or four main arms, whose length will vary from 2 to 4 feet according to the size of the tree, will form the future head of the tree, and from these numerous shoots will originate; these shoots in turn are reduced according to circumstances, usually from two to five on each arm, and given fair attention they will be in a fit condition to receive selected buds from a prolific tree by next autumn. It is advisable when the shoots intended for budding have attained a length of about 6 inches to nip off their terminals for the purpose of stiffening their growth, otherwise they are liable to be blown off by winds. All branches or parts removed in pruning should be carefully collected and burned. Applications against pests and disease could hardly be satisfactory if the material for reinfestation is available throughout the orchard.

Working the land is essential, and disc implements give best results. Before ploughing it is advisable to apply the necessary fertilizer, not just around the trees beneath the branches, but over the whole orchard, the feeding roots mainly extending beyond the extremities of the branches. The depth to which ploughing should be effected will depend on the nature of the soil and its original preparation. Where the subsoil is of a permeable nature, or has been broken up in the first instance, ploughing could be much deeper than on land where due consideration had not been given to this practice. It will also be noted that among some of our light loams fertility is confined to a shallow depth, where it would be futile to persist in deep ploughing to force the roots into a subsoil from which they could derive but little sustenance. Following upon ploughing, the soil should be further treated until finely broken; the implement necessary will depend upon the constituency of the soil. Generally a good harrow will meet all requirements. On the completion of ploughing between rows an open furrow should not be left on the border or margin, but two or three furrows should be turned back to fill this and the whole then worked

sufficiently to leave an even surface throughout the orchard. Except for the purpose of turning in fertilizer or green manure, a good type of disc cultivator can be substituted for the plough and will give at least an equal result.

The planting of trees may be continued and with the exception of custard apples (which should be left until the end of August) should be expedited. The attention of citrus growers should be confined mainly to good varieties like Joppo, Siletta, and late Valencia. The preserving of orange juice will very materially assist in the absorption of our crop, and the fact that the trees develop much more rapidly in this State than in Southern producing regions is distinctly in our favour; also our fruit contains a much higher sugar content. This, however, is not to be accepted as an invitation to continue the practice of sending immature fruit to the Southern markets.

Grape vines should be pruned, and where cuttings for planting are required these should be selected, trimmed, and heeled in slightly damp soil. Canes intended for cuttings should not be allowed to lie about and dry out, but treated the day they are severed from the plant. Cuttings are frequently made of excessive length. Ten to twelve inches is a fair length, allowing for insertion in the soil to admit of the top bud with a short section of the internote to protrude. Growth is only desired from the upper or exposed bud.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

ALL pruning other than that applied to peaches and varieties which are late in coming into growth should be completed this month, and the planting of young trees, if not already done, should no longer be delayed. Early planting is preferred, the sooner after the fall of leaves the better. The time is opportune (when there is indication of the buds swelling) to work over (where the stock is reasonably vigorous) unprofitable trees. Strap grafting, as advised by the local field officers, is the most satisfactory method of top-working deciduous trees.

The pruning of vines should be postponed as long as circumstances permit, and these can only be gauged on actual observation as they are subject to much variation.

The usual winter working of the land is essential for the retention of moisture and aeration of the soil, but in shallow soils in which many orchards are planted deep working is most detrimental. The matter of seedling stocks for apples and the inferior plants frequently received from Southern nurseries prompts a query as to how many seeds have been stratified for spring planting, and if any effort is being made towards raising a local supply of nursery stock.

Farm Notes for August.

THE most important work during August will be the preparation of the land for all spring-sown crops. The better the cultivation the better the results that can be expected. Potato planting will be in full swing this month, and in connection with this crop the prevention of diseases calls for special attention. Where possible, seed potatoes should be selected from localities which are free from disease; they should be well sprouted, and, if possible, should not exceed 2 oz. in weight. Seed potatoes of this size are more economical to use than those large enough to necessitate cutting. However, if only large-sized seed are procurable, the tubers should be cut so that at least two well-developed eyes are left. The cut surfaces require to be well dusted with slaked lime or wood ashes as soon as possible after cutting. If considered necessary to prevent possible infection by scab, potatoes should be treated with hot formalin or acid corrosive sublimate. Details of the method employed may be obtained from the Department. When treatment has not been carried out prior to sprouting it should be delayed until a day or so before planting. Where cut tubers are to be sown, they should be dipped before cutting.

In localities where all danger from frosts is over, sweet potato cuttings may be planted out. This crop deserves more attention owing to its value for both culinary and stock food purposes.

Arrowroot may also be planted this month in suitable localities.

With the advent of warmer weather weed growth will increase, and cultivators will be kept busy in growing crops, and land being prepared for sorghums, millets, maize, cotton, and summer growing crops generally.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY, 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.	
	May.	No. of Years' Records.	May. 1935.	May. 1934.		May.	No. of Years' Records.	May. 1935.	May. 1934.
North Coast.	In.		In.	In.	*Central Highlands.*	In.		In.	In.
Atherton	2·16	34	5·07	4·19	Clermont	1·29	64	0·15	2·12
Cairns	4·50	53	7·52	4·85	Gindie	0·90	36	..	0·68
Cardwell	3.62	63	4·99	4·06	Springsure ..	1·25	66	..	1·08
Cooktown	2·83	59	3·53	2·85					
Herberton	1·70	49	4·40	2·66					
Ingham	3·64	43	5·69	4·20					
Innisfail	12·50	54	14·88	26·34					
Mossman Mill ..	3·77	22	7·67	2·96	*Darling Downs.*				
Townsville	1·28	64	2·37	0·24					
Central Coast.					Dalby	1·30	65	1·81	3·06
					Emu Vale	1·15	39	1·10	0·37
Ayr	1·13	48	1·73	0·80	Hermitage	1·17	29	..	0·12
Bowen	1·30	64	1·82	0·37	Jimbour	1·21	47	1·81	2·95
Charters Towers ..	0·79	53	1·07	0·97	Miles	1·49	50	0·81	3·16
Mackay	3·71	64	10·80	3·74	Stanthorpe	1·84	62	1·03	0·28
Proserpine	4·36	32	5 87	5·39	Toowoomba ..	2·16	63	1·73	2·34
St. Lawrence ..	1·77	64	1·03	1·95	Warwick	1·52	70	0·95	0·15
South Coast.									
					Maranoa.				
Biggenden	1·68	36	2·55	1·61					
Bundaberg	2·59	52	2·34	1·08	Roma	1·40	61	..	0·77
Brisbane	2·76	84	1·55	2·39					
Caboolture	2·81	48	1·28	2·89					
Childers	2·08	40	2·82	1·92					
Crohamhurst ..	4·85	42	2·88	5·89					
Esk	1·94	48	1·33	2·10					
Gayndah	1·56	64	1.65	2·41					
Gympie	2·81	65	2·36	2·18	*State Farms, &c.*				
Kilkivan	1·81	56	1·68	1·92					
Maryborough ..	2·99	64	2·54	3·24	Bungeworgorai ..	0.89	21	0·08	0·61
Nambour	4·71	39	2·80	7·63	Gatton College ..	1·51	36	5·13	1·30
Nanango	1·52	53	1·37	2·93	Kairi	2·06	21	..	3·21
Rockhampton ..	1·63	64	1·09	0·82	Mackay Sugar Experiment Station	3·23	38	8·36	3·24
Woodford	2.87	48	1·65	3·94					

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—MAY, 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.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·94	81	66	86	2	54	26	353	14
Herberton	..	72	54	79	1	43	27, 28	440	11
Rockhampton	30·06	80	57	87	12	42	15	109	1
Brisbane	30·14	74	53	78	11	43	31	155	5
Darling Downs.									
Dalby	30·14	73	42	79	11	33	18, 31	181	6
Stanthorpe	..	67	34	73	11	20	17	103	6
Toowoomba	..	68	44	75	11	35	14, 17, 18	173	5
Mid-Interior.									
Georgetown	29·97	86	59	92	2, 3	47	28, 29	1	1
Longreach	30·08	82	50	89	11	42	28	..	..
Mitchell	30·15	74	37	82	10	29	15, 30	5	2
Western.									
Burketown	29·99	85	62	91	3, 12	55	16, 27, 28	29	2
Boulia	30·00	79	48	89	9, 10, 11	41	27, 28	..	..
Thargomindah	30·15	72	45	82	9	37	30	..	..

ASTRONOMICAL DATA FOR QUEENSLAND.

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

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	July. 1935.		August. 1935.		July. 1935.	Aug., 1935.
	Rises.	Sets.	Rises.	Sets.	MOONRISE. Rises.	MOONRISE. Rises.
					a.m.	a.m.
1	6·46	5·4	6·36	5·20	6·52	7·23
2	6·46	5·4	6·35	5·20	7·38	7·51
3	6·46	5·5	6·35	5·21	8·17	8·20
4	6·46	5·5	6·34	5·21	8·50	8·48
5	6·46	5·6	6·33	5·22	9·22	9·17
6	6·46	5·6	6·33	5·22	9·50	9·51
7	6·46	5·7	6·32	5·23	10·20	10·24
8	6·45	5·7	6·32	5·24	10·48	11·4
9	6·45	5·8	6·31	5·24	11·18	11·52
					p.m.	p.m.
10	6·45	5·8	6·30	5·25	11·53	12·47
					p.m.	
11	6·45	5·9	6·29	5·25	12·28	1·46
12	6·45	5·9	6·28	5·26	1·13	2·50
13	6·45	5·10	6·27	5·26	2·6	4·1
14	6·45	5·10	6·26	5·27	3·4	5·11
15	6·44	5·11	6·25	5·27	4·6	6·22
16	6·44	5·11	6·24	5·28	5·15	7·29
17	6·44	5·12	6·24	5·29	6·26	8·34
18	6·44	5·12	6·23	5·29	7·34	7·42
19	6·44	5·13	6·23	5·30	8·41	10·48
20	6·43	5·13	6·21	5·31	9·45	11·53
21	6·43	5·14	6·20	5·31	10·48	a.m.
22	6·43	5·14	6·19	5·32	11·53	12·54
23	6·42	5·15	6·18	5·32	a.m.	1·52
24	6·42	5·15	6·17	5·33	12·57	2·45
25	6·41	5·16	6·16	5·33	2·1	3·34
26	6·41	5·16	6·15	5·34	3·0	4·17
27	6·40	5·17	6·14	5·34	3·57	4·52
28	6·40	5·17	6·13	5·35	4·48	5·25
29	6·39	5·18	6·12	5·35	5·36	5·56
30	6·39	5·18	6·11	5·36	6·16	6·25
31	6·38	5·19	6·10	5·36	6·52	6·53

Phases of the Moon, Occultations, &c.

9 July	☾ First Quarter	8 28	a.m.
16 ,,	○ Full Moon	3 0	p.m.
23 ,,	☽ Last Quarter	5 42	a.m.
30 ,,	● New Moon	7 32	p.m.

Apogee, 6th July, at 1.0 p.m.

Perigee, 18th July, at 12.42 p.m.

A total eclipse of the Moon will occur between 1 and 4 p.m. on July 16, but the Moon, being on the opposite side of the Earth to the Sun, will be below our horizon, rising only when the Sun sets.

At 11 p.m. on the 19th, the Moon will be passing Saturn 6 degrees north of it, and having risen at 8.41 p.m., will be well up in the north-east by east about 25 degrees further north than the zenith at Warwick.

Venus and Neptune will be apparently within 3 degrees of one another on the 25th at 4 p.m. They will be high up north-west by north, Neptune, having Declination 7.38 north, will be nearly 36 degrees from the zenith at Warwick, the Declination of Venus being only 5.9 north, it will be 2½ degrees higher up. Optical aid will generally be required, but keen eyes may detect Venus after its position has been fairly gauged.

Mercury will be little more than half a degree north of the Moon when they set 58 minutes before the Sun on the 29th. The nearness of the Sun will preclude any observation of this phenomenon by ordinary observers.

A partial eclipse of the Sun will occur on the 30th after it has set at Brisbane.

Mercury rises at 5.41 a.m. (1 hour 5 minutes before the Sun) on the 1st; on the 15th it rises at 5.13 a.m., 1 hour 31 minutes before it.

Venus rises at 9.38 a.m., and sets at 8.32 p.m. (3 hours 28 minutes after the Sun) on the 1st; on the 15th, it rises at 9.15 a.m., and sets at 8.36 p.m. (3 hours 25 minutes after the Sun).

Mars rises at 12.3 p.m., and sets at 12.33 a.m. on the 1st; on the 15th, it rises at 11.26 a.m., and sets at 12.7 a.m.

Jupiter rises at 1.31 p.m., and sets at 2.39 a.m. on the 1st; on the 15th, it rises at 12.35 p.m., and sets at 1.44 a.m.

Saturn rises at 9.48 p.m., and sets at 10.28 a.m. on the 1st; on the 15th, it rises at 8.50 p.m., and sets at 9.35 a.m.

The Southern Cross will be at its highest point, represented by XII. on the clock face at 6 p.m. on the 1st, and 5 p.m. on the 15th. It will then be 57½ degrees above the horizon at Brisbane, 53½ degrees at Rockhampton, 49 degrees at Townsville, and 46½ degrees at Cairns, where 18 minutes must be added to the times for greatest altitude.

7 Aug.	☾ First Quarter	11 23	p.m.
14 ,,	○ Full Moon	10 43	p.m.
21 ,,	☽ Last Quarter	1 17	p.m.
29 ,,	● New Moon	11 0	a.m.

Apogee, 3rd August, at 4.6 a.m.

Perigee, 15th August, at 6.6 p.m.

Apogee, 30th August, at 12.18 p.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.