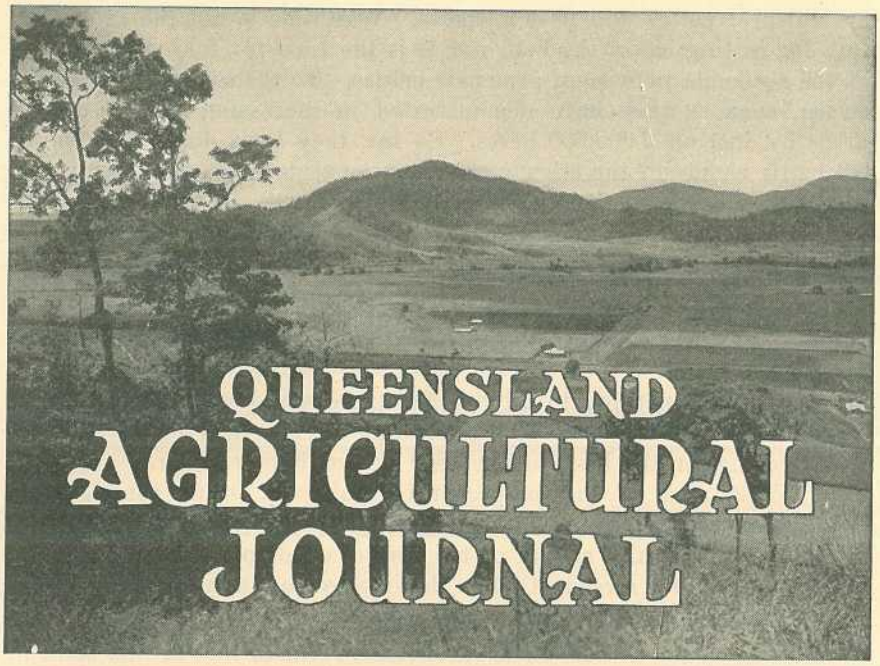
ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.



QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

Action on the Farming Front.

WE realise now, if we ever did, the immense task which confronts the Allied armies and the Allied peoples. It is up to us who are far removed from the scene of war to do our utmost to assist Britain and France in their epic struggle. Our job is to increase the volume of our exports of foodstuffs and other essentials to the Motherland. As the Allied armies grow in strength and numbers, so does the demand for food and clothing for the fighting forces increase. Our butter, meat, wool, and other products keep our armies going. Action is the call to-day—action on the farming front, as well as on every other front, and by the strength of action we shall achieve victory.

Farmers Plough for Victory.

THE farmers of Britain have every reason to feel proud of their magnificent contribution to the war effort. Under very difficult conditions they have achieved a remarkably fine result. Nearly 2,000,000 more acres are now under the plough, and that is by no means the limit. The present aim is to keep going full steam ahead and make this year's contribution look puny in comparison with next year's production.

British farmers are not worrying about post-mortems on previous agricultural policy and past mistakes. War time is not the time, they say, for hitting below the belt, nor is it the time for taking any notice of the academic policies of armchair critics. To them it is the time for action, such as they have demonstrated in increasing their cropping areas by just on 2,000,000 acres. So far, they have done their job as efficiently as any of the other arms of national defence—not taking into account, of course, the splendid fighting forces in the firing line. Already there are signs that the farmer is regarded as a front line defender by the consuming public.

Given the necessary finance, machinery, implements, fertilizers, and prices, the farmers claim that they will do the job more effectively and more economically than any academic authority can do it for them.

There is something in all this for Queensland producers to think about. The big fact that emerges is that agricultural policy must be prepared, not on the basis of one year or two, but in terms of a generation. There must be one comprehensive policy to ensure confidence in rural industry and in its future development, without chopping and changing. Continuity should be the essence of all policy. The war has shown very clearly already that in the interests of the nation as a whole primary production must be soundly based.

We can take our hats off to the British farmers who at this moment are turning the last furrows in their two-more-million-acre drive for victory.

The Nation Must Be Fed.

"WE will deliver the goods" was the slogan of munition workers in the last war, when the whole nation had to be keyed up to exert itself to the utmost after a searching inquiry had revealed serious shortcomings in the equipment of our fighting services. The same slogan might very fittingly be adopted now by every essential industry, and especially by the food-producing industries, since on them has been laid a tremendous responsibility—the responsibility of feeding, not only the troops, but the entire nation. There is no doubt that the goods will be delivered, but the magnitude of the task is not overlooked. As the British Minister of Agriculture put it at a recent gathering of English farmers: "It is no less than changing the whole face of rural Britain, and that involves, not only producing the maximum amount of food both for humans and animals in the shortest possible time that nature will allow, but it also means getting back into production vast areas which have been allowed to go idle."

We may be sure that such an objective has not been lightly planned by the authorities in the Old Country, nor have its implications been lightly assessed. Another thing, too, is this: there is more than a suggestion in recent Government announcements in Great Britain that British farming is being raised to higher levels of efficiency to-day with something more lasting in view than satisfying war time needs.

All this has a special significance for the Australian producer. With Denmark, Holland, and other European countries in enemy occupation, immediate sources of food supply for Britain are now blocked. That means, of course, that Great Britain has to look elsewhere for the butter and bacon and other foodstuffs she got from those countries up to a month or so ago. Naturally, the Dominions will supply the wants of the Old Land to the last ounce required, with the single proviso that shipping space is available.

Farmers in this country, therefore, have thus, in addition to a natural obligation, a great opportunity for widening the demand for their exportable commodities. Greater intensity of production, greater efficiency in production, readiness to recognise a great opportunity and willingness to develop it are the demands of the moment. Furthermore, quality standards have to be raised to the limit so that we may hold our markets when the war is over.

In the meantime, the Nation must be fed, and the farmers of this country, as well as those of other Dominions of the British Commonwealth, will see that "the tucker is kept up to it."

Effect of the War on Rural Industry.

THOSE who have given some study to the effect of the war on the land industries in Australia consider that its effect in the main will be to force rapid reorganisation, higher efficiency standards, and better standards generally. Obviously, now is the time to get busy on the spade work of methods of improving our standards in the market as well as in the paddock. All these matters will be of tremendous importance after the war, and now is the time to tackle the inevitable problems which will face us when the war is over. Marketing both at home and abroad will certainly be one of the most important of post-war problems.

Young Farmers' Clubs—National Recognition.

THE young farmers' club movement in Britain has become of such importance in war-time Britain that it has received national recognition. The powers that be have become aware that this movement can offset the drift from the land to the cities, can provide intelligent leadership for willing but unskilled young labour, and can constitute a clearing house for all kinds of rural activities.

One especial way in which these young farmers' clubs have been helping in the changed conditions is in regard to town children evacuated to country districts. Those youngsters with a liking for farm work have been made members of clubs, and many boys have thus been helped to a closer knowledge of farming. In fact, it is no uncommon sight to see boys as young as thirteen years of age driving heavy farm tractors and so doing their bit in ploughing for victory.

Tobacco Seed-Bed Fertilizer Experiments.

L. F. MANDELSON, B.Sc.Agr., Research Officer.

ATTENTION has been focussed on the importance of fertilizer mixtures for tobacco seed-beds in recent years in Queensland by the discovery that one important source of seed-bed failure was the use of excessive quantities of organic nitrogen. This physiological trouble, known locally as yellow patch, was fully discussed (4) in the "Queensland Agricultural Journal," in September, 1939. Therein it was indicated that the trouble was associated with the use of large quantities of organic nitrogen, such as dried blood or animal manures, on tobacco seed-beds, and was probably caused by the accumulation of free ammonia in the soil coming in contact with the roots of young tobacco seedlings. To avoid this trouble tobacco-growers were advised to use only nitrate of soda as a source of nitrogen in mixed fertilizers for seed-beds, and it was suggested that a mixture containing by weight two parts of nitrate of soda, four parts of superphosphate, and one part of sulphate of potash, applied at the rate of 1¾ oz. per square yard, should be used. This fertilizer treatment was recommended since it had been fully demonstrated that it could be satisfactorily used under Queensland conditions, and, furthermore, it was very similar to a standard recommendation made for tobacco seed-beds in South Africa (7).

A review of available literature on tobacco seed-bed fertilizer mixtures, made during the course of the yellow patch investigation referred to above, indicated that information on this subject was scanty and that there was a considerable divergence in recommendations. It appeared, therefore, that while a provisional recommendation could be made with confidence which would eliminate the incidence of yellow patch and result in satisfactory seedling growth, further investigation to evolve a more efficient fertilizer mixture might be profitably undertaken. Seed-bed fertilizer experiments were consequently carried out during the 1939-40 season for this purpose, and the object of this article is to discuss such work and to make a recommendation for a tobacco seed-bed fertilizer mixture based on the results obtained.

Seed-bed Fertilizer Mixtures.

Before discussing this experimental work on seed-bed fertilizers it will be of interest to review recommendations which have been made in other tobacco-growing countries for fertilizer mixtures for seed-beds.

In 1938 a conference of tobacco specialists in the United States of America (8) recommended a 4-8-3 mixture for seed-beds. It was stressed that materials for this mixture should be practically free of chlorides, and it was suggested that the addition of 1 per cent. available magnesia would be beneficial in certain cases. No mention of a rate of application, however, was made. More specific recommendations have been made

from time to time by authorities in some of the American tobacco-growing states. These might be briefly summarised as follows:—

Virginia (1935) (1) ..	1½ lb. to 2 lb. per square yard of a 4-8-3 mixture.
North Carolina (1933) (5)	200 lb. of a 5-8-3 mixture for each 100 square yards.
South Carolina (1927) (2)	100 to 150 lb. of either a 4-8-3 or a 4-8-4 mixture for each 100 square yards.
Georgia (1928) (3) ..	2 to 3 lb. per square yard of a 5-8-6 mixture.

The above range of recommendations covers applications which would supply to each square yard of seed-bed quantities of nitrogen varying from 0·64 oz. to 2·4 oz., phosphoric acid from 1·28 oz. to 3·84 oz., and potash from 0·48 oz. to 2·88 oz. These limits are equivalent to 4·1 oz. and 15·4 oz. of nitrate of soda, 6·2 oz. and 18·7 oz. of superphosphate, and 1·0 and 6·0 oz. of sulphate of potash respectively. Obviously such variations are extremely great.

In Canada (6) a standing committee of tobacco specialists recommended the use of 125 lb. of a 2-10-8 mixture for each 1,000 square feet of seed-bed for the 1940 season. This fertilizer would supply 0·36 oz. of nitrogen, 1·8 oz. of phosphoric acid, and 1·4 oz. of potash per square yard.

Finally, in South Africa (7) it has been recommended that ½ lb. nitrate of soda, 1 lb. of superphosphate, and ½ lb. of sulphate of potash be applied to 20 square yards of seed-bed. This is approximately equivalent to a 4-10-12 formula, and would supply 0·06 oz. of nitrogen, 0·16 oz. of phosphoric acid, and 0·2 oz. of potash per square yard. It is much the same as the recommendation made in 1939 for use in Queensland, which would supply 0·08 oz. of nitrogen, 0·21 oz. of phosphoric acid, and 0·12 oz. of potash per square yard.

These various recommendations indicate that a considerable discrepancy exists as to the quantity of plant food material which it is believed should be applied for optimum seedling growth on typical flue-cured tobacco soils, which are usually fairly poor. They suggest, furthermore, that some of the rates of application specified might be unduly high.

Design of Seed-bed Fertilizer Experiments.

Two experiments to investigate seed-bed fertilizers were established at Dimbulah, in North Queensland, during the 1939-40 season. Each had the same design with a different randomisation of plot treatments. The object of these experiments was to ascertain the optimum quantities of nitrogen, phosphoric acid, and potash for seedling growth. The materials and quantities investigated were as follows:—

Nitrogen, as nitrate of soda, applied at the rate of—

(1) ½ oz. per square yard (0·08 oz. N).
or (2) 4 oz. „ „ „ (0·64 oz. N).

Phosphoric Acid, as superphosphate, applied at the rate of—

(1) Nil.
(2) 1 oz. per square yard (0·2 oz. P_2O_5).
(3) 2 oz. „ „ „ (0·4 oz. P_2O_5).
(4) 3 oz. „ „ „ (0·6 oz. P_2O_5).

Potash, as sulphate of potash, applied at the rate of—

(1) Nil.
(2) ¼ oz. per square yard (0·12 oz. K_2O).
(3) ½ oz. „ „ „ (0·24 oz. K_2O).
(4) ¾ oz. „ „ „ (0·36 oz. K_2O).

The treatments were arranged in randomised blocks of sixteen plots, certain of the higher order interactions being partially confounded. Each plot was 1 square yard in area, and the ninety-six plots of an experiment were distributed in three seed-beds 72 feet long by 4 feet wide.

To ensure uniform distribution of materials the ingredients for each plot treatment were mixed with varying quantities of washed sand to make the total volume of the mixture up to a uniform bulk.

Initial Seed-bed Fertilizer Experiment.

The first of these seed-bed experiments was established on a grey alluvial soil on 17th September, 1939. This soil, while slightly more fertile than the average North Queensland sandy soils, could still be considered poor. On analysis it was found that the top 12 inches of soil contained 0·04 per cent. total nitrogen, and 0·004 per cent. and 0·008 per cent., respectively, of phosphoric acid and potash soluble in 1 per cent. citric acid.

Although the precaution was taken to partially sterilize the soil with heat, by burning the inner portion of termite nests over the beds, unfortunately an uneven stand of seedlings was obtained. This partial failure, apparently caused by nematode infestation and possibly other factors, complicated the interpretation of the data collected. Nevertheless, on the 6th October, nineteen days after the emergence of seedlings was general, observations for each plot were recorded in regard to seedling size and vigour, irrespective of stand of plants. For this purpose plots were classified from 1 to 6 to indicate the average size of seedlings in each plot.

When the data obtained in this manner was statistically analysed, highly significant differences were noted between the respective rates of growth of seedlings receiving different applications of nitrogen and phosphoric acid. With the higher rate of application, or level of nitrogen, plants were significantly larger than with the lower level. On the average, the third level of phosphoric acid produced the largest plants, and this result significantly exceeded that obtained where the two lower levels were applied. No significant differences resulted from the potash treatments investigated, although growth was slightly better with the third level.

Hence it can be concluded that this experiment indicated that the best seedling growth occurred when nitrate of soda was applied at the rate of 4 oz. per square yard and superphosphate at the rate of 2 oz. per square yard, and that apparently varying applications of sulphate of

potash did not significantly influence growth. Owing to the generally uneven stand, due to disease factors, observations on plant populations of plots would have been misleading and consequently were omitted.

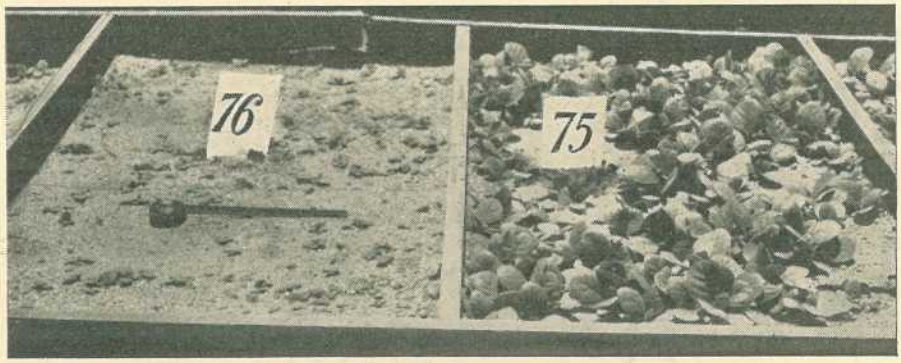

Plate 134.

SECOND SEED-BED FERTILIZER EXPERIMENT.—Two plots illustrating the striking increase in growth produced by superphosphate. Plot No. 76 received only ½ oz. of nitrate of soda per square yard, whereas Plot No. 75 received 2 oz. of superphosphate in addition to ½ oz. of nitrate of soda per square yard. Potash was omitted in both cases.

For statistical analysis Plot No. 76 was graded as 3 and Plot No. 75 as 12 out of a possible score of 20.

Second Seed-bed Fertilizer Experiment.

On 3rd November a second seed-bed experiment was established on a site close to the initial experiment and on a similar soil type. On 3rd December, twenty-three days after seedlings had emerged, contrasts between plots receiving different fertilizer treatments were striking (Plate 134), and at that time data was recorded to indicate seedling growth and vigour. The average size of seedlings in each plot was classified by numbers ranging from 1 to 20. Five days later an attempt was made to record the average root development of a few plants taken at random from each plot. Root size was indicated by the allocation of numbers from 1 to 10. On the same date an estimate of plot populations was also recorded.

A statistical analysis of seedling growth data indicated that a significant increase in the size of plants resulted from the application of the higher level of nitrogen, as in the previous experiment. Differences in growth response, when various levels of phosphoric acid were applied, were very highly significant. Actually, the best result was obtained with the fourth or highest level of phosphoric acid (Plate 135), although the difference in growth response between this and the third level was not significant. Both the third and fourth levels, however, gave significantly better results than the two lower levels, and it would appear that the optimum application would be one greater than the third and less than the fourth level, or between 2 oz. and 3 oz. of superphosphate per square yard.

On the average, potash did not produce significant differences in growth, although there was evidence of a significant interaction with phosphoric acid, as will be discussed later. Actually, with the various

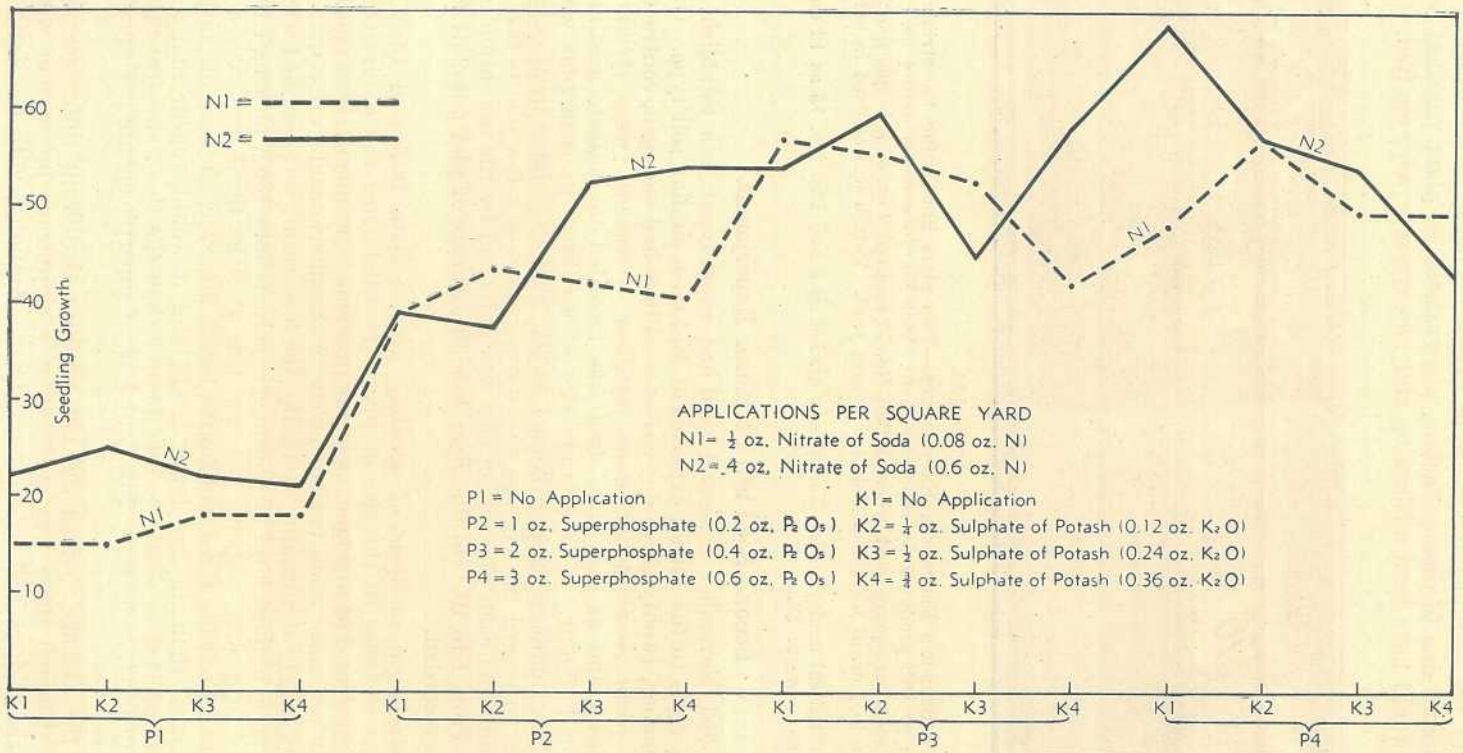

Plate 135.

GRAPH SHOWING AVERAGE SEEDLING GROWTH.—Size of plants resulting from the application of either ½ oz. or 4 oz. of nitrate of soda per square yard when applied with increasing quantities of superphosphate and sulphate of potash. Data obtained from the average of three replications of each treatment.

levels of nitrogen and phosphoric acid investigated, the best result was obtained with the second level of potash (Plate 136), which was equivalent to ¼ oz. of sulphate of potash per square yard.

It will be noted that these results are substantially the same as, and tend to confirm, those obtained from the initial experiment. They indicate that, of the quantities of fertilizer ingredients investigated, optimum seedling growth was obtained from applications of 4 oz. per square yard of nitrate of soda and between 2 oz. and 3 oz. per square yard of superphosphate, and that increasing applications of potash, on the average, did not enhance growth.

The effect of phosphoric acid on both plot populations and root development was also found to be highly significant. The best result was obtained with the third level, equivalent to 2 oz. of superphosphate per square yard. Applications in excess of this amount did not result in any beneficial effect as regards these two factors. Neither nitrogen nor potash significantly influenced seedling population or root development. Consequently, it would appear that treatments resulting in optimum seedling growth would not adversely affect either stand or root development of plants.

The Influence of Potash on Seedling Growth.

Although the growth of seedlings was not enhanced to a significant extent by the application of potash, some apparently beneficial effect was noted when potash was applied with relatively light applications of phosphoric acid. On the other hand, it was found that potash exerted a definitely adverse influence on otherwise beneficial effects caused by the application of increasing quantities of phosphoric acid. This was particularly noticeable with the heaviest application of phosphoric acid when the heavier applications of potash were also made.

A graph (Plate 136), showing the average seedling growth response to phosphoric acid at various levels of potash, when results with both levels of nitrogen are combined, illustrates this tendency. The line K1 of the graph, where no potash at all was applied, suggests the normal growth curve which would be obtained by applying increasing quantities of phosphoric acid, and the lines K2, K3, and K4 show growth curves obtained by the application of increasing quantities of potash. It will be seen that, at the second level of phosphoric acid (P2), increasing quantities of potash apparently resulted in enhanced growth, although increases in growth, due to these applications, were not sufficiently great to be considered significant. If potash did not exert any depressing effect on seedling growth, it might be expected that these curves, K2, K3, and K4, would tend to proceed parallel to K1 as increasing quantities of phosphoric acid were applied. However, it will be noted that this did not occur, and, at the third level of phosphoric acid (P3), the two higher levels of potash resulted in poorer growth than did the two lower levels. Of these, K2, representing the lowest application of potash actually investigated, gave the optimum response. At the highest level of phosphoric acid (P4) seedling growth appears to be progressively poorer as applications of potash are increased. This is particularly obvious when the results of the two lower levels are compared with those of the two higher levels.

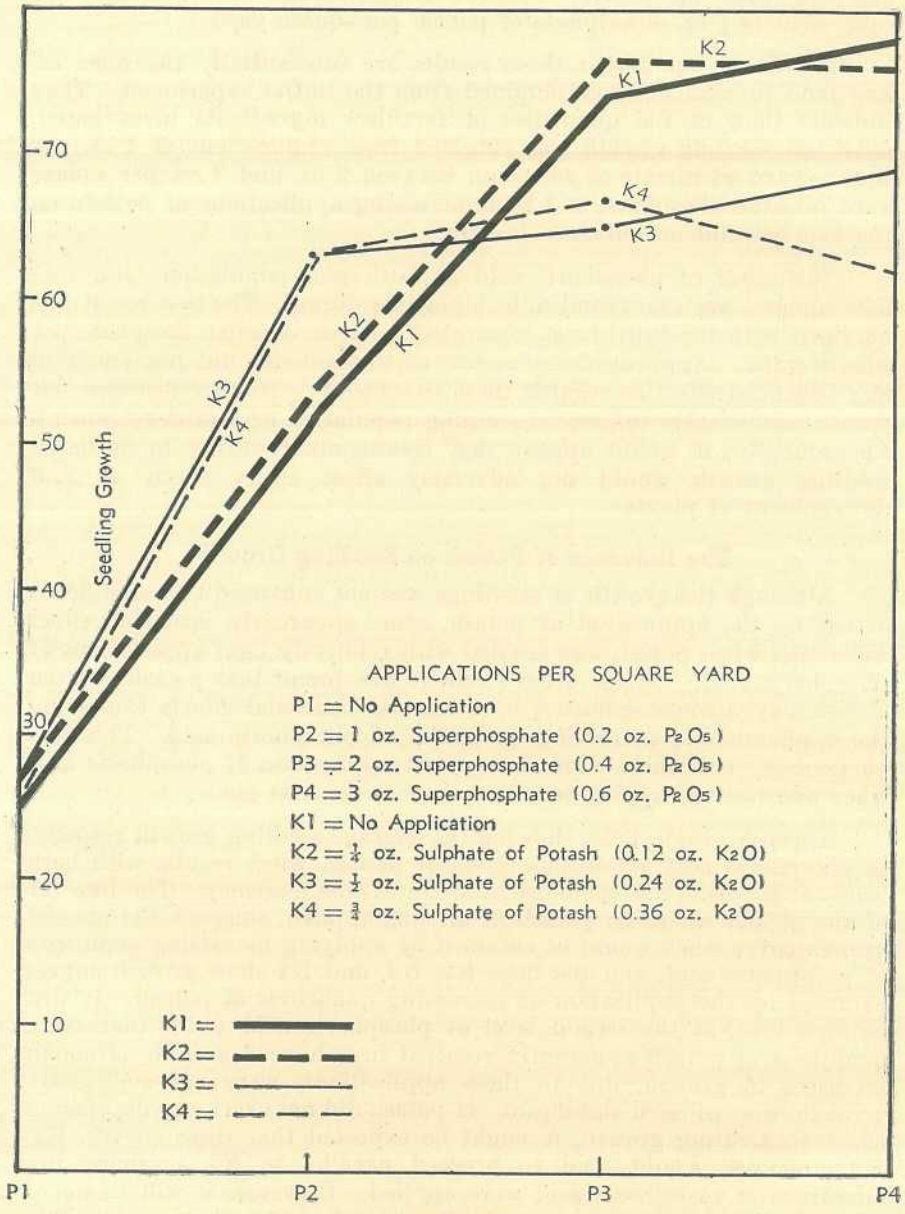

Plate 136.

GRAPH SHOWING AVERAGE SEEDLING GROWTH RESPONSE TO SUPERPHOSPHATE AT VARIOUS LEVELS OF SULPHATE OF POTASH.—Note the depressing influence of sulphate of potash with high applications of superphosphate, as shown by the relatively greater flattening out of the curves K3 and K4 as compared with K1 and K2.

The depressing effect of relatively heavy applications of potash in association with heavy applications of phosphoric acid, as illustrated above, was substantiated by the careful statistical analysis of recorded data. It is concluded, therefore, that, while the addition of some potash to seed-bed fertilizers might be desirable for normal plant growth, caution must be exercised as to the quantity used, particularly when relatively heavy applications of phosphoric acid are made.

Recommendation for an Improved Seed-bed Fertilizer.

The results of the experiments discussed above suggest that the provisional fertilizer mixture recommended during the 1939 season could be improved by increasing both its nitrogen and phosphoric acid content so as to supply the equivalent of about 4 oz. of nitrate of soda and 2½ oz. of superphosphate per square yard. Although no significant increases in growth resulted from applications of potash, and under some conditions relatively large quantities were even found to be detrimental, it is considered advisable, nevertheless, to retain the original recommendation of ¼ oz. sulphate of potash per square yard in seed-bed fertilizers. The object in so doing is to supply sufficient of this important plant food material for normal growth, as potash, as well as other nutrients, might be deficient on some of the poor sandy soils frequently used for seed-beds in North Queensland. Incidentally, recent research in Canada (9) has demonstrated that the presence of potash for seedling growth may improve the leaf quality of mature plants by increasing body in the cured leaf. For the same reason about 1 per cent. of soluble magnesia, as recommended by American authorities, should be desirable.

In designing a mixed fertilizer to embody these various factors, it also appeared desirable that its bulk should be such that, with a convenient weight of application, such as about 5 lb. per 100 square feet, it would supply the desired quantities of ingredients per unit area of seed-bed. To do this, and yet avoid the use of an inert "filler" material, it was considered that cotton-seed meal might be used as a secondary source of nitrogen to supply 10 per cent. of the bulk of the mixture. This material would only supply 0·06 oz. of nitrogen per square yard, if the mixture were applied as recommended, and hence there should be no danger of the yellow patch disease being induced by its inclusion. On the other hand, it is considered that this ingredient should be beneficial in improving the physical texture of the proposed mixture, and also in possibly adding small quantities of minor elements which might otherwise be lacking in poor sandy soils.

Based on the above considerations, the following fertilizer mixture, designed to contain 8·28 per cent. nitrogen, 6·82 per cent. phosphoric acid, 1·62 per cent. potash, and 1·08 per cent. soluble magnesia, is suggested for tobacco seed-beds:—

	lb.
Nitrate of soda	48
Cotton-seed meal	10
Superphosphate	32
Sulphate of potash	3
Magnesium sulphate	7
Total	100

It is recommended that this mixture be applied at the rate of approximately ½ lb. per square yard or, more precisely, at the rate of 5¼ lb. per 100 square feet of seed-bed, since this would be exactly equivalent to 4 oz. of nitrate of soda, 2½ oz. of superphosphate, and ¼ oz. of sulphate of potash per square yard.

Fertilizer manufacturers will prepare this mixture ready for use in 10½ lb. lots, which is the exact quantity required for a seed-bed 50 feet by 4 feet (i.e., 200 square feet). This source of supply should be the most convenient for an accurate application of the fertilizer. If, however, growers prefer to make it up for themselves they may mix according to the above formula.

Summary.

To investigate possible improvements for a provisional seed-bed fertilizer mixture recommended for the control of the yellow patch disease of tobacco seedlings, two experiments were established at Dimbulah during the 1939-40 season.

These experiments were designed to investigate the effect of (1) nitrate of soda applied at the rate of either ½ oz. or 4 oz. per square yard, (2) superphosphate applied at the rate of 0 oz., 1 oz., 2 oz., or 3 oz. per square yard, and (3) sulphate of potash at the rates of 0 oz., ¼ oz., ½ oz., or ¾ oz. per square yard.

A significant increase in growth resulted from the application of 4 oz. of nitrate of soda per square yard in both experiments.

Superphosphate applied at the rate of 2 oz. per square yard in the first experiment, and at the rate of 3 oz. per square yard in the second experiment, resulted in optimum growth responses. When applied at the rate of 2 oz. per square yard in the second experiment superphosphate also significantly increased both seedling root development and plant population per unit area, but neither nitrogen nor potash had any such effect.

Sulphate of potash, on the average, did not significantly enhance seedling growth in either experiment. When applied in relatively heavy applications, associated with relatively heavy applications of superphosphate, it had a depressing effect on growth.

A seed-bed fertilizer mixture is recommended based mainly on the results of these experiments. It consists of 48 per cent. nitrate of soda, 10 per cent. cotton-seed meal, 32 per cent. superphosphate, 3 per cent. sulphate of potash, and 7 per cent. magnesium sulphate, and contains 8·28 per cent. nitrogen, 6·82 per cent. phosphoric acid, 1·62 per cent. potash, and 1·08 per cent. soluble magnesia. When applied at the rate of 5¼ lb. per 100 square feet it supplies the equivalent of 4 oz. of nitrate of soda, 2½ oz. of superphosphate, and ¼ oz. of sulphate of potash to each square yard of seed-bed.

Acknowledgments.

The author wishes to gratefully acknowledge the helpful co-operation of Mr. P. McGovern, Assistant (Biometry), of this Department, for the statistical analyses of experimental data, and of Mr. H. McNee, Field Assistant, also of this Department, for the establishment of the seed-bed experiments at Dimbulah and for the compilation of seedling counts, as well as the Agricultural Chemist's Branch for the chemical analysis of seed-bed soil.

LITERATURE CITED.

(1) BYRNE, W. H., and T. L. COPLEY.—Flue-Cured Tobacco. Virginia Polytechnic Institute Bull. 138, 1935.

(2) CURRIN, R. E.—Tobacco Varieties and Plant-Growing. Clemson Agr. Coll. Circ. 91, 1927.

(3) CARR, J. M.—Bright Tobacco in Georgia. Georgia Coastal Plain Exp. Stat. Bull. 10, 1928.

(4) MANDELSON, L. F., and E. C. TOMMERUP.—Yellow Patch of Tobacco Seedlings. Queensland Agr. Jour. 52 : 3 : 280-294, 1939.

(5) MOSS, E. G., and JAS. F. BULLOCK.—The Culture of Flue-Cured Tobacco in North Carolina. The Bulletin of the North Carolina Department of Agriculture, 1933.

(6) NELSON, N. T., et al.—Ontaria Tobacco Fertilizer Recommendations for 1940. The Lighter 10 : 1 : 8-10, 1940.

(7) TAYLOR, H. W.—Tobacco in South Africa. Central News Agency, South Africa, 1927.

(8) WILLIAMS, C. B., et al.—Recommendations with Reference to the Fertilization of Flue-Cured, Sun-Cured, and Shipping Tobacco Grown on Average Soils in Virginia, North Carolina, South Carolina, and Georgia for the year 1938. Florence, South Carolina 1937 (Mimeographed).

(9) WILLIS, A. L.—The Influence of Seed-bed Treatment on the Maturity, Quality, and Yield of Flue-Cured Tobacco. The Lighter, 10 : 1 : 20-22, 1940.

Urochloa Grass.

L. S. SMITH, B.Sc., Assistant to Research Officer.

[Urochloa Grass*, which is spreading on the Darling Downs, seems to be a valuable chance introduction. Several specimens of this grass have been received by the Department of Agriculture and Stock with the report that it was smothering Mint Weed† and had possibilities in the control of this pest. These notes may help farmers to recognise the grass should it make its appearance on their properties.—ED.]

Common and Botanical Names.

THE only common name so far known to be applied to this species is Wild Millet, but that name is considered unsuitable as it is already applied to some other common grasses, chiefly to species of Echinochloa. Since the generic name is short, and as this is the only member of the genus definitely established in Queensland, either native or naturalised, it seems appropriate to employ it as the common name and to refer to this species as Urochloa Grass.

"Urochloa" is derived from the two Greek words "ura" (a tail) and "chloa" (a grass). Although the application of the combination "tailed grass" is somewhat doubtful, it may refer to the bristle-like process on the tip of the fertile floret within the "seed" or spikelet. "Panicoides" is derived from "panicum," the Latin name for Millet and also the botanical name of a genus of grasses, and "eidos," a Greek word meaning resemblance. The specific name, therefore, refers to the resemblance of the grass to some members of the genus Panicum as the latter was understood when this species was described.

Popular Description.

A loosely tufted annual grass from ½ to 2 feet high with sparsely branched erect stems, which often spread slightly in the lower portion before becoming erect and sometimes root at a few of the lower notches. The leaves are a rich green colour, soft to the feel, conspicuously hairy, commonly 2 to 4 though sometimes up to 8 inches long, and ¼ to ⅓ of an inch wide. The seed head consists of from two to six branches which each bear two rather densely packed rows of paler green seeds, which overlap for about half their length. The branches of the seed head are erect when they first appear and project from the upper leaves, but towards maturity the seed head becomes stalked and the branches tend to spread.

The seeds are 3/16 of an inch long and are interspersed with a few rather long, fine hairs. The outermost face is furrowed lengthwise, and there are three veins in the groove, while at the base there is a very small scale 1/16 of an inch long. The back or innermost face of the seed is rounded.

Leafy Panic Grass‡ and some of its allies may at first sight be confused with Urochloa Grass, but the difference in the size of the seed and its looser arrangement on the branches of the seed head serve to distinguish these grasses. Another more fundamental difference is that whereas Urochloa Grass has the face of the seed with the very small scale at the base turned outwards, the Leafy Panic grasses have the rounded back of the seed outermost and the face with the scale at the base turned inwards.

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* *Urochloa panicoides* Beauv.

† *Salvia reflexa* Hornem.

‡ *Brachiaria foliosa.*

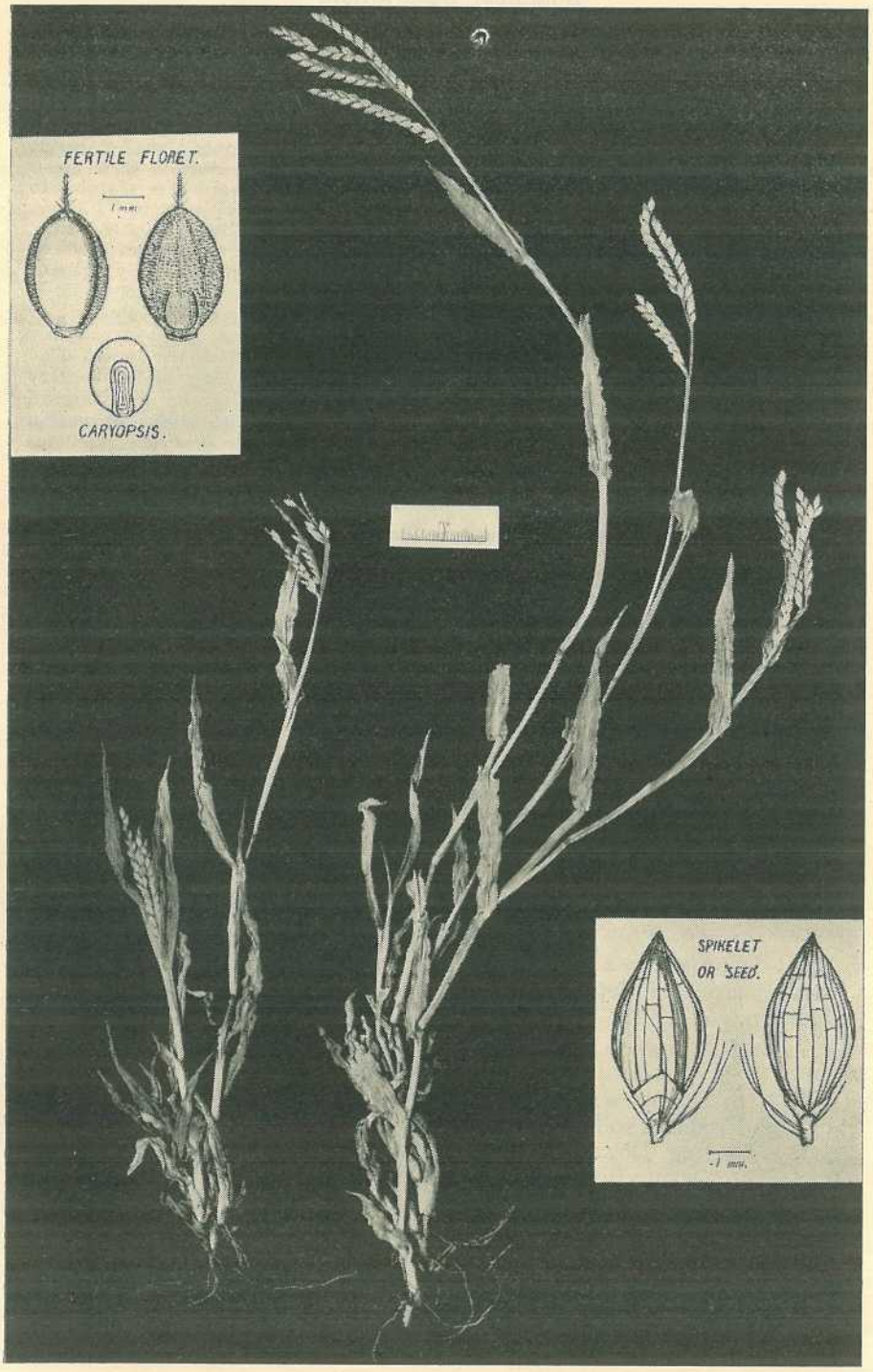

Plate 137.

UROCHLOA.—A grass of potential economic importance.

Botanical Description.

More or less loosely tufted annual, 15-45 mm. (sometimes more) high; culms erect, oblique or geniculate ascending and sometimes rooting at the lower nodes, up to 2·5 mm. diameter, 4-8 (rarely more) noded, sparingly branched at the lower nodes; internodes longer upwards, several of the lower sometimes about 5 mm. long and appearing shortly rhizomatous, intermediate ones typically shortly exserted, striate and with one longitudinal furrow, like the peduncle ± densely and spreadingly pilose with tubercle-based hairs except towards the base, rarely almost glabrous. Leaf sheaths keeled, striate, somewhat loose and often falling away in their upper part, from spreadingly tubercle-based hairy above or only towards the margins to pilose throughout; nodes pubescent or villous; ligule a densely ciliate rim 1-1·5 mm. long; blades soft, flat, ± densely and spreadingly pilose with tubercle-based hairs, acute at the apex, commonly linear to linear-lanceolate and semiamplexicaule at the base, 2-8 cm. long, 3-8 mm. wide, but sometimes narrowed gradually towards the base and up to 20 cm. long, primary lateral nerves 4-5 on each side of the midrib, margins undulate and crisped and often whitish. Inflorescence of 2-6 subsessile or pedunculate (the peduncles up to 5 mm.), secund, spiciform, erect or slightly spreading racemes; common axis compressed, pubescent at least on the angles, 0·5-6 cm. long; racemes moderately dense, simple, 2-seriate, 1-6 cm. long, mostly solitary rarely 2 approximate; rhachis straight or slightly wavy, ciliate on the margins, typically pubescent at the base, about 1·25 mm. wide, flat with a slender median longitudinal ridge beneath, internodes 1·2 mm. long; pedicels short stout oblique stumps broadening towards the apex, solitary, bearing several long white hairs, hairs 1-4 mm. long; spikelets in each series imbricate for about ½ their length, oblong elliptic, elliptic, or ovate elliptic, acuminate, acute at the apex, 4-5 mm. long, 1·6-2·1 mm. wide, glabrous. Glumes very unequal; the lower abaxial, broadly ovate, obtuse, clasping at the base, 1-1·5 mm. long, sub-5-nerved; the upper equalling the spikelet in shape and size, 9-13 nerved, sparsely reticulate above the middle. Lower floret sterile or male and then the anthers slightly larger than those of the fertile floret; lemma reaching the tip of the spikelet, typically longitudinally furrowed, 5-7 nerved, slightly reticulate in the upper part; palea practically as long as the lemma, 2-nerved, keeled at and winged on the nerves, inflexed flaps well developed and overlapping. Upper floret hermaphrodite, broadly elliptic, including the 0·8-1 mm. long mucro, 3·5-4·1 mm. long; lemma crustaceous, obtuse and ± scabrous pubescent at the apex, 5-7 nerved, transversely rugose, the margins shortly inrolled, after flowering a pair of depressed globular appendages frequently develop towards the margin at the base of the mucro, mucro sparsely and spreadingly hairy; palea 2-nerved, punctate or very finely rugose; lodicules 2, broadly cuneate, about 0·4 mm. long; stamens 3, anthers 0·8-1 mm. long; styles 2, free, stigmas plumose, blackish; ovary about 0·75 mm. long; mature caryopsis, pale greenish yellow, broadly ovate- or elliptic-oblong, strongly compressed, 2·0-2·2 mm. long, 1·5-1·7 mm. wide, scutellum about ⅔ as long as the caryopsis.

Country of Origin.

It is probably a native of India and has been here for at least twelve years, but details of its introduction and the date thereof are unknown.

Distribution and Habitat.

Up to the present, Urochloa Grass has been recorded from the black and reddish soils and, to a lesser extent, from the gravelly ridges of the Darling Downs District (Toowoomba, Drayton, Kingsthorpe, Jondaryan, Oakey, Pittsworth, and Warwick). It has also been collected on the heavy black soil flats around Beaudesert, in the Moreton District, as a minor weed of cultivation, and has been recorded from the Atherton Tableland. The grass seems to thrive on the more moisture-retentive clay soils in less exposed situations. A hot and dry summer causes severe wilting, though it soon responds to even light rains. On the Darling Downs, roadsides, old cultivations, and waste land often locally carry this as the dominant grass. So far as is known, Urochloa Grass has not been recorded elsewhere in Australia.

Potential Economic Importance.

Urochloa Grass comes away rapidly after the winter and early spring rains, and depending on the season, extent of grazing, and other factors, it may last until late in the autumn. It forms fairly dense stands, provides a fair quantity of leaf, and, in addition, is reputed to be palatable to stock. It is naturally more nutritious before seeding, which normally begins about February. On account of its rapid response after a dry spell it is often one of the first grasses to supply feed. Furthermore, one report from the Toowoomba district states that Urochloa was the only grass left by the grasshoppers in some places, during the recent plague, and that several dairy farmers were forced to rely upon it for a time for feed, with satisfactory results.

The main interest in Urochloa Grass at present, however, lies in the possibility of its use for the smothering out of Mint Weed, which is both a poisonous plant and a troublesome weed on the Darling Downs and in other parts of Queensland. Due to its rapid growth, its ability to form fairly dense stands, and its habit of seeding freely, several farmers have suggested that Urochloa Grass might be used to advantage for this purpose. In one instance, it is said to have replaced a heavy growth of Bathurst Burr* on vacant land over a period of a few years.

The optimum seeding takes place during the later summer and autumn months and the seed is easily hand stripped or swept from the ground and separated out. It is therefore suggested that in those areas where seed may easily be obtained and Mint Weed is a bad pest, Urochloa Grass might be well worthy of a trial.

Botanical Reference.

Urochloa panicoides Beauv. Agrost. 52, t.11, f.l. (1812).

* *Xanthium spinosum* L.

QUEENSLAND SHOW DATES FOR 1940.

The Queensland Chamber of Agricultural Societies has issued the following list of show dates for 1940:—

JUNE.

Wowan	6th and 7th
Maryborough	6th to 8th
Blackbutt	7th and 8th
Childers	10th and 11th
Boonah	12th and 13th
Bundaberg	13th to 15th
Gin Gin	17th and 18th
Gladstone	19th and 20th
Kilcoy	21st and 22nd
Rockhampton	25th to 29th
Toogoolawah	28th and 29th

JULY.

Mackay	1st to 4th
Esk Show and Campdraft	5th and 6th
Proserpine	5th and 6th
Bowen	10th and 11th
Nambour	11th and 13th
Ayr	12th and 13th
Rosewood	12th and 13th
Cleveland	12th and 13th
Townsville	16th to 18th
Maleny	18th and 19th
Charters Towers	29th to 31st
Gatton	23rd to 25th
Innisfail	25th, 26th, and 27th
Caboolture	26th and 27th
Atherton Show	30th and 31st
Crow's Nest	31st and 1st August
Maleny Show	abandoned for 1940

AUGUST.

Home Hill	2nd and 3rd
Pine Rivers	2nd and 3rd
Royal National, Brisbane	12th to 17th

SEPTEMBER.

Imbil	6th and 7th
Canungra	7th
Pomona	13th and 14th
Rocklea	14th
Malanda Show	18th and 19th
Beenleigh	20th and 21st
Ithaca	28th

OCTOBER.

Warwick Rodeo	5th and 7th

The Insect Parasites of Sheep.

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

INSECTS play an extremely important part in the economics of the livestock industry, as they can be responsible for very serious losses. All classes of domestic animals are subject to attack by these pests, but, it is safe to say, no section of the livestock industry suffers more severely than the sheep industry. It has been estimated, for example, that blowflies alone cost Australia approximately £4,000,000 per annum, to which large sum must be added the losses from infestation by lice, keds, the nasal botfly, and other pests. This loss is measured not so much by mortalities but by the more important, but less obvious effects, such as loss of wool and condition, and the expenditure involved in carrying out control measures. No sheep-owner can therefore afford to ignore the various insect pests which attack his sheep. Their control and eradication is possible only when he is conversant with the manner in which they live and breed, with the damage they are capable of causing, and with the measures to be undertaken for their control.

The number of different kinds of insects which attack sheep in Queensland is by no means small. Fortunately, many of these are comparatively unimportant. Only the more serious pests will be considered here, such as blackflies, blowflies, lice, the ked, and the nasal botfly.

BLACKFLIES (*Simuliidæ*).

Popularly spoken of as "sandflies," these flies are known to be serious pests of sheep and other animals in various parts of the State. They are small, robust, blood-sucking flies which appear in great numbers for a short period, following the flooding of the rivers and creeks by the summer rains.

The flies cluster thickly in the ears and nostrils and cause severe irritation and annoyance. These ill-effects are augmented by certain poisons which the flies inject into the body whilst feeding. Lambs suffer most severely and loss of condition and even death may follow an attack by these pests.

Blackflies breed only in running water, in which the eggs are laid and the larvæ and pupæ live. It is difficult, then, to recommend any practicable measure of control which deals with the breeding places of the flies. Protection of sheep from attack is at the present time possible only through the employment of smudge fires.

DESCRIPTION OF PLATE 138.

SHEEP BLOWFLIES.

Lucilia cuprina.

Fig. 1 .. .. Egg × 23.
Fig. 2 .. .. Maggot × 7.
Fig. 3 .. .. Puparium × 7.
Fig. 4 .. .. Adult Fly × 7.

Chrysomyia rufifacies.

Fig. 5 .. .. Egg × 23.
Fig. 6 .. .. Maggot × 7.
Fig. 7 .. .. Puparium × 7.
Fig. 8 .. .. Adult Fly × 7.

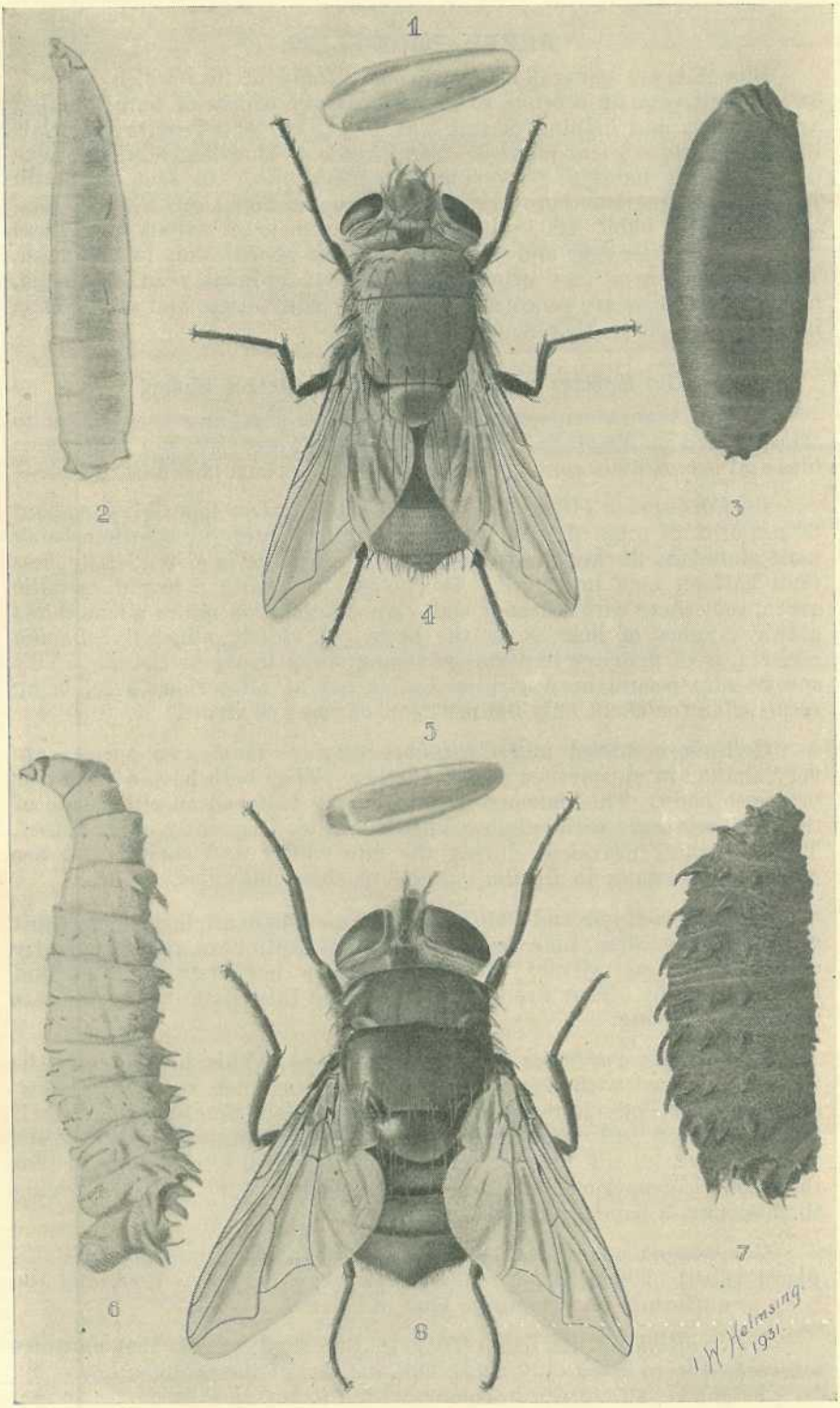

Plate 138.

SHEEP BLOWFLIES.

SHEEP BLOWFLIES.

Blowflies are generally regarded as species of flies which "blow" or lay their eggs on carrion, so in the ordinary course of nature acting as scavenges and helping in this way to get rid of offensive materials in a rapid and efficient manner. Some kinds of blowflies, however, have developed the habit of "blowing' live flesh also. In fact, in South Africa and America there are blowflies, the so-called screw-worm flies, in which this habit has been developed to such an extent that these flies now lay their eggs and can complete their growth only on live flesh. These screw-worm flies attack all kinds of animals. In Australia, however, blowflies are concerned principally with sheep, and are of little importance among other domestic animals.

The Species of Blowflies which Attack Sheep.

No less than seventeen different kinds of flies have been found to attack sheep in Australia. Some of these, however, are not true blowflies and are of little consequence. The more serious blowflies include—

Lucilia cuprina (Plate 138, fig. 4).—This fly is responsible for about 80 per cent. of cases of strike. It is widespread in its distribution, being most abundant during the spring and autumn. It is a slender fly, less than half an inch in length. The colour is usually a bright metallic green, sometimes with a bronzy tint. An examination under a lens shows a fair number of bristles on the body. A closely allied fly, *Lucilia sericata,* is of primary importance among sheep in Great Britain. This species also occurs in Australia, but is not at all serious here, being responsible for about only 0·5 per cent. of cases of strike.

Calliphora nociva and *Calliphora auger.*—These two species are very similar in appearance to one another. They both have a yellow or brownish body. The abdomen is blue, deeply blotched on either side of the basal segments with yellow. These blowflies frequently enter houses. They are most prevalent during the late winter and spring, and are next in importance to *Lucilia cuprina* as sheep blowflies.

Calliphora stygia and *Calliphora fallax.*—These are large and robust golden-coloured flies. Like the other species of Calliphora, they frequently enter houses and attract attention by their persistent buzzing and boisterous flight. They are most abundant in this State during the late winter and spring.

Chrysomyia rufifacies (Plate 138, fig. 8).—This blowfly may be readily confused with *Lucilia cuprina.* It is a much stouter fly, however, and the body is more bluish than greenish, though sometimes it is tinged green and even bronzy. If this fly is examined under a lens, very few bristles will be seen (cf. Lucilia). It will also be noticed that the colour is deeper on the edges of the segments of the abdomen, giving the abdomen a banded appearance.

Chrysomyia micropogon.—This fly is about the same size as *Calliphora auger.* It has large, reddish-brown eyes, a yellow face, and the body is uniformly dark metallic blue in colour.

Microcalliphora varipes.—This is the smallest of the blowflies attacking sheep, being only about half the size of the common house fly. It is bright metallic green in colour, with a pale yellow face.

These flies are all native blowflies with the exception of the species of Lucilia, which have been introdunced from other countries.

Life History Notes.

There appears to be no distinct strain of blowflies that attack sheep, for such flies as strike sheep will readily lay eggs on carrion and *vice versa*. The life histories of the various species are all very similar, differing only in detail. It is therefore proposed to deal thoroughly with the life history of *Lucilia cuprina*, mentioning that of the others only by way of comparison.

The Egg (Plate 138, figs. 1 and 5).

The female fly may lay up to 3,000 eggs in her life time. These are deposited on carrion or in the wool in batches of 150 to 200. In wool, the eggs are usually laid low down and near the skin. The brown blowflies (*Calliphora* spp.) frequently deposit tiny larvæ instead of eggs. The newly-laid egg is white in colour and somewhat sausage-shaped. In summer time hatching takes place in twelve to twenty-four hours. In cooler weather hatching may be considerably delayed.

The Larva or Maggot (Plate 138, figs. 2 and 6).

As soon as they hatch, the young maggots usually make their way to the skin surface and commence feeding. For this purpose they secrete digestive juices which liquify the food material, though they are also capable of tearing off minute solid pieces of flesh which they devour whole. The process of feeding is assisted by bacteria which predigest insoluble material. The food material of the maggots consists of skin exudations, moist scales, &c. Sometimes they penetrate the skin, but this depends to some extent upon the duration and intensity of the infestation. In the warm summer weather the maggot is fully fed in three to six days. The maggots of *Lucilia spp.* and *Calliphora spp.* are smooth and creamy in appearance (Plate 138, fig. 2). Those of *Chrysomyia rufifacies* and *Microcalliphora varipes* are brown and covered with tubercles, the so-called "hairy maggots" (Plate 138, fig. 6). The maggots of *Chrysomyia micropogon* are also smooth and creamy, but are "shivery."

The Pupa (Plate 138, figs. 3 and 7).

When fully fed the maggots for the most part drop from the sheep on to the ground. They wander around for a while, but eventually penetrate the soil. Here they shrink and become barrel-like in shape. The outer skin hardens and turns brown. Inside this brown shell a wonderful transformation takes place, and eventually the complete insect is formed. When it is ready to emerge, the fly, by means of a pulsating bladder-like organ on the front of its head, pushes off the end of the brown case in which it is imprisoned and makes its way to the surface of the ground. Flies have been known to penetrate through four feet of soil in this manner. The fly is now very soft and drab in colour, but after a short time in the sun the body and wings dry, the colours appear, and the insect flies off.

The period spent in the brown barrel-shaped case or puparium is about eight days in summer or forty days or more in winter. Sometimes this pupation takes place in the fleece.

The Adult.

The female fly, after emerging, immediately seeks carrion so that she may have a meal of protein. Otherwise, her ovaries would fail to develop. After mating, the female then lays eggs. Egg laying may take place at the earliest five to seven days after mating. This gives a life cycle period from egg to egg of seventeen days during the summer.

Little is known of the biology of the adult flies, but some information concerning their range of flight and longevity is available. Blowflies may live up to ninety-four days and may fly at least ten miles. This means that flies breeding in carrion or on a sheep may be distributed over a tract of country at least twenty miles in diameter—an area of 314 square miles.

Strike.

Infestation of the living animal by fly maggots is known as myiasis or strike. Under Australian conditions, strike in sheep may be divided into five different types:—

(*a*) *Crutch or Breech Strike.*—This type of strike involves infestation of the crutch and constitutes the most common form of strike. It is seen chiefly in ewes, but is not confined to this class of sheep;

(*b*) *Body Strike.*—Body strike includes infestation of those parts of the body exclusive of the crutch, head, and pizzle. It is the most severe type of strike and usually involves the withers, back, loins, thighs, and sides of the neck and chest;

(*c*) *Pizzle Strike.*—This is seen only in rams and wethers and refers to infestation of the area adjacent to the pizzle;

(*d*) *Head Strike.*—This form of strike is seen chiefly in rams and includes the area at the bases of the horns.

(*e*) *Other Types of Strike.*—Here are included all other types of strike. Infestation of shear cuts, castration wounds, docking wounds, and other kinds of wounds, accidental or man-made in origin, are chiefly concerned here.

In the early stages of strike, the sheep may show little evidence of the presence of maggots beyond an uneasiness as shown by frequent twitching of the tail and stamping of the legs. The maggots may complete their development without penetrating the skin, which may merely become inflamed and weeping. If the skin is penetrated, a conspicuous raw, hot, and swollen wound develops and the animal suffers distinct discomfort. Provided the wound is not struck again, it usually heals and the animal recovers. Sometimes the wound becomes septic, in which case the animal may die. If, however, the wound is being continually struck it enlarges rapidly, hairy maggots appear in it, and these tend to burrow into the flesh, forming pockets. Animals in this stage may die unless treated. Badly struck sheep wander away from the mob and lie down under bushes and in other secluded places where they are difficult to find.

The losses caused by blowflies are enormous. Mortalities are frequent, but far greater damage is brought about by the loss of wool and condition. The wool lifts from the wounds and is also shorn away from the surrounding areas when dressings are applied. The disturbance

to the animal's constitution may also result in a marked break in the fleece. There is finally the tremendous expenditure involved in handling and treatment.

Infestation of living flesh by blowfly maggots may under certain circumstances, on the other hand, be beneficial. During the Great War it was noticed that wounds which had been attacked by maggots showed a decided tendency towards rapid healing. Subsequently, it was demonstrated that the application of maggots reared under sterile conditions to certain types of wounds in man which were long delayed in healing, such as osteomyelitis, brought about a rapid recovery. This "maggot therapy," as it is called, has since been used extensively all over the world. Further work showed that the healing properties of the maggots were due to a particular substance secreted by them. This substance is called allantoin. Either this compound or its derivative urea is now proving very efficient in the treatment of osteomyelitis, bad burns, and other such wounds which are long delayed in healing.

Factors Influencing Strike.

The conditions influencing the prevalence of strike are by no means completely understood. It has been ascertained, however, that these conditions include certain factors which (*a*) govern not only the presence of "primary" flies, but also their activity and abundance, and (*b*) render the sheep not only attractive to the flies but are also favourable to the development of the maggots.

Primary Flies and Conditions Influencing Their Activity and Abundance.

Although there are several species of blowflies which attack sheep, some of these may be present without strike being evident. Observations have shown that the sheep blowflies may be divided into two groups, according to the manner in which they react to the various stages of decay in carrion. Should an animal die, certain species are attracted to the carcase and will lay their eggs on it only while the carcase remains comparatively fresh. Once it reaches a certain stage of decay it is not longer suitable to them for egg laying. After the maggots of these flies have been at work for some time, the carcase is then selected for egg laying by other species of flies. Thus, blowflies become divided into primary and secondary flies, the primary flies including those species which visit the carcase first and lay their eggs on it whilst the flesh remains comparatively fresh. Furthermore, infestation of carrion by primary flies' maggots assists the carrion to reach that stage of decay when it becomes attractive to the secondary flies. If primary flies are absent the carcase may simply dry up and the maggots of the secondary flies may not appear in it at all. *Lucilia spp.* and *Calliphora spp.* are primary flies, whilst *Chrysomyia rufifacies* and *Microcalliphora varipes* are secondary flies.

In the case of blowing of sheep, these two groups of flies play a similar part to that enacted with carrion. Strike is initiated usually by the species of *Lucilia* and *Calliphora*, and previous infestation with the maggots of these flies is usually necessary before the hairy maggots of *Chrysomyia rufifacies* and *Microcalliphora rufifacies* appear. The

position with regard to *Chrysomyia micropogon* is not known with any degree of certainty. It is believed that this fly is secondary to a certain extent, but that in the presence of wounds and abrasions which have reached a certain stage of decay its maggots are able to exist without the previous presence of maggots of the primary flies. In most cases, however, strike can be initiated only by the primary flies, and in their absence very little blowing of sheep would be evident.

There is yet a group of tertiary flies which appear in carrion when it is approaching the dried-up, mummy-like stage. None of these is a true blowfly and the group comprises certain species of flesh flies, the house fly and other allied species, and a medium-sized black fly called *Peronia rostrata*. These have also been bred from the living sheep, but are of little importance.

Primary flies are most abundant and most active during warm and mild wet humid weather. Such conditions are usually seen during the late summer, autumn, and spring. Intense activity may also be observed during mild wet winters. During the heat and dryness of summer, on the other hand, primary flies practically disappear and there is little or no strike.

The influence of humidity or moisture on blowfly activity is well known to those sheep owners whose properties contain low-lying damp pastures or pastures with heavily-timbered streams or waterholes, for here strike is always more severe than in cleared, dry pastures.

Factors which Render the Sheep Attractive.

Before a sheep becomes attractive to the flies and strike can develop the area attacked must not only be moist but must remain moist long enough for the eggs to hatch and for the maggots to reach the skin. Moisture, it is believed, plays its part by increasing the activity of bacteria in the fleece and by irritating the skin, causing inflammation with its accompanying exudate. Thus, it is considered that sheep with delicate skins which are thereby very susceptible to the presence of moisture are also very liable to strike.

Fleece Rot.—An excellent example of the association of moisture, bacterial activity in the fleece and on the skin, and susceptibility to strike is to be found in a condition of the fleece known as fleece rot. This condition occurs during continuous mild, wet, and humid weather. It is very attractive to the flies and is the principle cause of body strike. As a result of bacterial activity, the wool fibres are matted together and crusts are formed which lift from the skin as the wool grows. Usually, the affected wool is grey to light-brown in colour, but frequently, owing to the presence of colour-producing bacteria, green, purple, pink, red-brown, and yellow colourations are seen, occurring as bands in the fleece. The areas affected with fleece rot are usually small, up to 3 inches in diameter, and commonly occur on the withers, back, rump, and sides of the neck or chest.

Crutch Strike.—Crutch strike in ewes is due chiefly to the soiling of the crutch wool by urine, thus keeping this area moist. Diarrhœa may act in a similar manner.

Pizzle Strike.—Pizzle strike in rams and wethers is associated with the same conditions as the principal cause of crutch strike in ewes—that is, the wool adjacent to the pizzle is kept moist by urine.

Other Causes of Strike.

From the above it would appear that any factor which predisposes to the fleece becoming and remaining wet, or to any part of the body retaining moisture, is of the greatest importance in susceptibility. Several such factors have been implicated and these include—

(i.) Certain Characteristics Associated with Body Conformation.

(*a*) *Body Folds or Wrinkles.*—The presence of folds or wrinkles in the breech is one of the causes predisposing to strike in this area. By reason of these folds, this part of the body is unable to dry out and so remains continuously wet, both from body exudations and in ewes also from urine. In fact, it has been demonstrated that sheep may be divided into classes in which susceptibility to crutch strike is definitely linked up with the degree of wrinkling in the breech, plain bodied animals being least susceptible.

In rams, particularly in those with close set horns, strike at the base of the horns, especially in wet, humid weather, may be associated with the presence of a skin fold in this area which maintains the moist conditions requisite for the development of strike;

(*b*) *Conformation of the Hind Quarters.*—Bad conformation of the hind quarters, in which the hocks approach one another, is also conducive to crutch strike, as this characteristic prevents the urine being delivered clear of the body;

(*c*) *Malformed Vulvæ.*—Frequently, in ewes, the tip of the vulva is directed sideways, which is conducive to the soiling of the crutch with urine. Such malformation is, in many instances, a sequence to injury, particularly from careless shearing;

(*d*) *Conformation of the Withers.*—The conformation of the withers is highly important in susceptibility to body strike in this region of the body. If the conformation is such as to favour a retention of moisture, this area becomes very susceptible. The most susceptible type of wither is one showing "pinch" or "grip." In the former case there is a definite hollow behind the wither. If this hollow or pocket becomes so exaggerated as to form a "grip" the wither is extremely susceptible. Sheep with high shoulder blades or very broad withers are also likely to be struck in this area;

(ii.) Fleece Characteristics.

These operate, chiefly, according to the degree the fleece can become and remain wet. They are of the greatest importance in susceptibility to fleece rot and body strike;

A fleece which is regarded as being comparatively insusceptible shows good character, soft handling, and is bright. A susceptible fleece, on the other hand, lacks character, and is harsh and yellow in colour;

Density of the fleece is also important and sheep which lack density in their fleece, particularly on the withers, may be regarded as susceptible subjects.

Control.

The control of blowflies attacking sheep is, unfortunately, not in a very happy position, despite the immense amount of work that has been done. The measures investigated have followed two main lines—namely, (*a*) measures which aim at reducing the numbers of the flies, and (*b*) measures which take into consideration protection of the sheep.

Measures which Aim at Reducing the Numbers of Flies.

Trapping.—To meet with any measure of success, the flies that are trapped should consist principally of primary flies. Furthermore, the majority of the primary flies captured should be egg-bearing females. Carrion is the only bait known to attract blowflies in any numbers, but, unfortunately, carrion attracts primary flies only over the very short period that it remains comparatively fresh. The vast majority of the flies that are attracted and caught in traps with a carrion bait are secondary flies. It has been shown that greater numbers of primary flies may be attracted if sodium sulphide is added to the bait. Furthermore, it has also been demonstrated that an intensive system of trapping in which such a prepared bait is employed may be responsible for a decided reduction in the number of cases of strike. To achieve this purpose, however, such large numbers of traps are required that this method of control becomes economically unsound.

Carcase Destruction.—To the logical mind, the destruction of carrion in which blowflies breed would appear to be decidedly beneficial. It has already been pointed out that strike depends chiefly on the presence of primary flies, but rather strangely the number of primary flies that breed through in carrion is very small. In fact, it has been shown that many more primary flies can be bred from a struck sheep than from a sheep carcase. Anyone observing the seething mass of maggots in carrion must at once be struck by the tremendous competition for food which is going on among them. The primary fly maggots which have hatched from eggs laid during the first three to four days of death have to compete for food not only among themselves but with larger numbers of secondary fly maggots whose numbers are increasing every day. These secondary fly maggots, particularly the hairy maggots, are much more robust and voracious. As a result, large numbers of primary fly maggots are driven from the carrion and die. Eventually, too, the carrion reaches a stage of decay when it is no longer suitable as food for the primary fly maggots and further numbers are killed.

To be in any way beneficial, the carcase must then be treated whilst it contains mostly primary fly maggots, that is, within three to four days of death. The most efficient method of destruction is by burning. Failing this the carcase should be dusted liberally all over with a powder consisting of one part of borax and two parts of fine dust, or should be saturated with an arsenical solution.

Burial of carcases is not recommended, as in some way or other it favours the breeding of the primary flies.

A further feature which renders carcase destruction impracticable is that every carcase, including all those of birds and small animals, must be searched for over a wide area and destroyed or treated.

Measures which Aim at Protecting the Sheep.

Undesirable Body and Fleece Characteristics.—These are best dealt with by rigid culling and careful breeding. Breeding towards a plain-bodied sheep with a bright, relatively insusceptible fleece does not affect either the quality or quantity of the clip.

Breech wrinkles may be removed by surgical means. At the same time distorted vulvæ may be straightened (Mules's operation). It has been demonstrated that if this operation is applied at lambmarking the incidence of strike in after life can be decreased to a significant degree. Care should be taken when docking to leave the ewe lambs' tails short enough so that they do not interfere with the free passage of the urine by pressing on the vulvæ.

In some quarters Mules's operation is not regarded very favourably, as it is considered to prevent to a large degree the more desirable breeding out of the undesirable characteristics.

Crutching.—By this term is meant the shearing of the wool from the region of the breech and over and above the tail and down the back of the legs. It is of undoubted value in preventing strike, as the removal of the wool permits these parts to remain dry for some time (at least six weeks). Crutching, however, is rather costly. It costs at least 1½d. per sheep, and there is, in addition, the loss from shortening the staple of crutchings. There is also the inconvenience of mustering and driving to the shearing shed for treatment.

Jetting.—This is cheaper than crutching and may be applied at a moment's notice on any part of the property where yards are available to hold the sheep. Jetting involves the application of an arsenical solution in a thin jet to the breech of the sheep at a pressure sufficient to penetrate the fleece and saturate the skin. Sheep may continue to be struck after jetting, but the maggots are poisoned as soon as they begin to feed. The pressures employed vary according to the age of the sheep and the density of the fleece, but should not xceed 150 lb. to the square inch. If carefully carried out, jetting may be depended upon to give a four to six weeks' freedom during even severe waves of strike.

The jetting formula which has given most success is one recommended by the Department of Agriculture in New South Wales. It consists of—

White arsenic	4 lb.
Caustic soda	½ lb.
Stone lime	4 lb.
Water	40 galls.

The best and cheapest protection is given by a judicious combination of jetting and crutching.

Dipping.—The use of dipping fluids containing the amount of arsenic used against lice and ked (0.2 per cent. arsenious oxide) may be regarded as being of little practical value in preventing strike.

Dressings.—The ideal dressing for struck sheep would be one that would (*a*) kill the maggots in the wound, (*b*) promote healing, and (*c*) prevent reinfestation of the wound.

Unfortunately, the ideal dressing has yet to be discovered. The following dressings are the result of recent work and are claimed to

give good results. Dressings Nos. 1 and 2 are recommended by the Department of Agriculture of New South Wales, and dressing No. 3 by the Council for Scientific and Industrial Research: —

Dressing No. 1.

Sulphate of zinc	10 oz.
Powdered starch	4 oz.
Carbontetrachloride	8 oz.
Water	7 pints.

Directions.—Dissolve the zinc sulphate in the water. Add the starch and heat gently till the mixture becomes a watery jelly. Cool, add the carbontetrachloride, and mix thoroughly.

Dressing No. 2.

Powdered starch	4 oz.
Boracic acid	7 oz.
Carbontetrachloride	8 oz.
Water	7 pints.

Directions.—Prepare as with Dressing No. 1, adding the boracic acid to the water.

Of these two dressings, No. 1 is said to be more effective. Both should be retained in closed vessels.

Dressing No. 3.

	Parts.
Rectified oil of camphor	13·2
Potassium hydroxide	4·1
Boracic acid	10
Oleic acid (red oil)	2.9
Water	100

This dressing is rather difficult for the sheep owner to make up himself, and is best purchased. It is known as C.B.E. dressing. For any caring to attempt its manufacture, the following directions are given:—

Directions.—Dissolve 1 lb. of potassium hydroxide in 1½ gallons of water. Add 2½ lb. of boracic acid and stir or heat gently till dissolved. Make the solution up to 2 gallons and cool. Use finely powdered boracic and add it in small quantities.

Take a three-gallon vessel and mix 3·15 lb of oil of camphor with 0·6 lb. of oleic acid (red oil). Add to this the above solution in small quantities, stirring vigorously. Heat then to 60 degrees C. with constant stirring, continuing the stirring till cool.

LICE.

Lice are small, flat, wingless insects with strong legs well armed with spines and claws. Some kinds of lice have a broad, squarish head and feed on hair, scales, scurf, and other debris lying on the skin surface. These are known as biting lice. Other lice have a somewhat pointed head and are provided with tubular mouthparts by which they are able to pierce the skin and suck up blood and other fluids. These are the sucking lice.

Lice are permanent parasites, in that they occur on the host in all stages of their life history and are incapable of surviving for any length of time if they are removed from their host. Their life histories are all very similar, differing only in detail. The female louse lays eggs which she attaches to the hair or wool of the host. In time the eggs hatch and the young lice that emerge differ from their parent chiefly in size. The young lice feed and grow, passing through several stages of growth, each of which is preceded by a moult or casting of the skin, until they become adults.

Two kinds of lice infest sheep in Queensland—namely, the biting louse or red-headed louse, *Bovicola ovis*, and the sucking louse or foot louse, *Linognathus pedalis*.

Plate 139.
RED-HEADED SHEEP LOUSE (*Bovicola ovis*) × 48.

The Red-Headed Louse (*Bovicola ovis*) (Plate 139).

This species has been long established in Queensland. It measures about 1/25th of an inch in length and has a broad, reddish head from which it derives its common name. The abdomen is pale in colour, with a number of dark transverse bands.

This is the more common sheep louse and is well distributed throughout the State. It is found close to the skin among the wool of the neck, shoulders, back, and thighs. When the infestation is severe, it may occur on practically all parts of the body.

The eggs of the red-headed louse hatch in from six to 10 days. The young lice reach sexual maturity sixteen to eighteen days later.

The Foot Louse (*Linognathus pedalis*) (Plate 140).

The foot louse is a sucking louse. It is by no means as common as the red-headed louse, but has a wider distribution and is known to occur in several areas of the State, such as the far Central-West and South-West, where the red-headed louse is comparatively rare or absent. The foot louse has a short, bluntly-pointed head and measures up to 1/12th of an inch in length. As its common name implies, it is found chiefly on the hairy portions of the legs and adjacent parts of the body. Heavy infestations may spread to adjoining woolled parts.

The eggs of this species hatch in ten to eighteen days. The young lice begin to lay eggs when they are eleven to twelve days old.

Effect of Lice Infestation on the Sheep.

The irritation associated with lice infestation may be so severe as to interfere seriously with feeding and resting. As a result, animals may fail to put on condition and young sheep particularly may be stunted in growth. The most important effects of infestation, however, concern the wool. Infested animals constantly rub against fence posts and other objects and scratch and bite at themselves. As a result, the fleece becomes ragged and torn and thus greatly decreased in value. A further loss is to be found in wool which has become stained from the parasites' excreta.

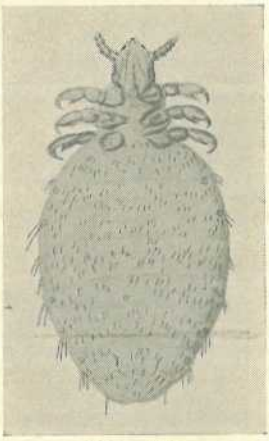

Plate 140.
FOOT LOUSE (*Linognathus pedalis*) × 48.

Treatment and Control.

Once present in a flock lice spread very rapidly. Undoubtedly, most of the infestation occurs through direct contact with lousy animals, but it should not be forgotten that clean sheep may become infested from yards and buildings which have previously housed lousy sheep.

Lice spend the whole of their life upon the sheep and are incapable of breeding or living for any great length of time away from it. Both eggs and adults, however, are often able to survive for brief periods in tags of wool which have become detached. An infestation may thus have its origin in the shearing shed or in yards. Strict sanitation in the shearing shed is therefore very desirable. After infested sheep have been shorn, all loose tags of wool should be carefully gathered and burnt or otherwise safely disposed of and the shed given a thorough disinfection. If a shed is not used for about a month, there is no risk of infestation.

Sheep infested with the red-headed louse may be cleansed by dipping in an arsenical or carbolic dip. These dipping fluids, however, do not kill the egg. It is therefore necessary to dip again after an interval of fourteen to sixteen days. This interval permits all the eggs that survive the first dipping to hatch, but is not long enough to allow the lice that hatch to reach maturity and lay further eggs.

The leg louse is much more difficult to control, for it is fairly resistant to the arsenical and carbolic dips employed against the red-headed louse. The best fluids to employ against the leg louse are—(*a*) A solution of nicotine sulphate containing one part of nicotine sulphate (40 per cent. nicotine) to 800 parts of water, or (*b*) certain proprietary fluids containing derris or rotenone. Complete immersion of the sheep is not required, the bath being just deep enough to cover the infested portions of the body as the animals walk through it. Best results follow two to three treatments at intervals of ten days.

When dipping sheep the following principles should be borne in mind:—

(1) The best time for dipping is six to eight weeks off shears. By this time the wool is long enough to hold the dip and all shearing cuts will have healed;

(2) Prepare the dip carefully and according to the directions given by the maker.

(3) Don't dip when the sheep are hot and thirsty, when the weather is very hot or very cold, or when it is raining. Yard the sheep sufficiently long before dipping so that they have time to cool off;

(4) Choose a warm sunny day for dipping and allow the animals ample time to dry before driving them.

(5) Don't overcrowd or rush the animals through the dip. Make sure the heads are wetted by ducking them under once or twice. Best results follow from at least one minute's swim;

(6) Dip the rams and any weak sheep separately. Rams require plenty of room and attention and are more susceptible to any ill-effects from dipping than other sheep;

(7) Don't dip the ewes and lambs together, and keep them apart till some time after dipping;

(8) Retain the animals in the draining pen until the dip ceases to run. This prevents wastage of dip and contamination of the pastures.

When dipping, the muster should be as complete as possible. Any sheep that are missed will quickly reinfest the flock. Attention is also directed to the danger of broken fences and of travelling stock as sources of infestation.

The Sheep Ked (*Melophagus ovinus*) (Plate 141).

This parasite is frequently spoken of as the sheep "tick." The term "tick" is erroneous, for the insect is not a tick at all, but a wingless fly. In colour, the ked is reddish or grey-brown and may measure up to nearly one-quarter of an inch in length. The insect has a very peculiar appearance, owing to the head being sunken into the thorax. The legs are strong and covered with spines. The ked is capable of moving very rapidly among the wool and its movements are distinctly crab-like.

This parasite is most numerous among the wool of the neck, breast, shoulders, belly, and thighs. It is most frequent on the southern areas of the Darling Downs.

Life History.

The egg is retained and hatches within the body of the female. The larva is not deposited until it is fully-grown, when it is attached by the female to the wool. At this time it is enclosed in a soft, white membrane, which in about twelve hours hardens and becomes brown in colour and barrel-like in shape. This is called the pupa and measures about one-eighth of an inch in length. The young ked gradually forms inside the pupa and is ready to emerge nineteen to twenty-four days later. The female commences to deposit larvæ ten to twenty-three days after emergence. The total number of larvæ a single female is capable of laying is not known with any certainty, but is considered to be ten to fifteen. These are deposited for a while at least at the rate of one every seven to nine days.

Plate 141.

SHEEP KED (*Melophagus ovinus*) × 14.

Effect of Ked Infestation.

The ked lives on blood, which it secures by piercing the skin with its mouth-parts. Heavy infestations may readily cause loss of condition. Infested wool becomes ragged, broken, stained, and greatly reduced in value.

Control.

Like the lice, the ked spends the whole of its life upon the sheep, and is incapable of breeding elsewhere, as is frequently thought. The adult insect, however, has been known to live as long as eighteen days when detached from the sheep, though usually the survival period is not as long as this. The pupæ have been known to remain viable for as long as forty-two days in tags of wool which have become removed from the sheep by biting and scratching. Here again, as in the case of lice, sheep may become infested in two ways—either by direct contact with infested sheep, which no doubt is the chief method of spread, or from yards, sheds, and paddocks which have housed infested sheep. In order, therefore, to make sure that such yards, sheds, and paddocks are clean, it would be necessary to spell them during the warmer months for a period of about two months. During the winter, however, if the temperature drops to freezing at any period during the day or night, adult

ticks will not survive longer than about five days, and as pupæ are readily killed by frosts, such infested yards, &c., need not be spelled longer than a week. Shearing-shed sanitation is again stressed.

The keds on the sheep may be killed by dipping in an arsenical solution as used for biting lice. Arsenic, however, has little effect on the pupæ and for this reason a second dipping after an interval of twenty-one to twenty-five days is necessary for eradication.

Attention is directed to the principles of dipping as laid down for lice.

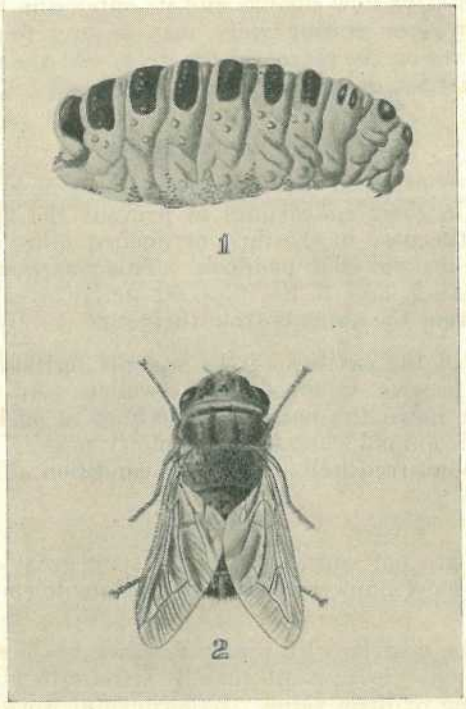

Plate 142.
SHEEP NASAL FLY (*Oestrus ovis*).
Fig. 1.—Larva × 6. Fig. 2.—Adult Fly × 6.

The Sheep Nasal Fly (*Oestrus ovis*) (Plate 142, figs. 1 and 2).

This is a squat, dark-grey, bristleless fly, extensively marked with silver-grey (Plate 142, fig. 2). It has a wide distribution throughout the State and is to be seen during the spring and summer months. The fly is most active during the warmer hours of the day, and in the early morning and towards evening may be seen resting on various objects in the sun. The adult fly has only rudimentary mouth-parts and cannot feed. It lives about four weeks.

Life History.

The female fly deposits a tiny larva or maggot on or near the nostrils. The maggot quickly makes its way up into the nostrils and

into the communicating cavities. It then attaches itself to the membrane lining these cavities by a pair of stout mouth hooks. Here it feeds on the pus and exudate its presence occasions. In young lambs the larva may be fully grown in about twenty-eight days, but in older sheep full growth is not attained until after about sixty-five days or more. The mature larva measures a little more than an inch in length. The dorsal surface is marked with black bands and the ventral surface bears rows of small spines (Plate 142, fig. 1).

When mature, the larva leaves the sheep's nostrils, usually being sneezed out, and having fallen to the ground burrows into the soil for protection. The larva now shrinks and its outer skin hardens and turns black. This pupal or resting stage may occupy four weeks to three months, depending on the season of the year. At the end of this period the adult fly emerges, dries its wings, and flies off.

Effect on the Sheep.

The presence of nasal bot flies keeps sheep in a somewhat frantic condition, and in their endeavours to prevent the fly from attacking they will hold the nose in the dust or against other sheep, frequently moving wildly around the paddock. This reaction interferes with feeding and resting, and if the flies are active over a long period is sufficient to prevent the animals from thriving.

The larvæ in the cavities of the nostrils irritate the lining membranes, which become inflamed and swollen. An intense purulent discharge passes down the nostrils, sometimes in such quantities as to interfere with the animal's breathing ("snotty nose"). Infested animals are irritated, do not feed well, and so lose condition. Heavy infestations may be fatal.

Control.

These flies are not considered to fly very great distances and for this reason are most numerous around permanent camps and watering places.

Smearing the nostrils with pine tar, which has been so often recommended in the past to prevent the fly from attacking sheep, is now regarded as being of little value. Experimental work in other parts of the world has shown that the grubs in the nostrils may be killed by applying to *each* nostril—

(*a*) Two cubic centimetres of equal parts of carbon-bisulphide and liquid paraffin, or

(*b*) Two cubic centimetres of equal parts of tetrachlorethylene and liquid paraffin.

To apply these mixtures the sheep is placed flat on its back with the head on the ground and held at an angle of 45 degrees. The correct amounts are inserted into each nostril by means of a syringe fitted with a short piece (two inches) of rubber tubing. The animal is retained in this position for ten to fifteen seconds after the mixture has been injected.

Acknowledgment.

Plates 139, 140, 141, and 142 are the work of the late Mr. I. W. Helmsing, Illustrator, Department of Agriculture and Stock.

Two Plants Poisonous to Stock.*

E. H. GURNEY, A.A.C.I., Agricultural Chemist, and W. D. FRANCIS, Botanist.

[*Contribution No.* 6.]

THE two plants, *Heterodendron oleæfolium* and *Ximenia americana*, are included with plants which have been proved to be poisonous to stock, and samples of these plants at different periods during a year's growth were collected by officers of the Department and forwarded to the Poison Plants Committee[1] for investigation. Samples of *Heterodendron oleæfolium* were forwarded from Blackall and Dalby districts and samples of *Ximenia americana* from Clermont.

Results of the determination of the hydrocyanic acid content of samples of *Heterodendron oleæfolium* collected in New South Wales have been published by Ramsay and Max Henry in the "Agricultural Gazette" of New South Wales, November, 1929, and by Finnemore and Cooper in the "Australian Veterinary Journal," August, 1938. Further reference to some of the data in these publications will be made later.

The analyses herein recorded were undertaken as the sources from which these plants were collected have essentially a summer rainfall, and it was therefore thought desirable to confirm previous work as to *Heterodendron oleæfolium* and find out if *Ximenia americana* behaved similarly.

METHOD OF ANALYSIS.

The method of analysis used by us was that of Finnemore (Aust. Journal of Pharmacy, 30th January, 1935, p. 41) with the slight modification that the distillate was collected in a saturated solution of sodium bicarbonate.

The analyses were made on the moist material as received, a moisture determination being made (at 105 deg. C.) at the same time as the determination of HCN and then the HCN calculated in terms of moisture-free plant, this latter figure being shown on the accompanying graphs.

Emulsin was used in every determination.

Heterodendron oleaefolium.

Heterodendron oleæfolium is a tree with a wide distribution in Australia, being found in all the Australian States. In Queensland it is most abundant as a member of the mixed timber and Brigalow and Belah scrubs of the mid-west. It forms a very shapely tree when growing in the open. Good specimens have a heavy head of foliage and provide excellent shade. The leaves are narrow, 3-4 inches long, and frequently of rather a pale, almost ashy green. The flowers are insignificant but sometimes borne in great abundance. The seed vessel or fruit consists of one to three pea-like lobes, each containing a single seed. Boonaree is perhaps the name by which is is most widely known and is the most suitable vernacular. Rosewood, Emu Bush, Cattle Bush, Whitewood, and Dogwood are names frequently given to it. They belong, however, more correctly to other trees.

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* *Heterodendron oleæfolium* and *Ximenia americana*.

[1] A committee established by the Department of Agriculture and Stock as the result of a grant from the Australian Wool Board for the purpose of conducting investigations upon plants suspected of being toxic to sheep.

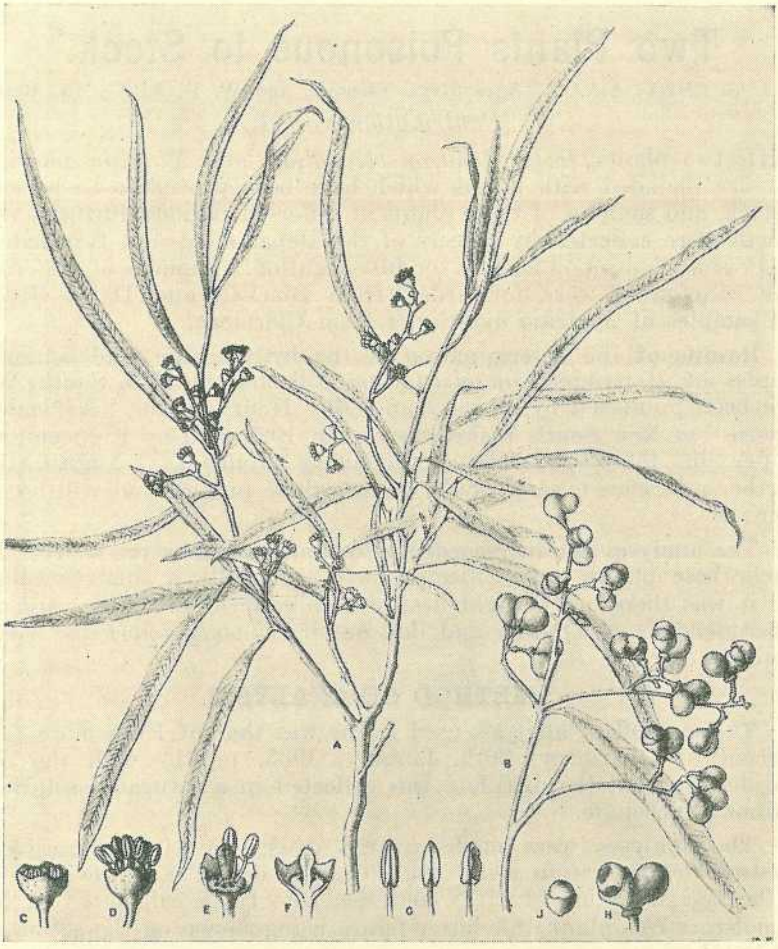


Plate 143.

BOONAREE OR WESTERN ROSEWOOD (*Heterodendron oleæfolium*).

[*Reproduced from the "Forest Flora of New South Wales," by J. H. Maiden.*]

Up to October, 1937 (line AB on Plate 144), no differentiation was made between broad and narrow leafed forms of *Heterodendron oleæfolium* from Blackall, so samples to that date were all treated as normal (broad-leafed) form. Again, after July, 1938, only one sample of the broad-leafed form was received each month, and this was treated as "mature leaves" on the graph (line CD).

The supplies of *Heterodendron oleæfolium* (narrow-leaf form) from Blackall consisted of a mixture of mature and young growth, and Plate 144 therefore represents the average HCN content of the leaves of the plant during the period represented.

In Graph No. 1 it will be seen that the HCN content of the young leaves of this plant increases to 151 mg. in December, then after a slight decrease it again increases to 152 mg. in February, after which date a regular decrease occurs until June in the plant samples

— HETERODENDRON OLEAEFOLIUM. (NORMAL) BROAD LEAVED FORM FROM BLACKALL. —

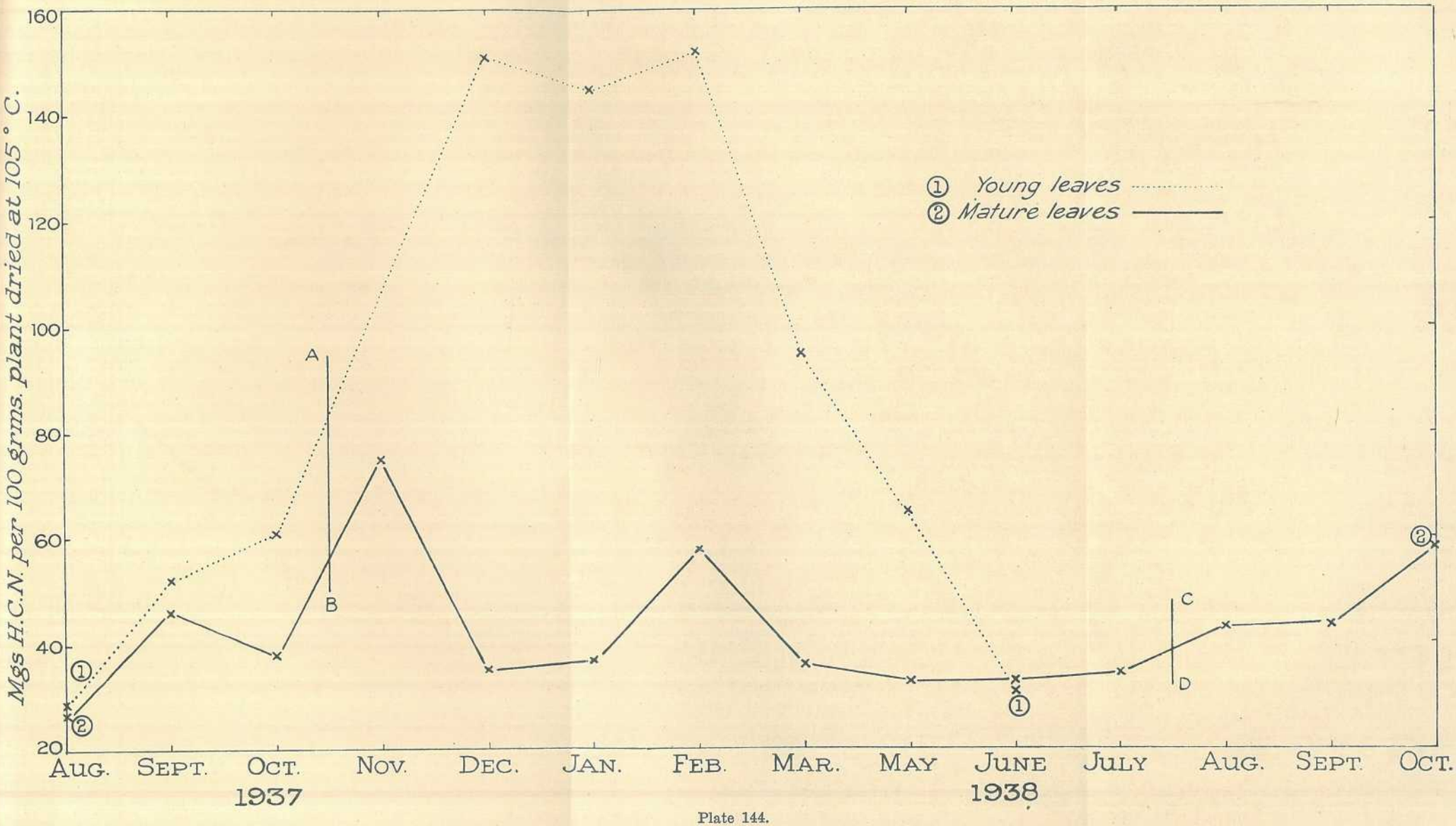


Plate 144.

To face page 548.]

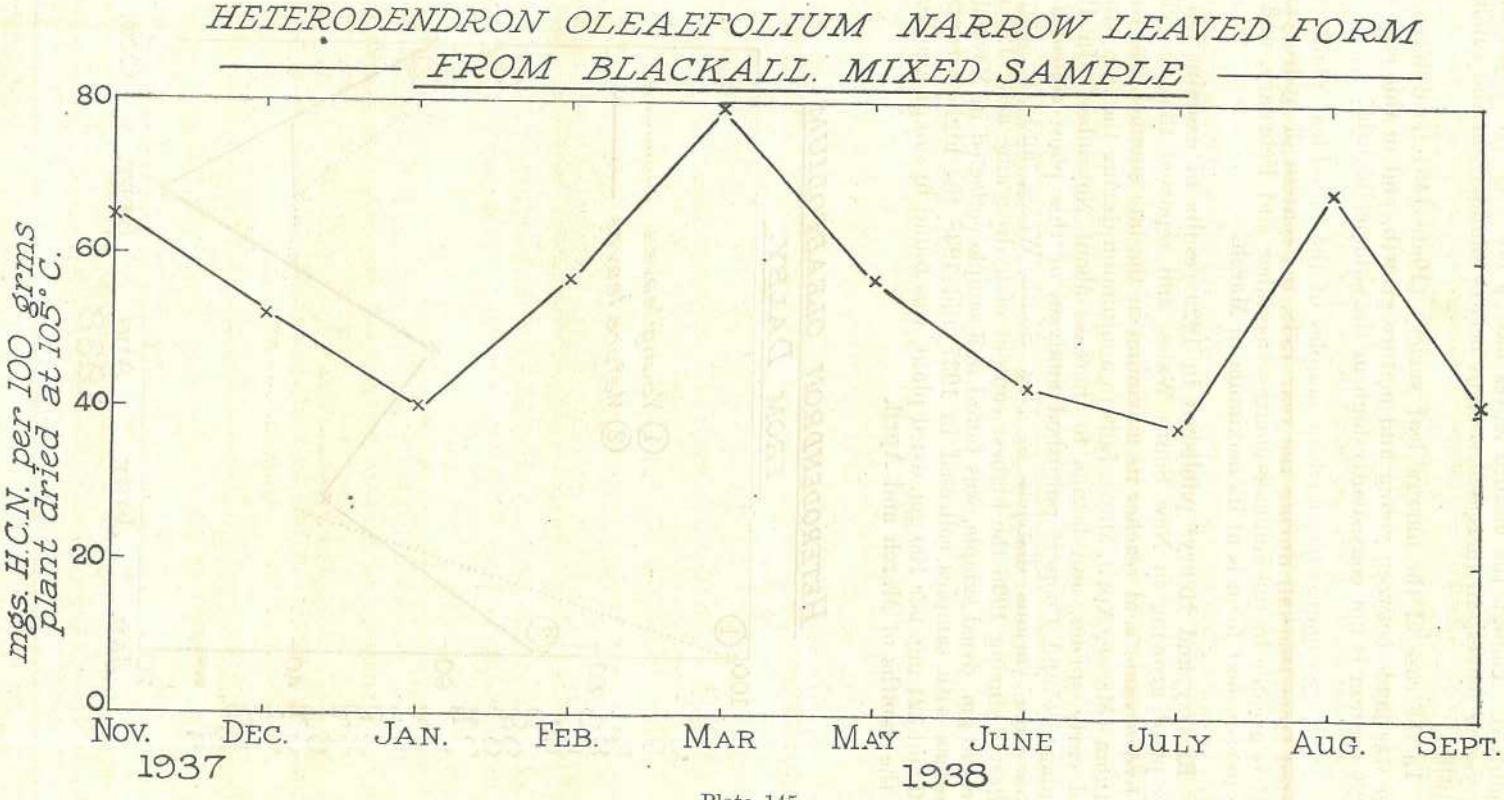

HETERODENDRON OLEAEFOLIUM NARROW LEAVED FORM
FROM BLACKALL. MIXED SAMPLE
mgs. H.C.N. per 100 grms plant dried at 105° C.
80
60
40
20
0
NOV.
DEC.
JAN.
FEB.
MAR
MAY
JUNE
JULY
AUG.
SEPT.
1937
1938

Plate 145.

submitted. Though the mature leaves have a lower HCN content than the young leaves, an increased content occurs similarly in the summer months.

In the case of the narrow leaf variety (Plate 145) no differentiation was made between young and mature growth, and in this case the HCN content is not consistently high in the summer months.

From the figures obtained on samples of the broad-leaf plant submitted from Blackall during the year 1938, the content of hydrocyanic acid is greater in the summer months December and February, and in the narrow-leaf form is at its maximum in March.

Ramsay and Henry[1] published in 1929 results of examination of this plant growing in New South Wales, and reported that the yield of hydrocyanic acid reaches its maximum in the late summer and early autumn (March, April, May), falls to a minimum during the late winter and early spring, and begins to increase about November. In 1938 Finnemore and Cooper[2] published analyses of this plant collected in 1936 from various districts of New South Wales, and in samples collected during 1936 the highest content of hydrocyanic acid, 125 mg. per 100 gm. dried sample, was found in a sample collected in November, whereas with samples collected in 1937 and 1938 the highest content, 300 and 321 mg. per 100 gm. dried plant, was found in samples collected in the months of March and April.

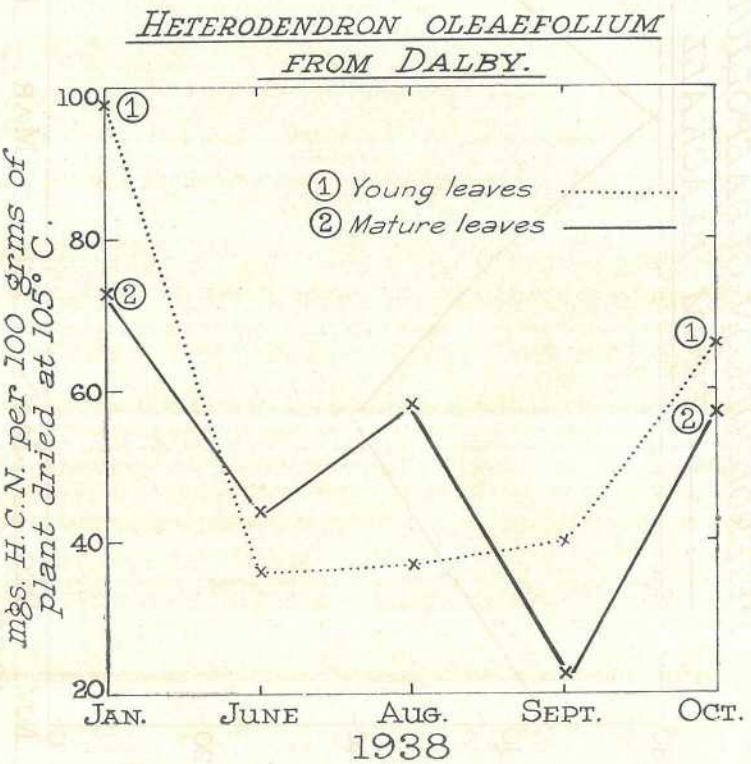


Plate 146.

XIMENIA AMERICANA FROM CLERMONT

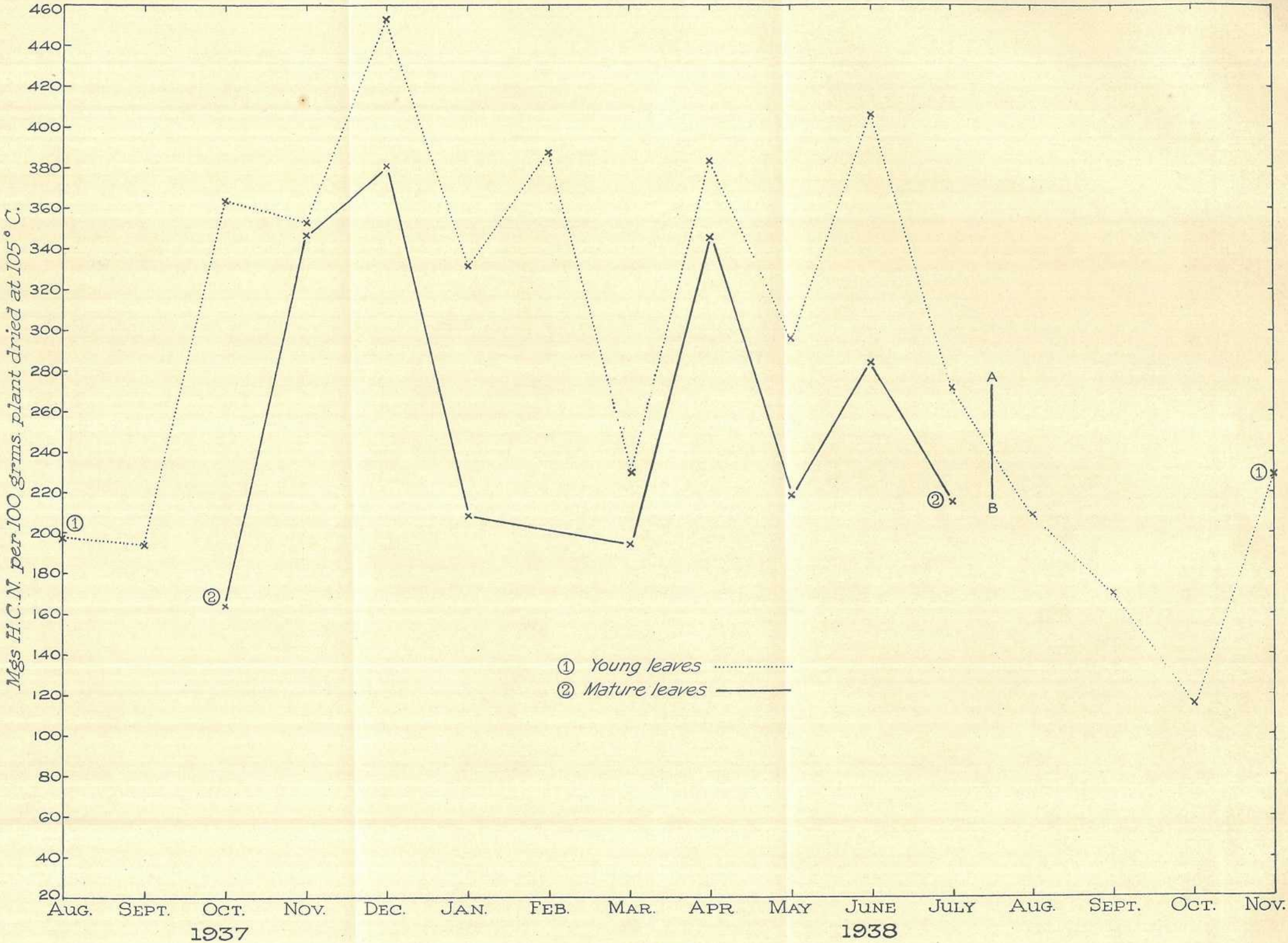


Plate 147.

[To face page 551.]

Only a few samples of *Heterodendron oleæfolium* were received from the Dalby district, the analyses of which are detailed in Plate 146, this showing lower figures for material collected during the winter than in spring or summer (this latter being the highest).

Reviewing the information obtained, therefore, it is seen that our results substantiate those obtained by other workers and that the greatest danger of poisoning from *Heterodendron oleæfolium* is to be expected in late summer and early autumn.

The hydrocyanic acid (HCN) contained in plant glucosides requires a suitable enzyme for its liberation, and in the publication of Finnemore and Cooper, mentioned before, it is distinctly shown by numerous comparative analyses of *Heterodendron oleæfolium* without and with added enzyme that the enzyme existing in this plant does not liberate all the HCN present and, as other plants eaten by stock commonly contain suitable enzymes, it is generally accepted that they are responsible for the liberation of HCN from the glucosides in this plant. All results reported in this article are considered as being the maximum content, as in all cases an enzyme has been added before analyses were made.

Ximenia americana.

Ximenia americana is a shrub with a wide distribution along the shores of tropical countries, including Australia and New Guinea. In Queensland it is not only found on the coast, but extends some considerable distance inland, and is most frequent as clumps or thickets in mixed timber or in Lancewood scrubs. It is an intricately branched shrub, frequently spiny. The leaves are usually a pale shining green. They are oblong or elliptic in shape and about 2 inches long. As the local name indicates, the fruits are like a small yellow plum, an inch to an inch and a-half in diameter, and contain a single seed.

The analyses of samples of *Ximenia americana* received from the Clermont district are represented on Plate 147.

After July, 1938, only one sample of *Ximenia americana* arrived each month, and these samples have been used in continuation of the "young leaves" graph (line AB), though they could equally have been included in the mature leaf graph. The portion of the graph to the right of the line AB therefore represents the average HCN content of the mixed, young, and mature leaves from August to November, 1938.

Frequent qualitative tests have demonstrated the presence of HCN in this plant and it was listed by Smith and White[3] in 1918 as a cyanogenetic plant, and Finnemore, Cooper, and Harris[4] record that with the addition of an enzyme 0·31 per cent. HCN (310 mg. per 100 gm. dried plant) was obtained, and that without addition of enzyme 0·28 per cent. HCN (280 mg. per 100 gm. dried plant) was obtained. This shows that sufficient enzyme exists in this plant to liberate practically the whole of the HCN present.

It will be seen from our analyses that the hydrocyanic acid (HCN) content fluctuated erratically throughout the period the plant was under investigation, but the reason for such variation in HCN content cannot be stated. Young leaves, however, at each testing gave a higher figure than mature leaves, and hence would be more dangerous to stock.

Conclusons.

1. Our analyses confirm the fact that *Heterodendron oleæfolium* contains a hydrocyanic acid (prussic acid) yielding glucoside.

2. This varies in different stages of growth, but frequently contains sufficient hydrocyanic acid to be dangerous as feed for stock.

3. The plant yields the greatest amount of HCN in late summer and early autumn.

4. *Ximenia americana* contains sufficient hydrocyanic acid at all stages of growth to be dangerous to stock.

Acknowledgments.

The grant from the Australian Wool Board to the Department of Agriculture and Stock has made possible the examination of the above plants. The assistance of the Wool Board is appreciated by the Department.

It is desired to acknowledge the assistance of Mr. W. G. McKechnie and Mr. W. R. Winks for the analytical work detailed in this article, and to Messrs. S. L. Everist, W. A. Kearney, and E. T. Lewin, who were responsible for the collection and forwarding of samples.

REFERENCES.

[1] Ramsay and Henry, Agr. Gazette of New South Wales, Nov. 1929, p. 834.
[2] Finnemore and Cooper, The Aust. Veterinary Journal, Aug. 1938, p. 153.
[3] Smith and White, Proc. Roy. Soc., Queensland, 1918, p. 86.
[4] Finnemore, Cooper, and Harris, Jour. Chem. Ind., 1938, p. 162.

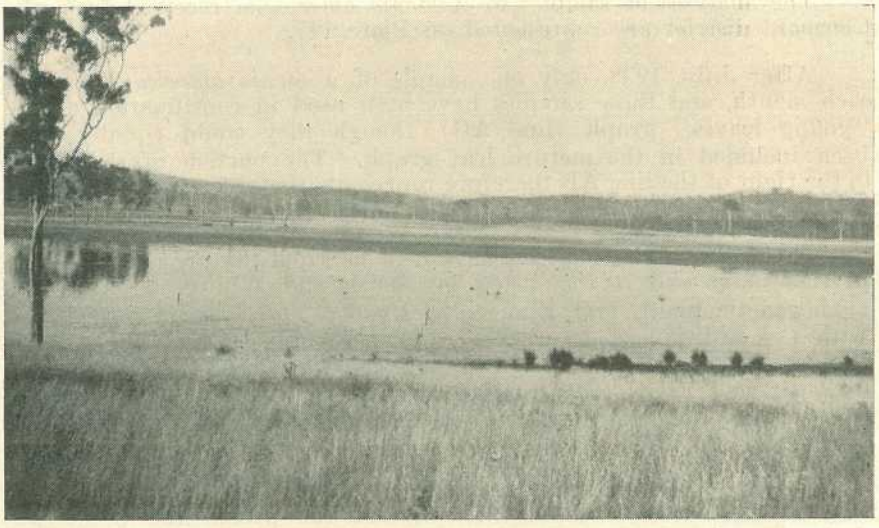


Plate 148.

A SOUTH BURNETT WILD FOWL SANCTUARY.—Lake Booinbah, near Boonara, on the Goomeri-Gayndah road.

Problems of Keeping Milk in the Home.

O. KUDELKA, Bacteriologist, Brisbane Milk Board.

A HIGH-QUALITY milk for drinking purposes has to satisfy several conditions. It has to be fresh, free from pathogenic germs, it has to contain as few as possible milk bacteria which are not pathogenic, and has to possess all nutritional properties in good proportions. In short, a high-quality milk has to be clean, safe, and rich. To produce, handle, transport, and to sell such a product certain methods must be applied, otherwise some defects in the milk will become apparent.

Among the conditions for the production of a high-quality milk the temperature plays a very important part.

The amount of bacteria present in freshly drawn milk coming from a healthy cow is always very low. The increase in the bacteria in the milk is caused by two factors. Firstly, external contamination that occurs during the handling with unsterilised utensils, or by dust contamination; and, secondly, the multiplication of the original milk bacteria at a favourable temperature. The multiplication of all bacteria depends on media, temperature, and time. The medium of milk is one of the best, and is very suitable for the multiplication of the milk bacteria and the bacteria commonly coming from external sources. The most favourable temperature for this development is over 70 deg. F., the optimal temperature being between 70 and 90 deg. F.

Thus can be understood the importance of the cooling of the milk immediately after milking to keep its original low bacteria count, and also the need for strictest cleanliness in handling.

The function of time is simply explained since, above a certain temperature, the number of bacteria increases proportionately to the length of time the milk is stored. This multiplication, however, is limited since the development of bacteria is checked by the by-products of the bacteria themselves if they are present in too high numbers.

Even after its supply to the household, milk must be treated very carefully. It has to be kept in the cleanest utensils (best in the bottle it is delivered in), and placed in a very cool spot. Milk should not be kept more than a certain time before being used. It is better to have a small quantity delivered twice a day than a large quantity once a day.

To study the bacterial changes in milk which take place when it is kept at different temperatures for different periods of time experiments were carried out.

Six bottles of a milk with a low bacteria count (pasteurised milk) coming from the same batch arrived early in the morning in the laboratory and were examined in the following way:—Bottle No. 1 was tested immediately. Bottles Nos. 2, 3, 4, and 5 were put on a table and kept at atmospheric temperature for different periods before being examined. Bottle No. 6 was kept in the refrigerator for the duration of the experiment. After every two hours one of the bottles on the

table was examined bacteriologically by the plate count test. Bottles 5 and 6, both kept for eight hours, but at different temperatures, were tested at the same time. The following are the results:—

No.	Time Examined.	Atmospheric Temperature. Degrees.	Bacteria Count.
1	8.30 a.m.	67·9	12,000
2	10.30 a.m.	70·2	164,000
3	12.30 p.m.	71·0	920,000
4	2.30 p.m.	70·7	1,200,000
5	4.30 p.m.	69·0	2,960,000
		Refrigerator Temperature. Degrees.	
6	5 p.m.	56·0	2,900

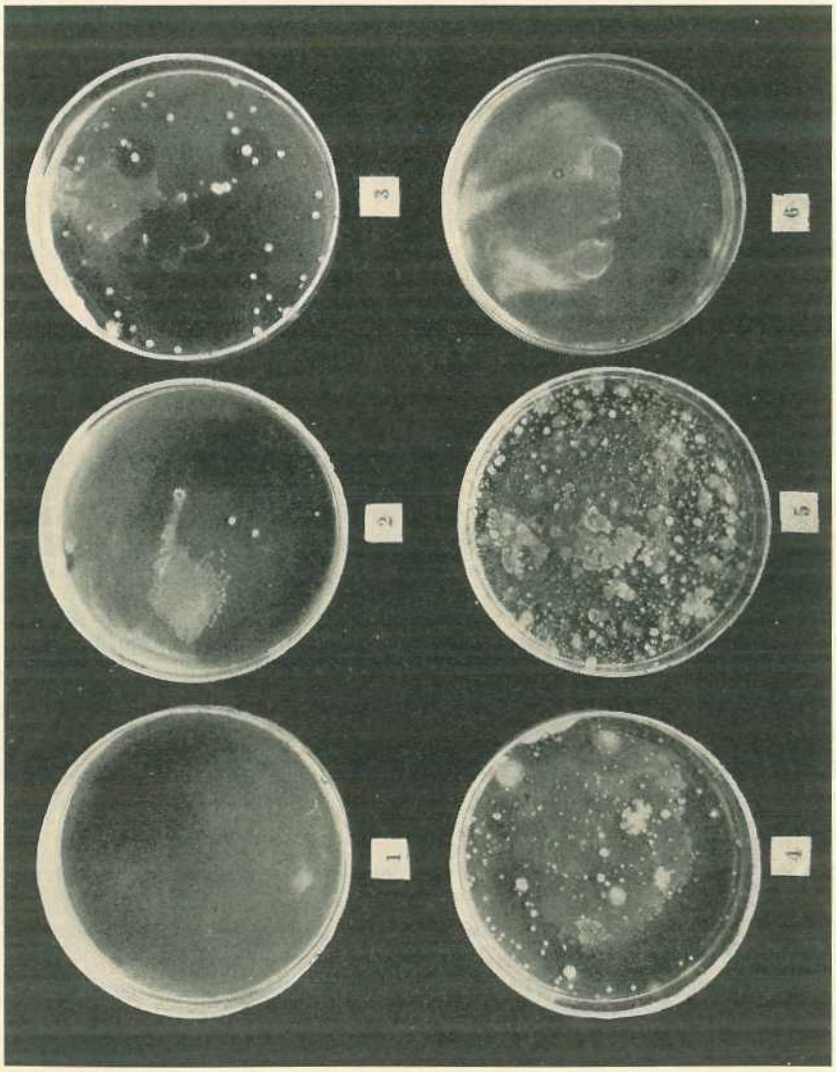


Plate 149.

The cloudy effect in Fig. 6 is not caused by colonies but by sterile milk which was added to the medium. The colonies are always distinctly visible.

The picture of the six plates (Plate 149) demonstrates very significantly the steady increase in the number of bacteria which takes place if milk is kept at a high atmospheric temperature for long periods. It can easily be seen that the last milk plate, which showed the count of the milk which was kept in the refrigerator, demonstrated that there was no increase in the number of bacteria during the eight hours before the examination.

It could, however, be argued that pasteurised milk, as a treated milk, has lost some of its supposed forces of resistance and can therefore not be used as an example. Like all other arguments against pasteurisation, even this is not founded on fact. Very many experiments have proved that milk, if it is properly pasteurised, does not lose one of the good qualities of the raw milk, but is freed from all pathogenic germs that could be present in it.

Nevertheless, in order to deal with this argument a second experiment was carried out with raw milk and the same methods of examination were applied. A very clean raw milk was used and kept at atmospheric temperatures. After every two hours a plate test was carried out. A sample of the same milk was kept for eight hours in the refrigerator and examined at the end of this period together with the last sample of milk kept at atmospheric temperature. The following are the figures:—

No.	Time Examined.	Atmospheric Temperature. Degrees.	Bacteria Count.
1	8.30 a.m.	67·9	12,000
2	10.30 a.m.	70·2	164,000
3	12.30 p.m.	71·0	920,000
4	2.30 p.m.	70·7	1,200,000
5	4.30 p.m.	69·0	2,960,000
		Refrigerator Temperature. Degrees.	
6	4.30 p.m.	56·0	14,000

Both experiments seem to prove the importance of cold storage of milk, even at home, and stress that the time of storage should be limited unless at a temperature below 60 deg. F. The higher the temperature, the shorter the time of storage should be.

Irrigation Practice on Brie Brie Estate, Mossman.

By W. H. CRAWFORD and G. BATES.*

ALTHOUGH this far northern portion of our cane area has an annual rainfall of almost ninety inches, most of this falls in the first three months of the year, and invariably crops suffer from lack of soil moisture in the spring; this is reflected in the tonnage harvested during the following season. The following figures, taken from the "Queensland Agricultural Journal," give the average monthly precipitation at Mossman over a period of twenty-five years:—

	Inches.
January	17·84
February	18·57
March	17·49
April	7·82
May	3·37
June	2·46
July	1·34
August	1·28
September	1·71
October	2·91
November	4·49
December	10·18
Total	89·46

An examination of these figures shows that even in an average year there is a lack of soil moisture in the early life of the crop, particularly when it is remembered that, although records may show fair showers in successive months, it is quite possible that these may have fallen early in one month and late in the next, giving often a period of six weeks dry weather; this causes a check in growth at a critical stage in the life of the crop. When the rainfall is below average the position becomes, of course, much worse. For example, although the average for August, September, and October amounts to approximately six inches, in the year 1937 only 2·25 inches fell over this period. This is probably the chief factor responsible for the 1938 crushing in Mossman being referred to as "the drought year."

In 1938, it was decided by Brie Brie Estate to investigate the possibilities of irrigation. Although in this year 40 acres were watered, the project was not commenced until November, and was more in the nature of a preliminary trial, which paved the way for a fuller understanding of the routine to be adopted in the future. Fortunately, there was no difficulty in obtaining a supply of water. This was drawn from the open river, the water of which is of high degree of purity, and the supply almost unlimited. The nature of the soil to be irrigated, and the undulating character of the land made flood irrigation impracticable, except in a few isolated paddocks, so that it was necessary to adopt the spray system.

The pumping plant (see Plates 150 and 151) consists of a wheel-tractor, developing 40 H.P. at the pulley, and a 6-inch centrifugal pump, directly mounted on an extension of the tractor chassis. The pump is

* In *The Cane Growers' Quarterly Bulletin* for April, 1940.

connected to the intake by a 6-inch flexible pipe. The tractor runs on kerosene, burning 2 gallons per hour, and the pump delivers 30,000 gallons per hour.

Plate 150.
ILLUSTRATING THE ARRANGEMENT OF TRACTOR, PUMP, AND FLUMING, BRIE BRIE ESTATE.

The mounting of the pump on the tractor chassis has proved a great convenience. As water is drawn from the river, different sites may be selected for different blocks, so that time and trouble is thereby saved when changing over, for it is not necessary to line up the pump at every shift. It is found that the average lift from the river to the pump is 12 feet, and blocks watered are usually 30-35 feet above water level.

The fluming and spray equipment consists of 25 chains of 6-inch 22-gauge galvanised piping, with quick acting couplings, and 27 chains of 4-inch spray line. These are in 17½ feet lengths, and a spray nozzle covering a square of 35 feet side is fitted at the centre of each alternate pipe. The spray uprights are of 1 inch diameter in lengths from 1 to 4 feet. In practice it is found possible to spray cane which is 18 inches higher than the upright used. Thus cane which is 2 feet 6 inches high is sprayed from 1 foot stand pipes.

The spray nozzles are hemispherical, having 81 holes, in nine rows, set at different angles, and are fitted with gauze screens. They may be removed easily for cleaning; this is done twice per day with the exception of the end nozzle which is cleaned at every change. The equipment also includes a number of 6-inch flexible bends, T-pieces, and four gate valves. The landed cost of the equipment was £800, exclusive of the tractor. The maximum length of spray line used is 13 chains; thus 13 chains x 35 feet, or roughly 0·7 acre, may be watered at each setting. The land is sprayed for one hour, applying the equivalent of 1·75 inches of rain. The soil type is mainly clay loam, and it is found in practice that unworked land can be sprayed for one hour without flooding. Worked land will absorb 2·25 inches which is obtained by spraying for about one and a-quarter

hours. While one line is being sprayed, the other is being changed, a job which takes thirty minutes—two men being employed. These men also look after the tractor and clean the sprays.

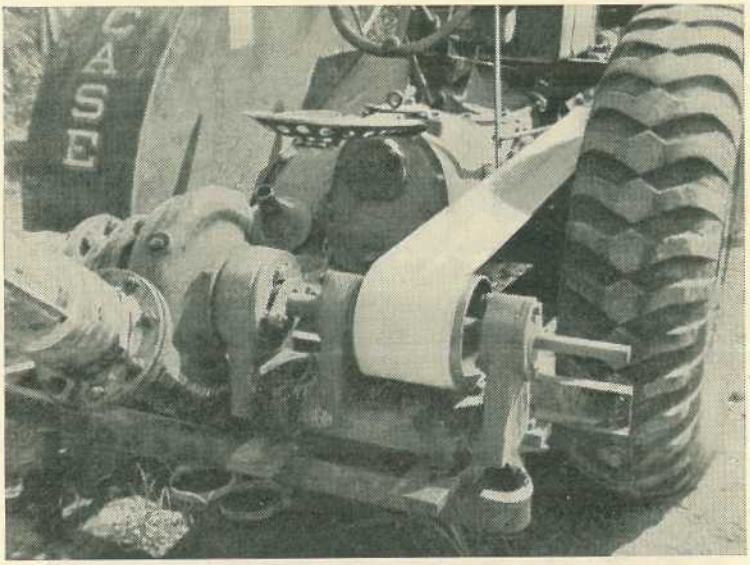


Plate 151.
SHOWING THE MANNER IN WHICH THE PUMP IS ATTACHED TO THE TRACTOR FRAME.

With the four gate valves, three changes may be made without stopping the engine. Care must be taken, however, that all air is driven out of the new line, before the old line is closed. If this is neglected then burst fluming will result. Precautions must be taken at the pump intake to prevent debris entering the spray system. The suction pipe is protected by fine gauze, with an outer covering of ½-inch mesh netting. It is found that algae often give trouble in the dry weather; however, major blockages are caused by trash and dirt, which are picked up with the wet pipes, when changing over, and a little care taken to prevent dirt getting in the joints will save trouble later on.

Mains must also be packed at the joints when on uneven ground, and where gullies exist, furrows have to be made across the fall to prevent scouring. In handling ratoons, the practice is to rake and burn the tops, and then the disc harrows are run over the land; the crop has generally been burnt before harvesting. The block is then watered for one hour. Later it is grubbed twice, fertilized, and ultimately watered again for one and a-quarter hours.

During 1939, conditions for cane growing were considered to be above the average, although, as usual, there was a dry spell in the early spring. Only 36 points of rain fell in July, 68 in August, and 91 in September. Irrigation was commenced in September, following the August rain. Forty-seven acres were watered twice, and 12 acres once. Following this, 552 points of rain fell in October, 1,016 in November, and 437 in December, so that further watering was not considered necessary.

It was found that 5 acres may be irrigated per day, and allowing for shifting and lost time, the cost works out at roughly £1 per acre per watering.

Cold Resistant Sugar Cane.

AN experiment, which is being watched with great interest by the rest of the world, is now being carried out in the United States under the general direction of Dr. E. W. Brandes, Principal Pathologist-in-Charge of the Division of Sugar Plant Investigations in the United States Department of Agriculture.

Dr. Brandes will be remembered by many Queensland growers as the leader of an expedition which explored New Guinea by aeroplane in 1928 and made a considerable collection of different types of sugar cane which looked promising for use as commercial or breeding canes. This collection was made available to the Bureau, but none of the commercial type canes proved to be suitable to our conditions; certain selected breeding canes, however, are now in use in our cross-pollination programme. Dr. Brandes again visited Queensland in 1935 during the Conference of the International Society of Sugar Cane Technologists and left here on a visit to the South Sea Islands for the purpose of collecting further types of sugar cane. He or his deputies made similar journeys to other countries at various times and some three years ago he received from Central Asia a variety of sugar cane which may play an important part in the sugar world.

The variety in question was received from Turkestan, and during the past three years several further importations of the same type of cane have been made. It is quite probable that there are many such varieties of wild cane in the vast stretch of country between the Caspian Sea and Western China, but the difficulties of travel in such remote parts have prevented visits by plant explorers.

The outstanding characteristic of this type of cane—popularly known as the "Turkestan" cane—is its ability to withstand extreme cold. The first importation was grown in the vicinity of Washington, the national capital of the United States, at a latitude similar to that of Tasmania. During the winter time, in spite of the fact that 15 to 20 degrees of frost were registered, the plants remained green and few of the lateral buds were killed. The cane was also found to grow quite rapidly under the comparatively cold conditions of spring, as experienced in Washington.

Now the sugar-cane industry of Louisiana suffers under the extreme disability that late autumn frosts kill the cane, so that it has to be harvested before it is ripe, while early spring frosts prevent its early planting or ratooning. As a result, sugar cane in Louisiana has a growing season of only some seven or eight months per year. It was, therefore, natural that Dr. Brandes and his associates should be very interested in the cold-resistant qualities of the Turkestan cane, and visualise the possibility of crossbreeding it with some of the Louisiana canes in order to produce a commercial cane which would have a longer growing season.

Accordingly, it was decided to attempt to cross this Turkestan cane with ordinary commercial cane, but a difficulty was immediately encountered in the fact that the wild Turkestan specimen arrowed in mid-summer, whereas the commercial varieties of sugar cane arrow in late autumn. However, this difficulty was overcome by taking advantage of the reversal of seasons north and south of the equator. Enquiries showed that commercial varieties of cane would be arrowing in the

Republic of Colombia, in South America, at a time when the Turkestan cane was arrowing in the northern hemisphere.

Cuttings of the Turkestan cane were planted in boxes, and when the arrows were just about to emerge they were crated and shipped down to Colombia as fast as possible. When removed from the crates the arrows were in good condition and they were then set in position in contact with arrows of commercial varieties of sugar cane. At the same time pollen was collected in special containers from the cane which was arrowing in Washington, and these containers were then rushed by aeroplane to Colombia and there the pollen was dusted on to the flowers of commercial canes.

This experiment was carried out in August, 1938; both methods proved successful and some 15,000 hybrid seeds were obtained and taken back to Washington by air. The seed was planted immediately on arrival and gave rise to large numbers of seedlings which are obviously hybrids between the two types of cane. They have shown improved vigour over the wild type and have also demonstrated their ability to withstand cold which would have killed ordinary varieties of cane.

A large number of these hybrids arrowed last year and in August, 1939, pollen from these (as well as a second lot from the wild cane) was sent to Colombia by aeroplane for dusting on to commercial cane types. Success again followed the venture and there are now growing in Washington large numbers of seedlings which are the grandchildren of the Turkestan cane—that is to say, they contain one-quarter wild Turkestan "blood." At the time of latest reports these seedlings were quite small, and it could not be determined whether they contained any commercial types; a further back-cross on to ordinary sugar cane may still be necessary.

It should, of course, be quite possible to produce, in this way, commercial varieties which will retain some of the cold resistance of the Turkestan parent, and if and when this is successfully concluded a considerable benefit should be conferred on some of the sub-tropical cane-producing countries. On the other hand, of course, it should not be concluded that the world's cane sugar industry will thereupon migrate to countries like Tasmania and New Zealand: the sugar-cane family contains many members, the stalks of which contain little or no sugar. This is particularly true of the so-called "wild" canes which, in addition, have such thin stalks that they would produce a very small crop per acre. Consequently, in order to get varieties which will yield satisfactory tonnages of sugar, it is necessary to cross the wild cane back on to the noble cane several times. Each back-cross to the noble cane improves the thickness of stalk and sugar content but, at the same time, it must naturally "dilute" the characteristics inherited from the wild forbear. We must therefore expect that as the progeny from the Turkestan cane are back-crossed to noble canes, they will lose a good deal of their resistance to extreme cold.

Nevertheless, it will be a very great achievement if there can be produced an otherwise suitable cane which will be able to withstand temperatures of, say, 28 deg. F. instead of being killed at 32 deg., and perhaps this is as much as we could expect. Of course, it is possible that there will result a commercial cane which could be grown in Tasmania—but it is decidedly not probable.

A.F.B.

—In *The Cane Growers' Quarterly Bulletin* for April, 1940.

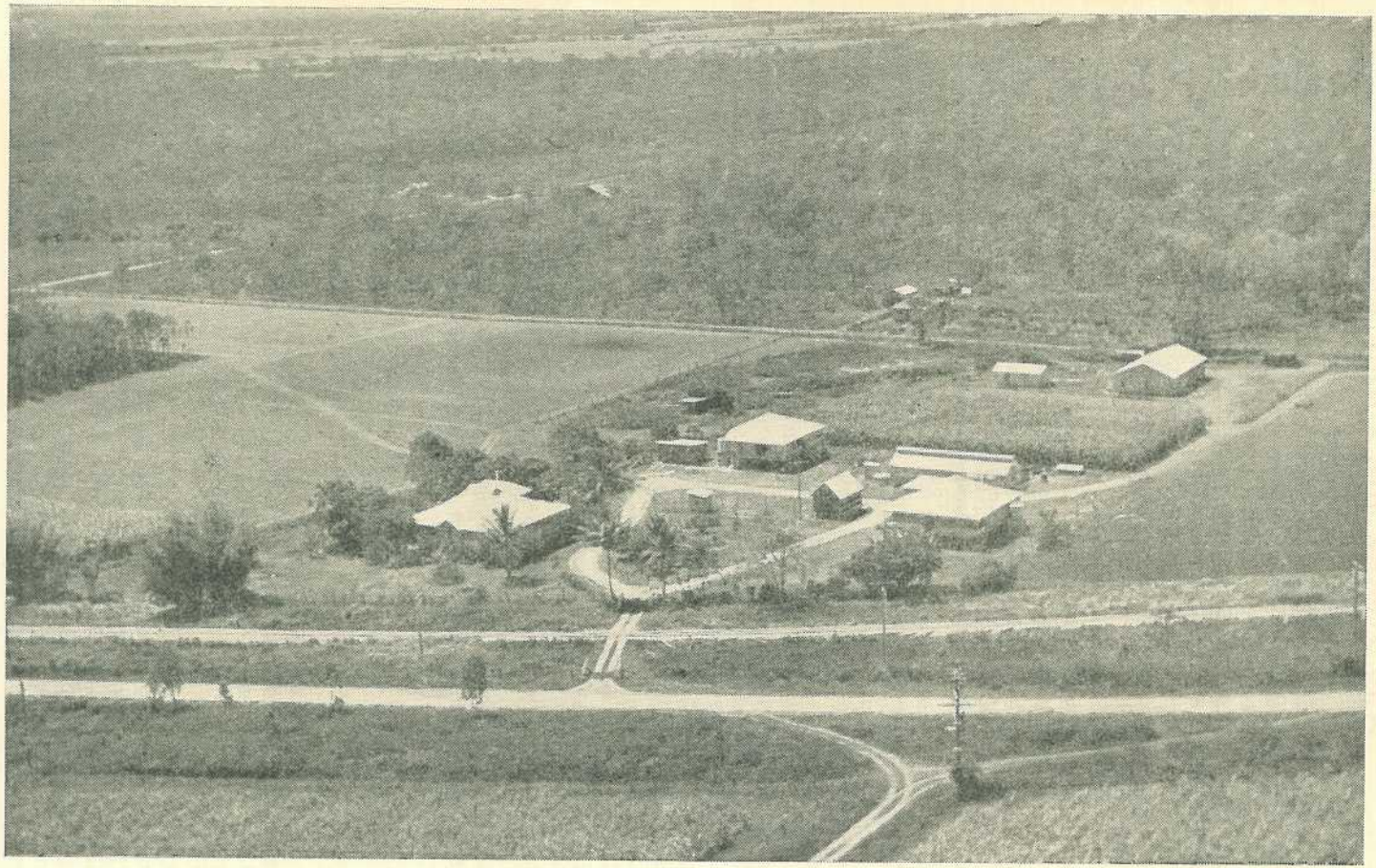


Plate 152.
AERIAL VIEW OF MERINGA SUGAR EXPERIMENT STATION.

Hay Crops for Cane Farms.

By N. J. KING.*

DISCUSSIONS on alternative crops for the canegrower have laid little stress on the importance of hay crops in the farm economy. The following notes have been written primarily for south Queensland conditions—as it is in such climatic limits that experience in hay crops has been obtained at the Bundaberg Experiment Station. Practices in the production of fodder crops for farm stock vary considerably in the southern districts, but it may be said to follow, roughly, the following lines:—

(1) In the crushing season cane tops form the basis of the feed—supplemented with molasses, grain, or lucerne chaff—depending on the individual farmer.

(2) In the slack season (or growing season) some cane tops from volunteer ratoons left for the purpose, sorghums, maize, sacchaline, fodder canes, and some maize grain are used.

The above crops are usually fed as chop-chop in the green state with or without the admixture of grain and/or molasses.

In the harvesting season the collection of tops from green cane does not involve much time or expense, and no doubt the tops constitute a good roughage basis when supplemented with other foods. In the slack season, however, the collection of any of the above green crops is perhaps more costly in time and labour than is generally recognised. In the summer months green feed has to be cut, carted, and put through the chaff-cutter daily so as to ensure some degree of freshness in the product; and time can be ill-afforded for this work during a period when cane cultivation and planting are of paramount importance.

The advantage of a hay crop is that it may be stored in the barn after curing, a good supply of chaff can be prepared on a wet day when farm operations are impossible, and the minimum of time and labour is required in feeding the stock. A further argument in favor of the hay crops is provided by the present disease position in the Bundaberg district. The growing of maize must be looked upon as a particularly risky proceeding in view of the seriousness of the downy mildew position. The obvious decision in such a case is for the minor crop to give way to the major one, and it is a particularly short-sighted policy to grow such a disease-susceptible crop as maize on cane farms where the major crop is thereby endangered. Any fodder crop which is going to endanger the growth of cane should therefore be eliminated in or near the diseased areas.

Sufficient has been written in previous bulletins regarding lucerne growing in South Queensland to justify its omission from these notes; the value of lucerne hay is admitted by all, and no further recommendation is needed here. The only point worthy of further consideration is in relation to flood irrigation of lucerne. On the Experiment Station this crop has been watered by sprays since 1935, but on many farms where irrigation water is available, and the expense of a spray system does not seem justified, it is a relatively simple matter to introduce the flooding system by means of a little judicious grading. There are several flooding systems for such crops, and the layouts are available to any interested growers. The level forest lands around Bundaberg lend themselves admirably to this method of watering.

* In *The Cane Growers' Quarterly Bulletin* for April, 1940.

Sudan grass (*Sorghum sudanense*) is one of the most valuable hay crops for the south Queensland climate. It is a rapid-growing annual, suitable for green fodder, silage, or hay, but on account of the several accidents following the grazing of the young green crop it is recommended that the hay crop only be used. For hay purposes about 15 lb. of seed per acre should be sown broadcast. If a cane crop has just been ploughed out it is advisable after harrowing the seed in to roll the ground with a heavy roller. This flattens down any stools lying on the surface so that they will not interfere unduly with the mower when harvesting the crop. Sudan grass is a summer-growing crop, and at least two cuts—sometimes three—may be obtained from a single seeding. The first crops are cut when commencing to flower, and the final cut is obtained when the crop is in full bloom. It should not be allowed to seed, since the presence of much seed imparts a bitter flavour to the resultant hay.

Care should be taken that only pure seed is used. Sudan grass and sorghum cross-pollinate very readily, and Sudan-sorghum hybrids would be obtained in the next seeding. In curing the crop good hay can be made by leaving on the ground for twenty-four hours after mowing, then raking into windrows for further curing. Five or six days are needed generally for complete curing of the hay, before stacking in the barn. The feeding value of the hay is good, and horses maintain very fine condition on Sudan grass hay.

On the Bundaberg Experiment Station three crops have been grown in four months, the average height being approximately 4 ft. 6 in. to 5 ft. Crops such as these require a fair amount of plant food, and should Sudan grass be sown following the ploughing out of a cane crop a dressing of sulphate of ammonia—about 1 cwt. per acre—should be given the crop during the early stages of growth. Sudan grass in good condition has a dark green colour, and any yellowing of the crop is indicative of nitrogen starvation. It may be advisable on the red volcanic soils to apply also some potash.

Another crop grown to a very slight extent around Bundaberg, and yet capable of making a good hay crop, is oats. Oaten hay is an admirable food for stock and in the average winter in this district a good crop can be obtained. Three varieties have been grown here—Algerian, Sunrise, and Belar. Of these Algerian was the best yielder and made the best quality hay; Sunrise was next, and Belar the poorest. In such proximity to the coast it is inevitable that some rust will appear on the crop, but unless this assumes serious proportions the hay will not be adversely affected. Sunrise was found to be the most resistant to rust of the above varieties.

Field peas or vetches can be sown with oats to make a good-quality mixed hay, but unless the winter rains are above average the crop of peas or vetches will be poor. Normally they climb on the oats stems and are mown and cured together.

Neither of the two crops is expensive to plant. They are easily grown and both make excellent hay crops. It would appear to the writer that it is actually cheaper to grow and cure such crops for hay than to expend continually valuable time daily in cutting and carting cane tops during the growing season, and converting them into chop-chop.

Milk Straining.

ON the most carefully managed farm, a certain amount of visible dirt finds its way into the milk. The term "visible dirt" covers such matter as dust, cow hairs, flies, and manure, as distinguished from bacteria, which are not visible to the naked eye. Bacteria may be present in milk which appears perfectly clean, fresh, and pure—and their presence may not be realised until souring begins several hours after contamination. If visible dirt is present in the milk, however, bacteria will be there also, hence the necessity for straining through a suitable strainer. The cotton wool disc type prescribed by the Dairy Regulations is preferable to any other. It can only be used once, and there is no risk of contaminating fresh supplies of milk, as sometimes happens with a cloth strainer which has not been properly washed.

It is better to keep visible dirt out of the milk than to strain it out. Early straining is better than last-minute straining, for to some extent the longer dirt is allowed to remain in the milk the greater will be the number of organisms passing into the liquid. The process may be understood more clearly by a rough analogy with making a brew of tea. If the tea leaves are removed soon after the addition of the hot water, the tea remains weak. If they are stirred in the teapot, or left for any length of time, the brew becomes much stronger. Similarly, if dust and dirt are left in the milk, undesirable bacteria, with which every particle of dirt is teeming, pass into the milk and increase the tendency to early souring.

The milk from each cow should be removed immediately milking is completed and tipped through the straining disc into the receiving tank above the cooler. It will not require a second or even a third straining, for one straining, together with proper cooling, will be sufficient to give the milk a satisfactory keeping quality.

FEEDING DAIRY CATTLE IN WINTER.

Many farmers conserve enough roughage to last their dairy herds through a severe winter, but few understand why the milkers fail to keep up production. Mastication and digestion of dry roughage use up at least 60 per cent. of the energy value of the feed. With concentrates, less than 20 per cent. is used. It follows that very often on poor quality roughage, a cow is either unwilling or unable to consume enough to meet the requirements of full lactation. The trouble might be met in two ways. Extra consumption can be stimulated by increasing the palatability of the food. Molasses thinned out with water is excellent for this purpose. Bran and other milling by-products also may be used when prices are reasonable.

Seed cake preparations are excellent for dairy cattle. Because of its slightly laxative nature, linseed has found greatest favour. There is a growing tendency to replace vegetable proteins by animal protein. Meat and animal protein meals are used extensively when analyses and prices are sufficiently attractive. By consulting the registered analyses and comparing costs, the farmer can determine which product is the cheapest to buy. All farmers who have overcome the cow's natural dislike for meat and animal protein meals have been amply repaid by the money saved and by the increased production. Under certain conditions, however, it may be uneconomical to feed such concentrates. This is usually the case with poorer milking herds.

The farmer should add a mineral supplement to the ration of all milkers, as well as heavy-in-calf cows. A mixture of two parts sterilised bone meal and one of salt should be kept in a convenient place, or about one eggcupful mixed in each feed. With heavy milkers, the allowance might be doubled.

MEAT AND BLOOD MEALS.

Meat meals and blood meals sold under a variety of names are rich in digestible protein. A high-class meat meal with a crude protein content of 65 per cent. has about twice the digestible protein of commercial cottonseed or linseed meal. In farming terms, this means that 1 lb. of high-grade meat meal has above the same feeding value as 2 lb. of linseed or cottonseed meal.

The cost of meat or blood meal is not greatly different from that of the vegetable meals, and if they can be conveniently included in the ration of dairy cattle feeding costs will be reduced.

Only dairy cattle which have been consistently underfed take kindly to meat or blood meals. Cattle which have been accustomed to small quantities of these meals from birth also present no difficulty. As a general rule, however, dairy cattle only slowly acquire a liking for concentrates containing meat and blood meals and at first only a few ounces should be included in the regular ration. The amount can be gradually built up to the required level, which will, of course, depend upon the quality and quantity of other foods used. Advice on suitable rations may be obtained from the Department of Agriculture and Stock, but the dairy farmer can usually adjust the concentrates in the ration to conform with the milk yield of the individual cow.

Grain and molasses, grain and salt, milling by-products—such as bran and pollard or such attractive meals as linseed, cottonseed, or cocoanut—may be mixed with the meat and blood meals to attract unwilling cows.

Animals which still refuse to eat these meals may be kept for a short time without any food, other than that offered, if allowed plenty of water. It is important that the feed should be changed night and morning, so that a fresh mixture is always before the cow. If this system appears too drastic the nose-bag method may be used. Freshly-chaffed green maize and the meal are mixed before using, and the contents of the bag should be changed night and morning. Most cattle can be induced to eat meat or blood meals by one or other of these methods.

Both meat and blood meals should be fresh, free from objectionable odour, finely milled, and sterile. An undue greasiness is not detrimental, but, in general, the higher the fat content the less palatable the meal.

Meat meals should show a good analysis. Any preparation with a crude protein content of less than 50 per cent. is not a true meat meal, but a meat and bone meal. Blood meal should show a minimum of 75 per cent. crude protein. It should be almost without smell.

As both meals decompose when allowed to remain in a moist condition they should be stored in a dry place and any excess in the feed boxes should be removed each day. Material which has been "fouled" by moisture soon becomes a source of danger and is then only fit for fertilizing.

DIRT ON THE DISHCLOTH.

Although the necessity for using only brushes for the cleaning of dairy utensils is generally well understood by dairy farmers, instances still come under the notice of field officers where some farmers persist in using cloths for this purpose. Cans washed with cloths which are not kept scrupulously clean, or renewed for each occasion of use, are a potent cause of taints, such as "dish cloth" or "cheesy" flavours, in milk and cream, the flavour becoming noticeable after the cream has been kept for some time, and particularly if it is not delivered to the factory daily.

The use of cloths to wipe cans or utensils dry after washing and scalding or steam-sterilising is also unnecessary; in fact, it only helps to reintroduce bacteria to the cans. If properly scalded or steam-sterilised the heat of the can will cause the immediate evaporation of any remaining moisture.

WHOLESOME MILK.

Normal milk can only be produced by a normally healthy herd, fed on wholesome and non-taint producing fodders. If only one cow in the herd is not in normal health her milk production will be sub-normal, and, if mixed with the milk from the remainder of the herd, the quality of the whole may be seriously affected. Cleanliness should be exercised during the whole process of milking, and all utensils and surroundings kept clean.

If the milk is intended for human consumption, cooling and aerating will allow the feed flavours to be given off, and the reduction in temperature will check bacterial development.

Keeping Pigs Healthy.

BY the general practice of hygiene and sanitation in the piggery, coupled with sound feeding methods, the incidence of most pig diseases can be considerably reduced.

Roomy, well ventilated, but draught-proof sties are necessary.

The floors should be swept clean every morning, all refuse being taken away and the yards raked over. Correct drainage of sties and yards will avoid the accumulation of water and help to keep down insanitary conditions.

Moisture is necessary for the free living stages of nearly all worm parasites; in its absence very few of them can survive for any length of time. Therefore, pig keepers who wish to avoid losses from worms must have dry, well-drained sties and yards.

Unhygienic and insanitary conditions are predisposing causes of rheumatism, catarrh, and some of the more serious bacterial infections—such as suppurative otitis and pneumonia. Piggeries should, therefore, be constructed on high ground, floors should be made of concrete, and the run should be well sheltered from inclement weather.

Correct feeding and watering, together with adequate housing and paddocking, are undoubtedly most important factors in the preservation of the health of the pig.

MANGE IN PIGS.

Caused by a minute, worm-like mite which lives in the hair follicles and sweat glands of the skin, the condition described as demodectic mange in pigs is one which the pig-raiser ought to know all about, because its presence sometimes results in the de-grading of carcases, especially of those submitted for export.

The mites are microscopic in size, measuring only one-hundredth of an inch in length.

The lesions of demodectic mange first appear, as a rule, on the snout, eyelids, elbows, and knees. In the initial stages, the areas attacked have a reddened, scurfy appearance with numerous small, hard nodules scattered over them. These become infected with bacteria and begin to ooze pus and serum. The disease gradually spreads over the throat, breast, abdomen, and elsewhere where the skin is soft and thin.

In its early stages, demodectic mange may be checked by frequent applications of crude oil. The disease, however, is very difficult to cope with, and once it appears it is best to get rid of infected animals and to isolate all other animals which have been in contact with them for at least a fortnight. In addition, the sties should be cleaned out thoroughly with boiling water and soda, and then disinfected.

MEATMEAL FOR PIGS.

It is known generally that meatmeal is a good substitute for separated milk in the pig's diet, but unless it is used carefully meatmeal may prove an expensive food.

Meatmeal, which is a by-product of abattoirs and meatworks, is sold under several trade names and some varieties contain a small percentage of bonemeal. It is a wholesome food, convenient to use.

As meatmeal is expensive in comparison with pig foods grown on the farm, it should not be used more freely than is necessary.

Separated milk, which meatmeal replaces, is used according to its availability, pigs sometimes receiving milk as their sole diet, but pigs will thrive on small quantities of milk used in combination with grain and other foods such as pumpkins and sweet potatoes; the milk supplies a part of the protein necessary to balance the ration. Each pig from weaning until baconer stage and each dry sow should receive a minimum of three-quarters of a gallon of separated milk daily, and each sow with a litter double that quantity.

When these minimum quantities of separated milk are not available, meatmeal may be substituted, using about ½ lb. of meatmeal to replace each three-quarters of a gallon of separated milk.

Pigs thrive on a mixture of milk and meatmeal, or meatmeal alone as the protein-rich portion of the diet. The quantities used should not exceed from ¼ to ½ lb. daily per pig from weaning to baconer stage, according as to whether good lucerne is available or not; and ½ lb. for each dry sow and 1 lb. daily for each sow with litter.

By feeding a constant quantity of separated milk or meatmeal, and increasing the grain and other foods according to the pig's appetite, the nutritive ratio is widened automatically as the pig grows and satisfies its requirements.

In cases where pigs have access to good young pasture or green crops, the minimum quantity of separated milk or meatmeal stated above may be reduced by up to 50 per cent., depending on the quality of the green foods.

Meatmeal may be fed dry or mixed with milk or water.

Name and Address.	Name of Hatchery.	Breeds Kept.
G. Adler, Tinana	Nevertire ..	White Leghorns, Australorps, Rhode Island Reds, and Langshans
F. J. Akers, Eight Mile Plains ..	Elmsdale ..	Australorps
E. J. Blake, Rosewood	Sunnyville ..	White Leghorns, Australorps, White Wyandottes, and Rhode Island Reds
W. Brown, Waterworks road, Ashgrove	Strathleven ..	White Leghorns
A. F. Buchler, Milman	Pincrow ..	White Leghorns
J. Cameron, Oxley Central ..	Cameron's ..	White Leghorns and Australorps
M. H. Campbell, Albany Creek, Aspley	Mahaca ..	White Leghorns and Australorps
J. E. Caspaney, Kalamia Estate, Ayr	Evlington ..	White Leghorns
J. L. Carrick and Son, Manly road, Tingalpa	Craigard ..	White Leghorns and Australorps
N. Cooper, Zillmere road, Zillmere	Graceville ..	White Leghorns
R. B. Corbett, Woombye ..	Labrena ..	White Leghorns and Australorps
T. G. Crawford, Stratford, via Cairns	Rho-Isled ..	Rhode Island Reds
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme ..	Australorps, White Leghorns, and Rhode Island Reds
O. M. Dart, Upper Brookfield ..	Woodville ..	Australorps, White Leghorns, Langshans, and Rhode Island Reds
Dixon Bros., Wondecla ..	Dixon Bros. ..	White Leghorns
F. G. Ellis, Old Stanthorpe road, Warwick	Sunny Corner ..	Australorps
Elks and Sudlow, Beerwah ..	Woodlands ..	White Leghorns and Australorps
B. E. W. Frederich, Oxley road, Corinda	Glen Albyn ..	Australorps
W. H. Gibson, Manly road, Tingalpa	Gibson's ..	Australorps and White Leghorns
Gisler Bros., Wynnum ..	Gisler Bros. ..	White Leghorns
G. Grice, Loch Lomond, via Warwick	Kiama ..	White Leghorns
J. W. Grice, Loch Lomond, via Warwick	Quarrington ..	White Leghorns
Mrs. M. Grillmeier, Mount View, Milman	Mountain View	Australorps, Minorcas, and Rhode Island Reds

Name and Address.	Name of Hatchery.	Breeds Kept.
C. and C. E. Gustafson, Tannymorel	Bellevue ..	Australorps, White Leghorns, and Rhode Island Reds
P. Haseman, Stanley terrace, Taringa	Black and White	Australorps and White Leghorns
C. Hodges, Kuraby	Kuraby ..	White Leghorns and Anconas
H. Hufschmid, Ellison road, Geebung	Meadowbank ..	White Leghorns, Brown Leghorns, Minorcas, Australorps, and Rhode Island Reds
S. W. Kay, Cemetery road, Mackay	Kay's	White Wyandottes, Light Sussex, Rhode Island Reds, Australorps, White and Brown Leghorns
F. W. R. Longwill, Birkdale ..	Nuventure ..	Australorps and White Leghorns
J. McCulloch, Whites road, Manly	Hindes Stud Poultry Farm	White Leghorns, Brown Leghorns, and Australorps
W. S. MacDonald, Box 208, Babinda	Redbird ..	Rhode Island Reds and Anconas
F. McNamara, Vogel road, Brassall, Ipswich	Frammara ..	White Leghorns and Australorps
A. Malvine, junr., The Gap, Ashgrove	Alva	Australorps and White Leghorns
H. L. Marshall, Kenmore ..	Stonehenge ..	Australorps and White Leghorns
W. J. Martin, Pullenvale ..	Pennington ..	Australorps, White Leghorns, and Langshans
C. Mengel, New Lindum road, Wynnum West	Mengels ..	Australorps
J. A. Miller. Racecourse road, Charters Towers	Hillview ..	White Leghorns
F. S. Morrison, Kenmore ..	Dunglass ..	Australorps, White Leghorns, and Brown Leghorns
Mrs. H. I. Mottram, Ibis avenue, Deagon	Kenwood Electric	White Leghorns
J. W. Moule, Kureen	Kureen ..	Australorps and White Leghorns
D. J. Murphy, Marmor ..	Ferndale ..	White Leghorns, Brown Leghorns, Australorps, Light Sussex, and Silver Campines
S. V. Norup, Beaudesert rd., Cooper's Plains	Norups ..	White Leghorns and Australorps
H. W. and C. E. E. Olsen, Marmor	Squaredeal ..	White Leghorns, Black Leghorns, Australorps, Brown Leghorns, and Anconas
A. C. Pearce, Marlborough ..	Marlborough Stud Poultry Farm	Australorps, Langshans, Rhode Island Reds, Light Sussex, White Wyandottes, Khaki Campbell Ducks, Indian Runner Ducks, and Bronze Turkeys
E. K. Pennefather, Douglas street, Oxley Central ..	Pennefathers ..	White Leghorns and Australorps
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farm	White Leghorns, Brown Leghorns, Australorps, Langshans, White Wyandottes, Rhode Island Reds
G. R. Rawson, Mains road, Sunnybank	Rawson's ..	Australorps
J. Richards, Atherton	Mount View ..	White Leghorns and Australorps
H. K. Roach, Wyandra ..	Lum Burra ..	Australorps and White Leghorns
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
S. E. Searle, New Cleveland road, Tingalpa	Tingalpa ..	White Leghorns and Australorps
A. Smith, Beerwah	Endcliffe ..	White Leghorns and Australorps
A. T. Smith, Waterworks road, Ashgrove	Smith's ..	Australorps and White Leghorns
T. Smith, Isis Junction	Fairview ..	White Leghorns and Langshans
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns

Name and Address.	Name of Hatchery.	Breeds Kept.
J. Steckelbruck, The Gap, Ashgrove	Cosy Nook ..	White Leghorns and Australorps
A. G. Teitzel, West street, Aitkenvale, Townsville	Crescent ..	White Leghorns
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkins' ..	White Leghorns and Australorps
P. and K. Walsh, Cleveland ..	Pinkland's ..	White Leghorns
W. A. Watson, Box 365 P.O., Cairns	Hillview ..	White Leghorns
G. A. C. Weaver, Atherton ..	Weaver's ..	Australorps, White Leghorns, Buff Leghorns, Wyandottes, Anconas, Indian Game, Rhode Island Reds, Barred Rocks, Buff and Black Orpingtons
H. M. Witty, Kuraby ..	..	White Leghorns and Australorps
P. A. Wright, Laidley ..	Chillowdeane ..	White Leghorns, Brown Leghorns, and Australorps
R. H. Young, Box 18, Babinda	Reg. Young's ..	White Leghorns, Australorps, and Brown Leghorns

Following is a list of new registrations received up to the 21st May, 1940:—

B. Cross, Apple Tree Creek, Childers	Spring Hill ..	White Leghorns, Australorps, and Langshans
W. Easson, Formosa road, Tingalpa	Grassdale ..	White Leghorns and Anconas

THE CHICKEN SEASON.

A large proportion of the chickens which will be hatched during the coming spring will be culled at various stages of growth, as being unsuitable for production in the future. Some of the culling may be necessary because of the parentage of the individual, but by far the greater number of culls will be due to the lack of care, attention, and feeding.

Because of the high cost of poultry food, the improper feeding of the chickens, particularly during the early days of life, is likely to be responsible for a greater percentage of culls than any other cause. Foods that are most suitable for chickens during this period are relatively costly, and efforts may be made by many to economise by substituting foods which, while they might prove satisfactory for older stock, are not entirely suited for the growth of young chickens.

Economic production is only possible from the well-grown, well-fed, and well-bred birds; consequently, it is essential to give the layer of the future a good start in life. When it is considered that growing chickens, during the first six or eight weeks, do not consume very large quantities of food, the saving that may be made by the cheapening of the ration does not reduce the first costs to any material extent.

The following table indicates the reasonable weekly food consumption for chickens of two of the most popular breeds, and the average weight that chickens might be expected to be at these periods:—

TABLE SHOWING WEEKLY FOOD CONSUMPTION AND WEIGHT OF CHICKENS.

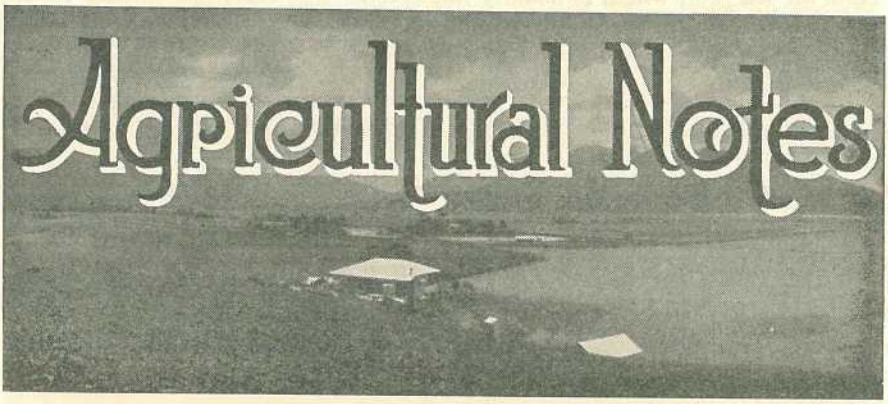
Week.	Leghorns.		Australorps.	
	Food Consumed, in oz.	Weight of Chick.	Food Consumed, in oz.	Weight of Chick.
First	1·64	1·97	1·53	2·14
Second	3·36	3·31	3·32	3·61
Third	4·80	5·31	5·05	5·84
Fourth	6·46	7·61	7·20	8·68
Fifth	7·58	9·94	6·89	12·08
Sixth	8·96	12·92	10·62	15·86
Seventh	8·65	16·65	13·95	20·17
Eighth	13·29	20·41	15·05	25·31
Total	54·74	..	63·61	..

Pounds food consumed per 100 chicks in 8 weeks—Leghorns, 342 ; Australorps, 398.

The above table indicates that it takes about 350 lb. of food per 100 to rear White Leghorn chicks to the age of eight weeks and approximately 400 lb. of food to rear Australorps to the same age. The saving of 2s. or 3s. per 100 lb. consequently makes very little difference to the cost, but it may materially and adversely affect the growth that is desired. In nutritional experiments that have been conducted at the Animal Health Station, the following rations have given most satisfactory results :—

Ration.	1–8 Weeks.	8 Weeks to Maturity.
	Lb.	Lb.
Maize Meal	40	63
Bran	20	13½
Pollard	20	13½
Meat and Bone Meal	7½	5
Dried Buttermilk	10½	3½
Salt	1	1
Cod Liver Oil	1	1
Lucerne Meal	..	2½
Crude Protein Content	17·15%	14·40%

To those who mix their own rations, a mash containing the above-mentioned ingredients is recommended. Those who prefer to buy a prepared mash should purchase none but mashes which have been made expressly for the purpose of feeding chickens and growing stock.



The Sweet Potato.

THE sweet potato is not cultivated in Queensland to-day to the extent that its usefulness warrants.

When questioned about the shortage of sweet potatoes for table use, the farmer usually replies, "There is no demand for them." This is true only in part, but the demand still exists for the right varieties. A dry floury, or a moderately moist potato, will suit the consumer best. No doubt, some of the good varieties in use in the past are not now available, owing to droughts and irregular planting, but many are still to be found in certain localities. If the planting is confined to varieties which have proved popular with the consumer, and which could be sold on name, the demand for them should be continuous. Under present conditions a householder may buy sweet potatoes which are unpalatable. If, however, consumers realised that there were different types and varieties of sweet potatoes, they would learn very soon to purchase only types which they like.

Market gardeners might, therefore, cultivate varieties for which they could readily find buyers. Some market gardeners are already doing this with good results. Very watery or stringy varieties are both undesirable. It is a mistake for a grower to allow a portion of his crop to stand over after maturing, as the tubers then begin to deteriorate in quality.

Sweet potatoes are easy to grow, and can be raised on a variety of soils, the period of growth from planting to harvesting being approximately three months. The period of planting is dependent very largely on the locality; in most parts along the coast it may extend from October until the end of February. The crop must mature before the frost commences. The crop does not require a big rainfall—in fact, excessive moisture is detrimental to good results, in that it increases the growth of vines, and lessens the crops of tubers.

The most satisfactory method is to plant a few medium-sized tubers in a nursery bed of good friable soil, which is mulched in order to retain moisture and promote rapid growth, and to pick cuttings as growth progresses. A bed of fifty selected tubers planted in this way will provide many thousands of cuttings. The alternative, and less satisfactory, method of obtaining planting material is to procure cuttings

from an old plot, which is usually neglected. The terminal cutting from the vine is generally regarded as giving the best results. The land is set up in ridges 3 feet apart. The cuttings should be 12 to 15 inches in length, and planted on the ridge to a depth of approximately 6 inches, cuttings to be set from 20 to 24 inches apart. On well-prepared soil weeds should not be troublesome, and little attention will be necessary until harvesting.

A good crop of sweet potatoes will yield 20 tons of tubers to the acre. Several of the old varieties were known by different names in various districts. A classification of all varieties grown in Australia was carried out in recent years by an officer of the Department of Agriculture and Stock, and cuttings of a known type, together with a number of new seedling varieties, were distributed in different agricultural districts of the State. Some recommended varieties for planting for table use are Gold Coin, Seedling No. 3, Brook's Gem, and Snow Queen.

It is advantageous to the grower to market the tubers in a clean and attractive condition.

PROTECT THE POTATO CROP AGAINST IRISH BLIGHT.

Irish blight is a disease which is well known to most experienced potato and tomato growers. Black, water-soaked areas of decay make their appearance on leaves and stalks during cool, showery weather. These will become dry and papery if there is a dry change, but when rain or misty weather continues the disease will rapidly spread until the whole of the foliage becomes blighted and the plant dies to the ground. The disease may pass down the underground stems and infect the tubers, or these may be infected direct through exposed surfaces before or after digging. The symptoms in the tuber consist of a sunken and darkened condition of the skin, beneath which is a varying area of brown decay extending into the flesh. When stored under moist conditions, affected tubers may rot completely.

The development of this disease is closely bound up with weather conditions. The causal agent is a fungus which, in Queensland, is unable to grow during the warm summer months. Hence, blight only appears during the late autumn, winter, and spring. The fungus is also dependent on moist, showery weather for the production of its delicate spores and its rapid development and spread. It is for this reason that the disease is sporadic in its appearance, and varies in severity with the nature of the season.

The fact that Irish blight is not serious every year tends to make many farmers somewhat lax in regard to doing anything for the control of the disease. There is, however, a definite risk attached to this attitude, and potato growers are strongly advised to give serious attention to the control measures outlined below.

Spray the plants thoroughly with Bordeaux mixture. Commence when the plants are young, before the disease becomes well established, and repeat the application during the growth of the crop so as to keep the foliage well covered. About three applications during a dry season and five during a wet one are usually sufficient. Plants should not be sprayed when they are wilting from want of water, as some spray burn may result.

The spray should be made up at the strength of 4 lb. bluestone and 4 lb. hydrated lime to 40 gallons of water. Approximately 150 gallons of spray are required for 1 acre of fair-sized plants. Spraying can be carried out with a knapsack pump, but a larger outfit, such as a barrel pump, is more convenient for treating large areas. Directions for preparing Bordeaux mixture may be obtained on application to the Department of Agriculture and Stock.

FARM WATER SUPPLY.

It is extremely important that the supply of water on the dairy farm should be of pure quality and sufficient for requirements. Many farmers fail to realise that a contaminated water, if used for washing the cows' udders, the hands of the milker, or the utensils, may result in dangerous bacterial infection of the milk or cream. If cows and other stock are allowed access to foul or polluted water, not only will they wade, collecting unclean bacteria on the coat and udder, but they will drink it if a good fresh and pure supply is not available in adequate quantity, and in this way the spread of disease will be increased. The average milking cow is estimated to need 12-15 gallons of drinking water daily—this amount may not be sufficient in summer or in the case of heavy milkers —and experiments have proved that where cows have been allowed unlimited fresh drinking water, the milk yield has shown an increase.

Deep well water, provided it is not heavily mineralised, is the most satisfactory type of supply, for coming from far below the surface it is usually very pure and has the advantage of a low temperature all the year round. This is especially useful for cooling purposes in the dairy.

Shallow wells may yield a good quantity of water which is usually soft, but it is frequently impure owing to its proximity to the surface; surface rain water cannot receive sufficient filtration through the soil layers by the time it reaches the shallow well level to free it completely from contamination. Pollution from surface drainage is commonly found in shallow well water, but this does not mean that it cannot be made use of on the dairy farm. It does mean, however, that either chemical sterilization or boiling must be resorted to in order to purify it.

Tank water is the most common form of supply on Queensland farms, and in comparatively dust-free areas this water may be of a high standard of purity, but this is not always so, for where much dust settles on roofs or after a dry spell, the water is bound to wash off a great deal of sediment and with it undesirable bacteria. This applies especially to tanks attached to the milking bails, for water collected from these roofs is liable to be contaminated with manure dust and particles blown from the stock yard, making it unsuitable without treatment for dairy purposes. The practice of rinsing clean cans on their return from the factory with such cold, untreated water has been known to contaminate them seriously; instead they should be thoroughly scalded out with boiling water and allowed to drain dry.

Farm water treatment must be simple and cheap, and two methods are recommended.

(1) *Boiling.*—For washing dairy utensils, the water must be pure, and boiling is the simplest method of purifying a suspected supply. If water is brought up to the boil (210 deg. to 212 deg. F.)

the bacteria causing ropiness and other faults will be destroyed, together with coliform (dung) types and disease organisms. Every farmer should provide himself with a dairy thermometer so that he can check temperatures, for the correct heating of water and utensils and cooling of milk and cream are essentials in successful dairy management.

(2) *Chlorination.*—Sterilization of water by means of some chlorine compound is quite satisfactory provided the right amount is used. A quantity giving 1 *part of chlorine in* 2,000,000 *parts of water* will sterilize any ordinary supply, leaving no excess. Where cloudiness or sediment are present, as may be the case if tanks are not cleaned, or with shallow well water, a larger amount of the compound may be needed than with a clear water, but care must be taken not to overdose with this powerful chemical since any excess will cause a bad taint in milk and cream. Addition of the chemical to water in the tank once a week, and after rain, should serve to keep the supply in good condition.

The periodic cleaning out of all water tanks is essential to maintaining a pure supply, and should not be neglected.

GROW MORE FODDER CROPS.

Every year, producers in the Maranoa and Western Darling Downs districts are confronted with the difficulty of maintaining the condition of stock during the winter months, when pastures are short and harsh. There is only one way out, and that is to take advantage of the better types of soil available and grow fodder crops—not in a haphazard, casual way, but by using a system by which land is given a fallow period prior to the planting of each crop.

The recent bountiful rains throughout these districts provided an opportunity for making a commencement with a fodder programme, and, in view of the erratic seasonal conditions usually encountered, every advantage should be taken of the moisture now in the ground. Many settlers have winter crops—such as wheat, oats, or barley—germinating now, and an excellent practice, particularly after the heavy rains experienced, is to give the crop a light harrowing as soon as the plants have a good hold in the soil. This should be done at right angles to the direction of sowing to check weed growth, prevent evaporation, and give plants a better chance to stool.

Following planting and harrowing, attention should be given to land intended for summer fodders such as Sudan grass, sorghums, Japanese millet, and cowpeas. There is every temptation to utilise every acre of available cultivation for sowing winter crops. In the very rare years when good winters are experienced, plough and plant methods may work out to some advantage, but far better results, on the average, will be obtained if a systemised cropping programme—including rotation of crops and fallowing—is adopted. Wherever possible, therefore, land which has not been prepared for winter crops should be ploughed and left in the rough state for early spring planting. In this way, moisture at present in the ground will be retained, and even light rains in spring will permit planting at that time. Apart from moisture conservation, the aeration of soil by fallowing oxidises plant foods and makes them more readily available to the growing crop.

Some Tropical Fruits.

THE WOOLMI.

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

THIS fruit is one of the most popular and most widely used of the native fruits of North Queensland. Botanically it is known as *Antidesma dallachyanum*, the specific name commemorating Mr. J. Dallachy, an early day naturalist of North Queensland, by whom it was first collected. It belongs to the family Euphorbiaceae. The common name "Woolmi" which is used here is the name given to the fruit by the aborigines of the Rockingham Bay district, where it was first discovered. This name appeals as being more applicable than the names "Wild Cherry" or "Herbert River Cherry" frequently used.

The Woolmi is a small tree, seldom growing more than 25 feet high. Under natural conditions it occurs on the fringes of the rain forests, or close to the banks of creeks or lagoons, in parts of the North Queensland coast, where the rainfall is not so heavy as that of the wettest regions. It appears to have a preference for a well-drained alluvial soil. As a garden tree it is of shapely habit, but, under conditions of natural growth, it is frequently ragged in shape and spindly of growth by reason of the smothering effect of taller growing trees overshadowing it. The foliage is very deep green on the upper surface, and bright green on the lower surface of the leaves. Young leaves are only slightly pubescent and the mature foliage is almost or quite glabrous. The leaf is rather thick and leathery to the touch.

The fruit is sometimes solitary, but is more frequently in clusters of four or more on racemes 3 or 4 inches in length. The individual fruits vary from about ½ to 1 inch in diameter, and from cream with a rose red cheek to a dark purple red in colour when ripe. Both size and colour vary on different trees. The darker coloured fruit is usually more luscious and sweeter than the light coloured fruit.

The seed is small, 3/16 inch to ¼ inch in diameter, with a thick, hard shell. It germinates readily in the seed-bed in eight to ten weeks. The young seedlings may be transplanted without difficulty. Growth is fairly vigorous, and by the time the young tree commences to bear at about six years of age, it will have reached a height of about 8 feet. Sometimes two crops are borne in a season, but one is the usual setting. The trees blossom for the main crop during December, January, and February. The flowers are borne numerously in racemes which arise chiefly from spurs on the smaller branches and twigs. About forty

Plate 153.
THE WOOLMI (Stephens).

minute greenish flowers are contained in a spike. Fruit from this flowering is ripe between April and late July, some trees being early maturing, others late. The secondary crop is produced from a small flowering in September, and is ripe at the time the trees are in bloom for the main crop.

The fruit may be eaten fresh, but is more frequently used in preserves. Following are some of its uses: —

Woolmi Conserve.—Place the fruit in a preserving-pan and barely cover with water. Boil until the fruit is tender (about a quarter of an hour). Then add one cup of sugar for each cup of fruit and boil until it jellies. Short boiling before the sugar is added produces a conserve of light colour with tender, transparent fruit. Long first boiling makes the fruit tough and the finished product dark in colour.

Woolmi Sauce.—Six lb. woolmi, 1 lb. light brown sugar, 2 lb. vinegar, 1 teaspoon cayenne pepper, ½ tablespoon salt, ½ oz. cloves, ½ oz. allspice, small handful white ginger, well bruised. Put all the ingredients into a preserving-pan and bring slowly to the boil. Boil well and then strain through a colander. Bottle when cold and seal airtight.

Woolmi Wine.—Put about 6 quarts of ripe cherries in a dish and cover with boiling water. Set aside for eight to ten days, stirring the fruit well each day. Then strain and add sufficient water to make 1 gallon of liquid. Add 4 lb. sugar, and, when dissolved, bottle the liquor and tie a piece of muslin over the mouth of each bottle. Put aside in a cool, shady place, and after three months cork the bottles. The wine improves with keeping.

TOMATOES IN FROST-FREE AREAS.

The tomato does well on several types of soils in the North and South Coast districts provided they are well drained, although a rich loamy soil is preferable. The plants should be well supplied with plant foods, but should not be too liberally treated with nitrogen, which will tend to produce a large plant throwing late fruit. Fertilizers should be rich in phosphoric acid and potash, with just sufficient nitrogen to produce a good but not over-luxuriant growth. A complete fertilizer can be made up as follows:—

420 lb. Sulphate of ammonia
700 lb. Superphosphate
560 lb. Bonedust
560 lb. Sulphate of potash

2,240 lb. (used at the rate of from 3 to 5 cwt. per acre).

The method of planting will be determined by the system of training to be adopted. Where trellising or staking is to be practised, the rows may be 3 feet apart, and the plants in the rows from 15 to 18 inches apart. The rows should, if possible, run north and south. When not staked or trellised, the rows require to be at least 4 to 6 feet apart and the plants 4 feet apart in the rows.

The tomatoes may be trained on a trellis or staked. In the latter instance, stakes 5 feet long are driven into the ground alongside each plant when they are about 1 foot in height. As the plant grows, the lateral growth produced from the axils of the leaves is removed. Further growth is thus limited to single or double stems, which are tied to the stakes at intervals.

Pruning tends to promote the formation of flower clusters and the setting of fruit. When several flower clusters have been produced, the leader or leaders are checked at one or two leaves above the last flower cluster.

The plants should receive regular attention, and lateral growth should be restrained until it is time to check the leaders. In this way the energies of the plants are directed towards the growth and maturing of the fruits and the tendency to shed first blossoms and fruit is reduced.

Trellising or staking, together with pruning, permits the maximum amount of light and air to reach the plants, thus decreasing their susceptibility to disease.

MARKETING CAULIFLOWERS.

Cutting.—There should be no difficulty in marketing cauliflowers to the best advantage. The main stalk is cut a short distance below the base of the leaf stalks. This short length of stalk gives protection and prevents the leaves from breaking away. All first quality cauliflowers should be marketed with the leaves intact, as this prevents the heart from being damaged in transit.

Containers.—A clean chaff sack is the best container, being light and airy. Corn sacks, unless new, are usually unsuitable.

Packing.—The cauliflowers should be packed with the leaves brought together to protect the heart. This assists in preventing bruising and discoloration, keeping the heart white and attractive and in a fit condition to sell at high values.

Grading.—First and second quality cauliflowers should be packed separately. Each bag should contain as near as possible cauliflowers of the same size and quality. Mixed sizes do not sell as well as graded. Any cauliflowers showing leaf damage should be packed as second grade.

Branding.—Where possible, markings should be placed on the bags before filling. Stencils suitable for doing this are easily procured, and save time. The grower's name, or mark, and the number of cauliflowers in the bag should be conspicuously placed on the side of the bag. This makes identification easy, and often saves unnecessary handling.

Packed bags should not be used as a seat when carting cauliflowers.

SELECTING NEW BANANA AREAS.

With the coming of winter, intending banana-growers would be well advised to give serious consideration to the selection of the areas shortly to be felled for the 1940 planting.

Of late years, bananas have been grown extensively and fairly successfully on inferior forest country, but, in most instances, a suitable aspect, assisted by good cultural methods, has been the chief factor in success.

The best aspect, of course, is the north-east or northerly slope, with standing timber on all four sides to give the necessary shelter from strong winds, and these aspects ensure the maximum amount of winter sunshine.

With sites facing any further into the east than north-east, great care should be taken that, as far as possible, the area is sheltered from the cold south-east winds. An efficient breakwind on the south side of an easterly patch should, therefore, be provided for in the clearing plan. The site chosen should be so situated that tall timber or hills at the top of the proposed area will not shut out the winter sun at an early hour.

A north-westerly slope is preferable to south-east, south, or south-westerly slopes, if heavy belts of timber block the strong westerly winds. Many good bananas have been grown on westerly slopes of this description, chiefly because the areas in question receive the sun during the whole of the afternoon.

All southerly slopes should be definitely avoided, more particularly if there is open country for any distance around the proposed area. Much more timber will have to be felled than actually required for planting, to obviate the long shadows which standing timber at all close to the patch throw over the plantation. The limited period during which they are exposed to the sun is the chief objection to all southerly slopes.

A good warm-slope plantation will produce from two to three bunches to every one on the cold-slope areas. Production costs, particularly to the grower on leased ground, enter so largely into the picture that intending growers with a choice of ground should always choose a warm situation to gain the best results.

TENDING BANANAS AFTER RAIN.

After the monsoonal rains of the late summer, banana plantations will commonly be very dirty with weeds and, consequently, growers will then have to set about generally cleaning up their areas. Furthermore, the heavy rains will have had a leaching action on soils, particularly those of a porous nature on hillsides, and soils low in soil organic matter, and it is therefore wise also to give a dressing of fertilizer at this cleaning up time. In the October, 1939, number of *The Queensland Agricultural Journal* there appeared an article dealing with the root distribution of the banana. This article included a number of diagrams and photographs which showed very clearly that the roots of the typical banana plant are much more extensive, and penetrate the soil to a greater depth than is commonly supposed. One example shows, in the absence of a clay subsoil, a large number of roots more than 4 feet from the base of the plant and 12 to 18 inches below the surface. The other examples make it clear that the depth to which the roots will penetrate depends very largely on the depth to which the soil overlies any clay or other impervious subsoil. Taking into account this and other information given in the article referred to, it is obvious that unless the soil is a very shallow one overlying an impervious subsoil, it is advantageous to chip weeds deeply, and so ensure the destruction of the weeds and, at the same time, influence the roots of the banana to penetrate more deeply into the soil. The mere shaving of weeds at the surface of the soil or but slightly deeper is not really efficient and should be avoided.

The data given in the article shows that the roots of the banana will extend to at least 5 feet laterally from the corm, and from this it can be appreciated that when fertilizer is being applied it is advisable to broadcast it over most of the plantation and not to confine its spread to a small area close to the plant. When small suckers are to be fostered, it may, of course, be beneficial to throw a little extra material fairly close to their base.

WINTER ACTIVITIES IN THE ORCHARD.

Clean up all orchards and vineyards, destroy all weeds and rubbish around the trees likely to harbour pests of any kind, and keep the surface of the soil well stirred, so as to give the birds and predacious insects every chance to destroy any fruit fly pupæ which may be harbouring in the soil. If this is done, many pests that would otherwise find shelter and thus be able to live through the winter will be exposed to both natural enemies and cold.

Pruning may be started on fruit trees which have shed their leaves, as it is a good plan to get this through as early in the season as possible instead of putting it off until spring. Early-pruned trees develop their buds better than those pruned late in the season. These remarks refer to trees—not vines. The later vines are pruned in the season the better in the Stanthorpe district, as the late-pruned vines stand a better chance of escaping injury by late spring frosts. All worthless, badly-diseased, or worn-out trees which are no longer profitable, and which are not worth working over, should be taken out and burnt, as they are both valueless and a harbour for pests.

Land intended for new orchards should be got ready soon and its preparation should be thorough. All stumps and roots should be removed to a depth sufficient to ensure their not impeding cultivation. The preliminary cultivation should consist of a light ploughing of a depth sufficient to turn the weeds or grasses so that their roots are exposed, followed by cross ploughing and harrowing, whereby light roots, &c., are collected and removed. When perennial weeds, of which couch grass is a fair sample, are eliminated, the land should be ploughed and cross ploughed as deeply as possible, and the soil reduced to a fine tilth. Where subsoiling can be practised, it is a decided advantage in admitting root penetration and conservation of moisture.

THE WALNUT.

Walnut trees grow well in the cooler parts of Queensland where there is a plentiful water supply and deep and well-drained soil. The trees are ornamental and shady, and there is a good demand for the nuts. The trees should be planted in August or September about 30 feet apart. For a few years after planting, all the training necessary is to cut out crossing limbs and to top the most vigorous shoots in order to form a well-balanced tree; subsequently little pruning is necessary. Seedlings may be raised in a nursery bed and planted out when twelve months old, but as these may take many years to come into bearing and may not bear large crops of good nuts, it is more satisfactory to buy worked trees of tested varieties (Wilson's Wonder, Freshford Gem, and Franquette are recommended). The nuts fall to the ground when ripe, and to prevent losses by rotting should be gathered frequently and properly dried before bagging. Nuts to be used for seed should be gathered as soon as they have fallen from the tree, and soaked in water for a week just before planting. The best time to plant the seed is about the middle of July.

The Fruit Market.

JAS. H. GREGORY, Instructor in Fruit Packing.

WINTRY conditions have slowed up fruit consumption. Prices are being affected to a small degree, but the usual tendency is a slow rise after any substantial fall. With the coming of cooler weather, tropical fruitgrowers are advised to be more careful in the matter of the maturity of their market consignments. Fruit should be left to develop to greater degree of ripeness. Pineapples, papaws, and custard apples intended for the Southern markets are difficult to ripen satisfactorily at any time, but during the southern winter it is practically impossible to ripen backward fruit satisfactorily. Growers take no risk by allowing their fruit to develop before consignment. At present, far too much green fruit, especially papaws, is under offer. Citrus growers, too, are inclined to take similar market risks, and prices fell sharply after early consignments were received. At the time of writing, however, orange prices were improving. Strawberries are coming on to the market, and the demand for good quality fruit is strong. The quality of apples has much improved.

Average prices for May were:—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Smalls, 12s. 6d. to 20s.; Sixes, 18s. to 22s.; Sevens, 18s. 6d. to 23s. 6d.; Eights, 22s. to 24s.; Nines, to 24s. 6d.

Bunch bananas, 1½d. to 9½d. dozen.

Lady Fingers, 3d. to 8½d. dozen.

Sydney.—Cavendish: Sixes, 12s. to 22s.; Sevens, 22s. to 26s.; Eights and Nines, 25s. to 28s.; prices showing a tendency to ease.

Melbourne.—Cavendish: Sixes, 18s. to 21s.; Sevens, 21s. to 23s.

Newcastle.—Cavendish: Sixes, 22s. to 23s.; Sevens, 24s. to 25s.; Eights and Nines, 26s. to 29s.

Adelaide.—Cavendish: 25s. to 34s. per tropical case.

Pineapples.

Brisbane.—Smoothleaf, 4s. to 8s.; specials, to 8s. case; 1s. 6d. to 6s. per dozen. Roughs: 4s. to 7s. per case; 1s. to 3s. dozen.

Sydney.—7s. to 12s.

Melbourne.—9s. to 12s.; specials, to 14s.

Adelaide.—17s. to 19s.

Newcastle.—9s. to 13s.

Papaws.

Brisbane.—Yarwun, 6s. to 9s. tropical case; Gunalda, 3s. to 5s. bushel; Locals, 2s. to 3s. bushel.

Sydney.—8s. to 15s. tropical case.

Melbourne.—10s. to 14s.; special ripe, higher.

Newcastle.—10s. to 12s.

Custard Apples.

Brisbane.—3s. to 4s. half-bushel.

Sydney.—3s. to 8s. half-bushel.

Melbourne.—7s. to 10s. half-bushel.

Monstera Deliciosa.

Brisbane.—3s. to 4s. dozen; demand slow.

CITRUS FRUITS.

Oranges.

Brisbane.—Navels, 7s. to 10s.; Commons, 4s. to 7s. bushel.

Mandarins.

Brisbane.—Emperor, 3s. to 8s.; Glens, 6s. to 10s.; Scarlets, 5s. to 7s.; Fewtrell, 3s. to 6s.

Sydney.—Queensland Emperor, 6s. to 9s.; Glens, 10s. to 13s.

Melbourne.—Queensland Emperor, 8s. to 10s.; Glens, 10s. to 13s.

Lemons.

Brisbane.—4s. to 6s.; specials, to 11s. bushel.

Sydney.—10s. to 14s.

Melbourne.—10s. to 16s. bushel.

Grape Fruit.

Brisbane.—5s. to 8s. bushel.

Sydney.—5s. to 10s. bushel.

Melbourne.—6s. to 12s. bushel.

Tomatoes.

Brisbane.—Ripe and coloured: 6s. to 8s.; small sizes, lower; Green: 3s. to 5s.; slow of sale.

OTHER FRUITS.

Passion Fruit.

Brisbane.—9s. to 11s.; second grade, 6s. to 7s. half-bushel.

Sydney.—8s. to 10s. half-bushel.

Melbourne.—6s. to 12s. half-bushel.

Avocadoes.

Brisbane.—5s. to 7s. half-bushel.

Sydney.—7s. to 10s. half-bushel.

Melbourne.—8s. to 10s. half-bushel.

Rosellas.

Brisbane.—2s. to 3s. 6d. sugar-bag.

Ginger.

Melbourne.—6d. to 7d. lb.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Jonathan, 8s. to 10s.; Granny Smith, 10s. to 13s.; Cleopatra, 6s. to 9s.; French Crab, 6s. to 8s.; Delicious, 8s. to 11s.; Scarlets, 6s. to 8s.

Pears.

Brisbane.—Beune Anjou, 8s. to 9s.; Glou Morceau, 8s. to 11s.; Packham's Triumph, 6s. to 9s.; Winter Cole, 9s. to 13s.; Winter Nelis, 8s. to 11s.

VEGETABLES (Brisbane prices unless otherwise stated).

Cabbages.—3s. to 5s. dozen; small, lower.

Cauliflowers.—Prime, 7s. to 11s. dozen; others, 2s. to 6s. dozen.

Beans.—Brisbane, 2s. to 8s. sugar-bag; Sydney, 5s. to 8s. bushel; Melbourne, 7d. to 8d. lb.; Newcastle, 5s. to 7s. bushel.

Peas.—Brisbane, 5s. to 10s. sugar-bag; Melbourne, 4d. to 6d. lb.

Pumpkins.—Brisbane, 4s. to 5s. bag; Sydney, 4s. to 8s. bag; Melbourne, £9 to £10 ton.

Lettuce.—6d. to 1s. 6d. dozen.

Rhubarb.—1s. to 1s. 6d. bundle.

Beetroot.—3d. to 9d. bundle.

Carrots.—3d. to 1s. bundle.

Parsnips.—6d. to 1s. 6d. bundle.

Chokos.—3d. to 9d. dozen.

Marrows.—1s. to 4s. dozen.

South Australian Celery.—14s. to 17s. crate.

Local Celery.—1s. to 2s. bundle.

English Potatoes.—4s. to 6s. sugar-bag.

POTATO GRADE.

Grade standards for potatoes were issued a few months ago by Regulation under "*The Fruit and Vegetables Acts,* 1927 *to* 1935." An additional grade has been approved as follows:—

"New" potato grade shall consist of potatoes which comply with the standard of No. 1 grade, except that they shall not have a mature skin, and shall be not less than 3½ oz. in weight.

No. 1 grade, mentioned above, is as follows:—

No. 1 grade shall consist of sound potatoes which shall have similar varietal characteristics and a mature skin; they shall be reasonably free from second growth, decay, mechanical injury, and greening from exposure, dirt, and other foreign matter, and from damage caused by disease, sunburn, or insects, and shall be not less than 3 oz. in weight.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society, and the Jersey Cattle Society, production charts for which were compiled during the month of April, 1940 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORNS.				
MATURE COW (STANDARD, 350 LB.)				
Model 2nd of Alfa Vale	W. H. Thompson, Alfa Vale, Nanango	16,531·9	732·233	Reward of Fairfield
Boah Peak Melba (242 days)	Mrs. E. E. Bruggemann, Boah Peak, Silverleigh	10,791·85	443·554	Glenroy Royal
Navillus Vera 5th	C. O'Sullivan, Navillus, Ascot, Greenmount	9,747·5	371·811	Alfa Vale Re Nell
SENIOR, 4 YEARS (STANDARD, 330 LB.).				
Navillus Violet 4th	C. O'Sullivan, Navillus, Ascot, Greenmount	9,528·2	428·234	Alfa Vale Re Nell
SENIOR, 3 YEARS (STANDARD, 290 LB.).				
Gem 7th of Alpha Vale (365 days)	W. H. Thompson, Alfa Vale, Nanango	14,649·7	721·232	Alfa Vale Red Prince
Alva Glen Pet	G. H. Knowles, Alva Glen, Nanango	10,780·35	413·47	Master of Cedar Grove
JUNIOR, 3 YEARS (STANDARD, 270 LB.).				
Trevor Hill Picture (193 days)	W. Henschell, Yarranvale, Pittsworth	8,659·36	350·94	North Glen Emblem
SENIOR, 2 YEARS (STANDARD, 250 LB.).				
Gem 10th of Alfa Vale	W. H. Thompson, Alfa Vale, Nanango	14,246·25	540·764	Reward of Fairfield
Ehlma Park Pearlie (229 days)	N. Bidstrup, Ehlma, Warra	6,904·56	349·308	Alfa Vale Peter
Ehlma Park Mona	N. Bidstrup, Warra	8,061·62	322·388	Mount Blow Monash
Rhodesview Nancy 23rd	W. Gierke and Sons, Rhodesview, Helidon	7,641·78	308·328	Rhodesview Red Knight
Highfields Beauty 4th	J. A. Heading, Highfields, Murgon	7,537·65	284·447	Greyleigh Legend
Ashstead Fancy	H. Seiler, Redbank Creek, Gatton	6,375·96	260·794	Mountain Home Blossom's Royal
JUNIOR, 2 YEARS (STANDARD, 230 LB.).				
Alva Glen Maiden	M. Bishop, Glengowrie, Maidenwell	9,411·25	413·358	Cedar Grove Master
Oakvale Red Mona	C. O'Sullivan, Navillus, Ascot, Greenmount	7,727·3	347·44	Chatham of Raleigh
Blacklands Fairy 21st	A. Pickels, Wondai	7,136·25	316·393	Sultan 2nd of Blacklands
JERSEY.				
SENIOR, 2 YEARS (STANDARD, 250 LB.).				
Lermont Kitty	J. Schull, Lermont, Oakey	7,955·75	437·028	Woodside Golden Volunteer
JUNIOR, 2 YEARS (STANDARD, 230 LB.).				
Lermont Golden Kate	J. Schull, Lermont, Oakey	5,761·25	306·929	Woodside Golden Volunteer
Ladybird of Peeramon	A. H. O. Koppen, Peeramon	5,490·75	277·367	Trinity Segunda's Prince
Meadowvale Marlene	Young Bros., Kingaroy	4,510·69	272·709	Kathleigh Standard

The Young Farmer

INTERSTATE COMPETITION.

Particulars of an Interstate Competition for teams of club members are:—

1. A Team will consist of six members, one of whom will be the Team Leader. The Team Leader to be selected by the respective Team Manager.

2. The competition will be divided into Sections. Sections A and B are designed to ascertain the stock knowledge of competitors, Section C agricultural or horticultural knowledge, or knowledge of animal huhbandry, whilst Section D takes the form of an intelligence test of powers of observation.

COMPETITION.

Section.		Points.
A.	One member to describe the appearance of a good dairy cow, and demonstrate. Time allowed, 10 minutes ..	12
B.	One member (not the member who took part in Section A) to enter cattle judging competition, in which three Jersey cows are to be placed in order of merit and their points and faults described in writing on the card provided. Time allowed, 15 minutes	20
C.	Four members (not members who took part in Section A or Section B) to give an instructional or demonstrational lecture on some phase of agricultural or horticultural work or animal husbandry (excluding dairying) of his own choosing. Each member to work individually. Time allowed, 5 minutes each member	48
D.	Each member to visit one of the following sections of the Show and prepare an address describing the important features of the section visited. Each team to decide amongst itself which boy is to visit which section, but not more than one member of a Team to visit the same section. Addresses may not be read, but reference may be made to notes. The Sections:—Court of the Department of Agriculture, Junior Farmers' Exhibit, Metropolitan Meat Industry Board, Agricultural Implements, Poultry Pavilion, Districts Exhibits, Pig Pavilion, Bacon Exhibits, Farrer Wheat Court, Butter Exhibit, Fruit Exhibit. Time, allowed, Team Leader 10 minutes, other members 4 minutes each	20
	Total points	100

The marks obtained for all sections by each of the States are as follows:—

	Queensland.	New South Wales.	Victoria.
A.	8·0	11·0	8·5
B.	11·8	13·4	11·6
C.	43·68	34·8	30·36
D.	16·0	16·6	16·4
Total	79·48	75·8	66·86

General Notes

Staff Changes and Appointments.

Mr. T. K. Kelly, inspector of stock, Department of Agriculture and Stock, has been transferred from Ramsay to Warwick.

Messrs. F. J. Harris and J. L. F. Foran, analysts in the chemical laboratory of the Department of Agriculture and Stock, have been appointed also analysts for the purposes of the Dairy Produce Acts.

Mr. F. G. Few, analyst, chemical laboratory, has been appointed also an analyst under and for the purposes of the Fertilisers Act.

Messrs. J. W. Clancy (Maryvale), A. B. Cummings (Cairns), H. C. Scholer (Manly), H. C. Williams (Indooroopilly), H. M. Williams (Albion), A. M. Williams (Southport), and W. A. Brown (Kangaroo Point) have been appointed honorary fauna protectors and honorary rangers under the Native Plants Protection Act.

Mr. E. R. Behne, B.Sc., M.Sc.App., A.A.C.I., chief assistant mill technologist, Bureau of Sugar Experiment Stations, has been appointed mill technologist, Bureau of Sugar Experiment Stations, Department of Agriculture and Stock.

Mr. S. A. Lilliendal, Koumala, has been appointed canegrowers' representative on the Plane Creek Local Sugar Cane Prices Board, in place of Mr. C. W. Davidson, resigned.

Messrs. E. P. Noakes, R. J. Baldwin, W. Coleman, A. J. Thompson, S. D. Bolton, F. E. Eastaughffe, G. Meiers, J. W. Clayton, T. H. Coolee, and T. G. Gaydon, members of the Isis Shire Council, Childers, have been appointed honorary protectors under "*The Fauna Protection Act of* 1937."

Mr. S. L. Everist, assistant to research officer, Division of Plant Industry (Research), has been appointed assistant research officer, Agricultural Section, Division of Plant Industry (Research), Department of Agriculture and Stock.

Messrs. H. Lambert, F. C. Jorss, and R. J. Rollston have been appointed assistant inspecting cane testers for the forthcoming sugar season, with headquarters at Mackay, Maryborough, and Cairns, respectively. Messrs. Lambert, Jorss, and Rollston also have been appointed cane testers at each of the mills in their respective districts.

The undermentioned have been appointed cane testers for the forthcoming sugar season: Messrs. L. J. G. Becker (Pleystowe), C. J. Boast (Moreton), T. Breen (Inkerman), T. P. Brown (Marian), L. Chadwick (Mount Bauple), P. H. Compton (Maryborough), T. F. Corbett (Qunaba), T. D. Cullen (Gin Gin), L. G. F. Helbach (Babinda), T. Herbert (South Johnstone), J. Howard (Rocky Point), C. H. Humphreys (Racecourse), H. C. Jorgensen (Plane Creek), J. Macfie (Fairymead), S. McRostie (Tully), P. J. Phelan (Invicta), W. Richardson (Kalamia), G. Tait (Farleigh), W. Trulson (Mourilyan), R. D. Woolcock (Bingera), and V. F. Worthington (Mulgrave); Misses D. Bowder (Millaquin), E. Christsen (Proserpine), A. L. Levy (Mossman), M. A. Lyle (Pioneer), M. A. Morris (Cattle Creek), I. Palmer (Isis), E. Rowe (North Eton).

The undermentioned have been appointed assistant cane testers for the forthcoming sugar season: Messrs. R. Anderson (Kalamia), P. C. Boettcher (South Johnstone), C. Boone (Farleigh), A. Byrne (Inkerman), L. C. J. Clifton (Fairymead), W. C. Cocking (Qunaba), J. F. Emerick (North Eton), H. J. Heidke (Proserpine), J. D. Kinnon (Tully), J. Mackenzie (Racecourse), R. A. Mahoney (Pleystowe), C. M. Martin (Millaquin), G. W. Maslen (Marian), J. H. Murtagh (South Johnstone), R. D. R. Rex (Invicta), W. P. Snewin (Isis), J. Y. Taylor (Bingera), P. A. Van Lith (Plane Creek), D. Walton (Pioneer), and S. Wilson (Kalamia); Misses A. Anderson (Pioneer), F. Atherton (Moreton), K. Backhouse (Invicta), E. A. Crees (Bingera), P. G. Eadie (Tully), F. Foubister (Racecourse), N. Hooper (Fairymead), M. H. Makings (Moreton), (Mrs.) M. E. Nally (Babinda), K. M. O'Brien (Plane Creek), M. Osborne (Mourilyan), E. M. O'Sullivan (Maryborough), P. Southwick (Mulgrave), P. Thorburn (Millaquin), P. M. Watts (Proserpine), M. Whitla (Marian), and S. Wilkinson (Farleigh).

Mr. F. W. Schumann, Dalrymple Heights, has been appointed an honorary protector of fauna.

Constable W. M. McNaught, Mackinlay, has also been appointed an inspector under the Slaughtering Act.

Stallion Boards.—The following have been appointed members of stallion boards:—

Darling Downs North District Stallion Board.—J. C. J. Maunder, B.V.Sc. (Chairman), Government Veterinary Surgeon, Brisbane, W. C. Jeffery (Shirley, Miriam Vale), E. Cox (Paddington).

Darling Downs South.—A. R. Nott, B.V.Sc. (Chairman), Government Veterinary Surgeon, Brisbane, W. O. Scott (Hornet Bank, Taroom), W. Frood (Toowoomba).

West Moreton.—A. R. Nott, B.V.Sc. (Chairman), T. MacDonald (Wooloowin), D. Jackson (Teneriffe).

Wide Bay.—R. D. Chester, B.V.Sc. (Chairman), Government Veterinary Surgeon, Murgon, T. Turkington ("Wattle Brae," Pilton), H. S. Handley (Culverthorpe, Pampas).

Burnett.—R. D. Chester, B.V.Sc. (Chairman), T. Turkington, H. S. Handley.

East Moreton.—J. C. J. Maunder, B.V.Sc. (Chairman), W. O. Scott, D. Jackson.

Central Coast.—M. R. Irving, B.V.Sc. (Chairman), Government Veterinary Surgeon, Rockhampton, J. L. Bowman (South Brisbane), E. Cox.

Northern Coast.—M. R. Irving, B.V.Sc. (Chairman), J. H. Wall (Rockhampton), T. MacDonald.

Northern.—R. E. Churchward, B.V.Sc. (Chairman), Government Veterinary Surgeon, Oonoonba, T. Garrard (Woolloongabba), W. Frood.

The appointment of Mr. N. E. D. Arthur as acting inspector of stock at Tibooburra, New South Wales, has been cancelled, and Mr. F. F. Forster, inspector of stock, Tibooburra, has been appointed to be also acting inspector for Queensland.

The appointment of Mr. H. H. Griffiths as acting inspector of Stock at Habnarey Gate has been cancelled, and Mr. B. B. Brett has been appointed temporary honorary inspector of stock at Habnarey Gate.

Mr. R. D. Hogarth (Durah North, Chinchilla) has been appointed an honorary inspector of stock.

Changes have been made in the personnel of local sugar cane prices boards as follows:—

Mr. P. M. O'Connor, Clerk of Petty Sessions, Gordonvale, has been appointed chairman of the Mulgrave Local Sugar Cane Prices Board, in place of A. Anderson, Clerk of Petty Sessions, Cairns.

Mr. F. W. Blake, Clerk of Petty Sessions, Babinda, has been appointed chairman of the Babinda Local Sugar Cane Prices Board, in place of A. Anderson, Clerk of Petty Sessions, Cairns.

Mr. M. J. Waddell, Clerk of Petty Sessions, Tully, has been appointed chairman of the Tully Local Sugar Cane Prices Board, in place of C. Burchill, Police Magistrate, Innisfail.

Mr. C. R. M. Clelland, Clerk of Petty Sessions, Gin Gin, has been appointed chairman of the Gin Gin Local Sugar Cane Prices Board, in place of C. D. O'Brien, Police Magistrate, Bundaberg.

Mr. J. F. McCutcheon, Cowley, Mourilyan, has been appointed canegrowers' representative on the Mourilyan Local Sugar Cane Prices Board, in place of B. B. Ross, resigned.

Mr. D. L. Lennard, of Victoria street, Balmoral, has been appointed an honorary ranger under the Native Plants Protection Act, and an honorary protector under the Fauna Protection Act.

The planting or transplanting of maize in the Bundaberg district without a permit is now prohibited. The Bundaberg district is now a quarantine area under the Diseases in Plants Acts because of the prevalence of downy mildew disease in cane.

Mr. H. S. Iliff, previously Deputy Registrar of Brands, Department of Agriculture and Stock, has been appointed Registrar of Brands, Senior Clerk, Stock Branch, and Registrar of the Veterinary Surgeons' Board, Department of Agriculture and Stock.

Professor H. R. Seddon, D.V.Sc., of the University of Queensland, has been appointed Director of Veterinary Services, Department of Agriculture and Stock, for a period of three years.

Mr. L. D. Carey, formerly Staff Inspector, Department of Agriculture and Stock, has been appointed Chief Inspector of Stock and Chief Inspector of Slaughter-houses, Department of Agriculture and Stock.

Constable C. F. Murray, Cloncurry, has been appointed an inspector under the Brands Acts.

Mr. R. H. S. Murray, Manager of Forest Home Station, Georgetown, has been appointed an honorary inspector under the Diseases in Stock Acts, in place of Mr. L. R. Shaw, who previously held this position.

Open Season for Duck and Quail.

An Order in Council has been issued under "*The Fauna Protection Act of* 1937" providing for an open season for duck and quail in Queensland. The effect of this is to fix the open season for duck in Southern Queensland from 1st April, 1940, to 31st August, 1940, both inclusive, and for quail in Southern Queensland from 1st May, 1940, to 31st August, 1940, both inclusive; and for duck and quail in Central and Northern Queensland from 1st July, 1940, to 30th November, 1940, both inclusive. The maximum numbers which any one person may take during a period of twenty-four hours are 20 duck and 25 quail.

Egg Board.

An Order in Council has been issued under the Primary Producers' Organisation and Marketing Acts in relation to the Queensland Egg Board, which, in effect, empowers the Board to dispense with the issue of certificates to growers whose credit in the general reserve fund of the Board is less than 10s.

No Open Season for 'Possums.

The Minister for Agriculture and Stock (Mr. F. W. Bulcock) has announced the decision of the Government not to declare an open season for opossums during the present year. Although official reports indicate that opossums are fairly plentiful in some portions of the State, the oversea markets, especially those on the Continent, are in a disturbed state. Recent sales of Australian furs were unsatisfactory and large stocks are still held in London. The Minister stressed the major transport difficulties which would have to be overcome if supplies were placed on the market, and, in view of the present international position, competition would undoubtedly be poor and restricted.

It was doubtful, the Minister added, whether trappers would be recompensed for their outlay and labour should a season be proclaimed and, in all the circumstances, the decision to continue protection for the opossum throughout the present year was fully justified.

Fauna Sanctuary near Benaraby.

An Order in Council has been issued under "*The Fauna Protection Act of* 1937" declaring the property of Messrs. C., E. P., G. S., and A. C. Colyer, in the parish of Iveragh (near Benaraby) to be a sanctuary under and for the purposes of the abovementioned Act. Mr. A. C. Colyer will act as the honorary protector for the sanctuary.

Peanut Industry.

A Proclamation under "*The Peanut Industry Protection and Preservation Act of* 1939," prohibiting the removal from growers' premises of any ungraded peanuts except for delivery to the Peanut Board, has been issued. Regulations relative to the grading of peanuts also have been issued.

Council of Agriculture.

Regulations have been issued under the Primary Producers' Organisation and Marketing Acts relative to the Council of Agriculture. These are a re-issue of existing regulations, and outline the order of business and procedure at meetings of the Council. The revision has been made following the introduction of recent amending legislation.

Production of Ginger.

The Minister for Agriculture and Stock (Hon. F. W. Bulcock), in commenting on the decision of the Buderim Fruitgrowers' Association to enlist the aid of the Federal Government in establishing the ginger industry on a proper basis, drew attention to the efforts made by his Department whereby it was hoped that the production of ginger in Queensland might be stimulated.

The annual Australian requirements are approximately 3,250,000 to 3,500,000 lb., and production, which is practically limited to Queensland, amounts to about 45,000 lb.

The production of ginger in Queensland is limited at present almost exclusively to the Buderim district, and an area of only 10 acres is under crop. To meet Australian requirements and provide seed for replanting approximately 1,000 acres would require to be cultivated, and there is an area of from 700 to 900 acres of land in the Buderim district suitable for production of the crop. In addition, other areas along the coastal parts of Queensland would be definitely suitable for ginger growing. However, as the cost of production, amounting to about 4½d. per lb., would leave little margin of profit to the grower, the Minister considered that before any definite encouragement could be given to the stimulation of this industry it would be necessary to afford protection by way of duty in any endeavour made to meet Australian requirements through local production.

At present the major portion of the imported product is admitted duty-free, and a revision of the tariff in respect to this commodity would enable local growers to secure a reasonable return for their crop.

Mr. Bulcock stated that he had approached the Minister for Commerce some little time ago and sought advice as to what protection could be afforded to the ginger-growing industry by way of duty, and also whether the co-operation of the Department of Commerce could be secured in the direction of a general survey of the industry, with a view to taking such action as might be necessary to develop and stabilise it. So far no reply has been received to the request for this advice.

Buffalo Fly.

An extension of the buffalo-fly pest in the north-western area of the State has been recently reported, stated the Minister for Agriculture and Stock (Hon. F. W. Bulcock), in the course of a Press announcement.

The State Government recently made provision for the necessary finance to make an intensive survey of the infested area and to institute such measures as were found necessary to control the pest. A staff of experienced officers, under the direction of a Government veterinary surgeon, is now engaged on this work.

In order to protect the stock in districts contiguous to the present infested area a quarantine area was recently proclaimed into which stock are not permitted to enter unless they have been inspected and found free from the fly. Apparently, said the Minister, notwithstanding this provision, certain stock had been moved without permission from a property within the infested area to a clean area, and this movement is likely to have grave consequences if the stock were infested with the fly, inasmuch as it is calculated to spread the pest which it is hoped to control.

The Minister called attention to the fact that these irregular movements without permission constitute offences against the Diseases in Stock Acts, and any contravention of these Regulations must be regarded seriously. It is proposed, on the detection of these offences, to ask for drastic penalties.

In the interests of the cattle industry in Queensland, the Minister sought the co-operation of stockowners in adherence to the Regulations prescribing the issue of permits for all stock movements, and issued a strong warning against the movement of stock in the buffalo-fly area until the permission of departmental officers had been obtained.

Proposed Tobacco Leaf Board.

A ballot on the question of the formation of a tobacco leaf board, conducted by the Department of Agriculture and Stock, has resulted in the defeat of the proposal. Although 51.29 per cent. of the growers who voted gave an affirmative vote, it was less than the three-fifths majority necessary to carry the proposal .

Goondiwindi a Fauna Sanctuary.

An Order in Council has been issued under "*The Fauna Protection Act of* 1937" declaring Goondiwindi to be a sanctuary under and for the purposes of the Act.

Answers to Correspondents

BOTANY.

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

Cluster Clover.

I.B. (Bogantungan)—

The specimen is *Trifolium glomeratum*, the Cluster Clover, a native of southern Europe, now naturalised in most of the Australian States. It is an annual species of clover, and provides a palatable fodder during the late winter and spring months, but dies off on the approach of hot weather, about the middle of November. Seed is obtainable through the ordinary commercial channels and should be sown in the autumn.

Blue Panic. Tridax Weed.

R.F. (Townsville)—

The grass is *Panicum antidotale*, Blue Panic. This grass has gained considerable favour in some parts as a fodder. The weed is *Tridax procumbens*, Tridax Weed, a native of tropical America, now naturalised in most tropical countries. It is very common in Queensland along the whole coast, and we have seen it eaten by stock on a face with other plants.

Trees and Shrubs Suitable for the South Burnett. An Excellent Tree Supply Service to Farmers.

A.J.O. (Cloyna)—

Cape Chestnut (*Calodendron capense*); Crow's Ash (*Flindersia australis*); Coral Tree (*Erythrina*); Moreton Bay Chestnut (*Castanospernum australe*) (makes a good shade tree but bears seeds in great abundance, which when eaten by stock frequently cause severe gastric trouble); Camphor Laurel (*Cinnamomum camphorum*); Jacaranda (*Jacaranda mimosaefolia*); Silky Oak (*Grevillea robusta*); Currajong (*Sterculia diversifolia*); Portuguese Elm (*Celtis sinensis*); Privet (*Ligustrum lucidum*).

The foregoing are simply suggestions and are mostly obtainable through the ordinary commercial channels. Crow's Ash and Silky Oak are obtainable from the Secretary, Sub-Department of Forestry, Department of Public Lands, Executive Buildings, Brisbane. The Crow's Ash particularly is a very handsome tree and is indigenous to your locality. Other trees the Forestry Department supply are Hoop Pine, Bunya Pine, Mexican Cypress, Arizona Blue Cypress, and Mexican Pine, all of which should do well around Cloyna. The price to farmers is 5s. 6d. a dozen for plants in tubes, plus freight. The Forestry Department also has a system of sending out lots of trees of the one sort to farmers—price for tubed plants, 5s. a 100, together with cost of tubes, packing, and carriage to rail. If you want further particulars about them, we would advise your getting in touch with the Secretary of the Sub-Department of Forestry.

Regarding shrubs, following are a few suggestions:—*Habrothamnus elegans*, flowers red; *Hibiscus*—there are several sorts of Hibiscus in cultivation. If your winters are very severe, you would probably find that the syriacus or deciduous type would do better than the evergreens. *Lagerstroemia*, Crepe Myrtle, is more a small tree than a shrub and is obtainable in a variety of colours; *Abelia*, flowers pink and white; *Abutilon*, flowers red and yellow; *Brunfelsia* or *Franciscea*, the latter is the name usually used by nurserymen—flowers blue, fading to white; the mixture of blue and white flowers is rather pretty on the shrub and it is very hardy; *Cassia Candolleana*, flowers yellow; *Deutsia*, flowers white; *Dombeya*, flowers white; Oleander, flowers of various colours; there is also a variety with variegated leaves; *Murraya*, sometimes called Mock Orange, flowers white; *Raphiolepis*, Indian Hawthorn, flowers white; *Rondeletia amoena*, flowers pink; *Tecoma capensis*, flowers red. All are fairly hardy plants and should be obtainable through the ordinary commercial channels.

Rural Topics

Land Girls on the Job.

The Women's Land Army, an outgrowth of war time conditions in England where farm work is regarded more than ever as a key industry, is already justifying its organisation by the efficiency of its willing units. Some excellent tractor drivers have been turned out from the training farms, and, extraordinary as it may seem, many of the girls have shown an unexpected flair for mechanics. As a case in point, twelve girls had a three weeks' tractor course after which most of them were recommended for employment as tractor drivers capable of driving, ploughing, and setting out a normal field, while some of them were capable of doing all running repairs, including decarbonising and grinding in valves.

This represents obviously a great achievement, reflecting credit on the instructors as well as the girls who came from all sections of society. It shows, too, that women are keen on pulling their full weight in war time. Besides all that, their keenness to learn and help in the production of necessary food for the nation is a great social leveller.

Those of us who have cause to remember with affection the women of war time Britain in 1914-1918 know that our women will never be found wanting in any national emergency.

The Farmers' Feathered Friends.

One of the best controls of the plague grasshopper is the ibis, and because of this a "Spare the Ibis" campaign has been launched. The same applies to many other birds which feed on insect pests and so become a very important factor in our agricultural economy. The Government has very wisely proclaimed bird sanctuaries in every part of the State, and farmers and graziers are fully awake to the necessity of seeing that in all these places the rules of the sanctuary are observed.

The ibis particularly is of untold value in grasshopper control as every farmer in the districts threatened by the "hopper" plague last summer knows. To destroy an ibis is to reduce the effectiveness of the continuous campaign against insect pest which every primary producer has to wage.

Other valuable birds in grasshopper control are the plain turkey (which is totally protected throughout the State), starlings, and the much despised crow; but the ibis is by far the most valuable.

Grasshopper control in recent weeks has meant the saving of many crops, and in all his activities the farmer has found the ibis and other insect-eating birds very effective allies.

Drought Feeding of Sheep.

Molasses as a source of energy—and even poor-grade straw when there is a total lack of other fodder for sheep in a dry time—is recommended by the Council for Scientific and Industrial Research.

When its present investigations into stock nutritional matters and the feeding value of fodder crops are completed, the Council will draft a comprehensive drought-feeding scheme by which it will be a simple matter to select the cheapest possible rations from a number of available foodstuffs on a fluctuating market.

Molasses will have an important place in such a drought-feeding scheme because of its capacity to bind other ingredients together, its capacity to provide easily accessible energy for the sheep, and its other nutritious contents. Consequently, the nutritive value of molasses is being studied in detail.

When there is a total lack of ordinary feed, the provision of suitable energy-producing feeds is obviously a major problem in the pastoral industry, both in respect of the first cost of the foodstuffs and their transport. Conservation of fodder is, of course, the plain remedy where possible, and even poor-grade straw has about half the value of maize for this purpose. The economic feasibility of chemical treatment of straw to double its net energy value to sheep is being carefully considered.

Clydesdales Come Back.

Breeders who have kept their faith in the draught horse will yet reap their reward for their persistency in breeding and in improving the Clydesdale studs of the Commonwealth in spite of many discouragements.

Conditions have actually favoured the maintenance of high standards in horse breeding, because with a lessened demand more rigorous culling has been done.

Horses *versus* tractor is still a subject of vigorous argument wherever farmers meet in conference. The war with its power fuel limitations—both in respect of cost and supply—has, of course, altered the outlook of those who have small areas, comparatively, under cultivation. For the man farming in a small way, at present "the horse has it."

Farms as Gilt-edged Securities.

It is only in troubled times like the present that the man with money seems to realise that for real wealth—for something that is everlasting and tangible—he must go to the source of all life, the land. And that, judging from reports from all over Great Britain, is what he is doing now.

In most districts in the Old Country the demand for farms and estates of almost any size far exceeds the supply. It is not only those with money to invest, however, who are interested in good farms to-day, for there are enquiries on all hands from men who see a period of stability coming to farming, and who hope that the industry may remain stable even when the war is over.

This is the opinion of one buyer who has a mere £150,000 to invest, and which he is willing to risk in first-class agricultural and dairy farms:—"There is no question but that the public to-day realise that food-producing land is the finest gilt-edged security that it is possible to purchase."

A man like that would be welcomed everywhere in Queensland.

The British Farmers' War Effort.

By all accounts the British farmer has embarked on a great job of war work. In order to complete the ploughing up of an additional 2,000,000 acres in the first year of war, thousands of farmers have undertaken new commitments, and are adopting methods which, for one reason or another, they had been unable to undertake in peace time.

The response so far made by British farmers has been more than merely heartening; it has been an inspiring response in the face of many difficulties and handicaps, a response which has been but one of many proofs that the British people are determined to see this war through to victory for the free peoples.

The British Government, on its part, has wisely recognised that a higher level of prices will be necessary for farm products generally, and that farmers are perfectly justified in demanding a policy which the industry can follow with confidence and which will enable production plans to be laid for several years ahead. A balanced agriculture is the aim.

The British Government and the British farmer are active and willing partners in this task—a task which will ensure stability and confidence which are so essential to their war effort on the home food front.

Filling the Tin Can for Victory.

War and the canning industry promise to open up a "new market with almost unlimited possibilities for British farmers."

Canners as reported in "*The Farmer and Stockbreeder*" (England) are working at full pressure producing a huge reserve of foodstuffs for both the civilian population and the armed foces, and preparations are being made for factory extensions and for still bigger purchases at contract prices of various farm products, including peas, potatoes, carrots, broad beans, stringless beans, celery, beetroot, spinach, and almost every variety of fruit grown.

One factory alone buys the output of 3,000 acres of peas, besides other products. Yet even if the present supply of every operating canning factory were doubled, there would not be enough to meet the demand.

Negotiations are in progress between the British National Farmers' Union and the canners on the question of contract prices. It is probable that the British Government will be asked to give some form of protection to the industry, and on the farming side it will, of course, be necessary to ensure that capital so invested in specialised production will not be lost when the war is over.

Something Like a Ploughing Match.

Here are some of the details of a ploughing match in Ontario in Canada.

"The match lasted for four days and there was an aggregate attendance of more than 100,000 people. The competitors numbered over 600, including walking and riding, with horse and tractor. The visitors included the Governor-General, Lord Tweedsmuir, who himself is a no mean ploughman, and who demonstrated his prowess before an admiring throng."

We all remember the late Governor-General of Canada, who died recently, better as John Buchan, the author of many great yarns. The man who wrote books like he did *and* do a job of ploughing was the sort of man to whom we would all lift our hats.

The British Breakfast.

Experts claim that 24,000,000 rashers of bacon are consumed every day at British breakfast tables. Only a few years ago Empire bacon in the United Kingdom was notable for its absence from anything like a fair proportion of British homes. Denmark was the great provider; Sweden and other Baltic countries Holland, Poland, and other suppliers sent enormous quantities of bacon to Britain and the Empire countries were nowhere in the race.

Under present conditions Queensland pig raisers are awake to the great opportunity offered by the export trade.

Wealth in the Rubbish Bin.

Millions of tons of town refuse which go to waste in peace time are to be salvaged for the benefit of war time agriculture in Great Britain. Plans for the collection and disposal of waste have been made. The Ministry for Supply has appealed to all local authorities to turn their dust bins into a source of wealth instead of a symbol of waste. The authorities, it is pointed out, will not only serve a useful national purpose by providing an auxiliary supply of pig and poultry foods and other products, but also will add to their own revenues.

Plans also are being prepared for the greater utilisation of town refuse as a fertilizer. One farmer who farms in a very big way in the Old Country, and who uses "dust bin" fertilizer on his own farms, estimates that the rubbish of English towns amounts to 13,000,000 tons a year. This wasted fertility, he told his district farmers' club in January, could, at 10 tons to the acre, increase Britain's grain yield by 50 per cent. on a four-course rotation—manuring once in four years.

War Time Agriculture in Britain.

The British farmer is hoping that a point which is fundamental in a policy of agricultural expansion to meet war time needs shall not be overlooked by the British Government. The point is that crops must now be grown on land which, in normal times, would not pay to cultivate. This means that if crops are to be grown on marginal land, prices should be adjusted accordingly, because of the extra cost involved, as measured in terms of lower yield.

Variation in soils and circumstances must always be taken into account in any planned policy of production. In Britain, as in Queensland, or anywhere else as a matter of fact, the suitability of soils and situations for any particular crop varies. In the case of wheat, for instance, the area grown in Britain under pre-war conditions was less than two million acres—that is, the most suitable land on which wheat could be grown profitably at the prevailing prices. Accordingly, the British farmer argues that if a million more acres must be put under the plough, it must, of necessity, be on soils less suitable, and prices must make wheat a payable crop in such conditions.

It is the intention of the British Government, however, to fix prices when the time comes to ensure to farmers a reasonable return on crops to be harvested this year.

The Temperamental Cow.

Cows, in case you don't know it, are as temperamental as a star opera singer. If they don't like you, they'll lose weight or stop giving milk; if they're fond of you, they'll gain weight and cheerfully fill the bucket. From England has just come a story of a cow which overcame an inferiority complex and, consequently, developed into a record milk producer. The farmer who stepped up her production explains it this way: "I caressed her and fussed over her, and, presto, her inferiority complex vanished."

Polled Merinos—Queensland Breeder's Success.

"The polled merino ram is a distinct improvement on the horned type. It doesn't waste its substance growing a head gear that is useless and may actually be detrimental; it is less troubled by blowflies, and is much more easily handled."

That is the opinion of Mr. A. E. O. Iker, of Euneeke, who has been breeding polled merinos at Springsure for twenty years.

"When I decided to try my hand at evolving a hornless strain," said Mr. Iker in an interview recently, "my friends laughed at the idea and said I was only wasting my time. The merino had been horned so long, they said, that any stock I bred were bound to throw back to their ancestors. Knowing what had been done with cattle, I considered the experiment well worth while, and, to my surprise, the first mating with ewes from the ordinary horned strain produced twenty per cent. of poleys."

As Mr. Iker went on with his breeding, he became more than ever convinced that he was on right lines. If hornless cattle were an improvement, polled rams must be more so, for the size of a ram's spiral horns are altogether out of proportion to both his carcase and his strength—that is, when comparing him with a bull.

Blowflies had not worried him—in fact, Mr. Iker said that freedom from blowfly attack is one of the greatest virtues he claims for his sheep. Nor has he to worry about his rams getting hooked up in a wire fence, or about mis-shaped or in-growing horns. On the shearing board, too, they are easier to handle.

From his numbered ewes, he gets about ninety per cent. of polled rams.

It is too early yet to say if the elimination of horns has any appreciable effect on the size of the sheep or the weight of the fleece. He had to do a lot of in-breeding to get as many generations away from horns as possible, and, at first, there were few polled sheep to select from. Even now the numbers are very small in comparison with horned stock.

Now that horns have been largely eliminated, Mr. Iker shall be able to give more time to the general improvement of his polled sheep. The polled sheep, he says, are very good doers, and, in spite of so much in-breeding, they have not lost constitution. Nor has the wool deteriorated in any respect from the high standard set up by the parent flock. The demand for polled rams is much greater than the supply, he finds, but, as his special rams throw about fifty per cent. polls from ordinary ewes, the supply of hornless rams could be easily increased by mating them with good hornless stud ewes.

Give 'Em Beans!

Farmers in the Old Country are again relying more on home-grown beans for feeding to farm animals. This reversion to old practice will mean a lot to the stock owner in war time. Before farmers had heard of such things as protein equivalents they grew four times the quantity of beans they now produce, and imported concentrates were hardly known. The shipping situation, as in the last war, has compelled attention to home-grown fodder crop possibilities in Great Britain.

Formerly, beans were grown for two purposes: firstly, to combine with cereals and other home-grown foodstuffs to make a balanced ration for livestock; and, secondly, to act as a cleaning and restorative crop in rotation. Although farmers of those days knew nothing about "protein equivalents," they knew when their animals were "full o' beans," when they had more zest for work and were good for an extra gallon or two of milk.

The old-timer was well versed in "the science of frugality" and ways of avoiding unnecessary expenditure. He tilled the soil thoroughly on a sound rotation system which kept the land clean and in "good heart." On the heaviest soils it was beans, wheat and bare fallow, and on lighter soils roots, barley, clover, wheat, with beans replacing half the root crops and at other times half the clover—thereby lengthening the intervals between successive crops of roots and clover and safeguarding their general health.

Now, after "wandering for years in the wilderness," spoon-fed with "manna" brought from overseas, the British farmer is compelled by force of circumstances to "plough for victory."

It is calculated that one acre of a good crop of beans should provide the third gallon for four cows for six months, so that ten acres should be sufficient for a herd of 40 cows. At that rate, in the present national emergency, it is no wonder that farmers in war-time Britain, when it comes to feeding stock, are out to "give 'em beans."

The Many Uses of " Live Wire " Fences.

Farmers have shown remarkable ingenuity in adapting the electrified fencing idea to a variety of uses. That is the opinion of American research workers who made a study recently of the relation of electricity to agriculture.

In their report they say that not only are farmers using this cheap fencing for confining stock to pastures, but they are adjusting their electrical equipment to keep pigs from rooting under ordinary woven-wire fences; to prevent vicious horses or bulls from breaking down their stalls—an electrically charged wire running round the inside of the stall was sufficient; to train horses or cows to keep away from barbed wire fences, eliminating wire cuts; to keep stock from running off a scale platform while being weighed; to protect flower beds from both two-legged and four-legged marauders; to fence ditches, creeks and odd corners quickly and cheaply with a portable fence; to stop horses from halter pulling by stretching a "hot" wire behind them; to prevent the spread of Bang's disease by preventing cows from rubbing noses across the fence with cows in a neighbouring paddock; to keep dogs and other animals away from fowl-houses at night; to break pigs from chicken-eating by fastening the shock end of the wire to a dead chicken and placing it in the pig pen; to break stock from jumping fences by fastening a short chain around the animal's neck which contacts the wire if the animal attempts to jump.

One of the strangest uses found was the construction of an electrified poker, used in loading cattle or driving them around in stock yards. One farmer is planning to "fix the rabbits" by stretching an electrified wire around his paddocks.

A word of warning, though:—

Anyone thinking of putting electricity to these or any other uses should keep in mind that electricity is highly dangerous both to man and beast if not properly installed and used. Hooking a fence wire to an ordinary electric light wire is likely to result in serious injury, or even death to anyone contacting it. Only equipment obtained from a reliable maker and installed according to directions should be used. To the inexperienced, to play around with electricity is sheer foolishness.

Farming Does a Somersault.

The effect of the war on British agriculture has been remarkable. When the war started, farming turned a complete somersault—or, as we might put it, a regular "sugar-doodle." Before that agriculture was the Cinderella of British economic activities, but it is now hailed as the life-line of the nation.

War needs, too, have altered practically every farmer's plans. One in every 10 acres must now be ploughed, and country which has been under grass for more than a century without a sod being turned is under crop this year. A thorough going policy is being formulated to bring waste lands back into production.

The problem of prices—not without its headaches for many producers—is being tackled resolutely in order that the farmer may have a fair go. With many commodities, prices have already been fixed with an eye to cutting out, as far as possible, every form of profiteering.

County agricultural committees have been established and are operating in every part of the country. All the members of these committees are practical men with a close knowledge of local conditions, and upon them the Government has placed the responsibility of seeing that the utmost use is made of Britain's broad acres.

Swift changes have already taken place in the rural life of Britain. Farm wages are rising, horses have increased tremendously in value, and the village blacksmith has come into his own again—reconditioning wagons, drays, and other horse-drawn vehicles which are to be seen in ever-increasing numbers on country roads.

The auctioneer is missing from the fat stock sections of the country markets, for fixed prices make his services unnecessary. Increasing egg prices have given a new lease of life to poultry farms, and there is no shortage of helpers.

British agriculture is certainly coming into its own again, and, best of all, the farmers of the Old Land are meeting the sudden demands made upon their industry, enterprise, and energy, in spite of all the heavy handicaps they have had to carry in pre-war years.

Playgrounds under the Plough.

School playgrounds in some parts of Britain are going under the plough in accordance with the "Grow more Food" campaign. At one school in Essex, eighty of the boys have formed teams for digging, draining, and cultivating the land as part of their scholastic duties. Detailed records of progress are filed. One interesting result is that the young people are becoming distinctly land-minded.

Lamb Quadruplets.

A very rare case of a ewe giving birth to quadruplets occurred recently on a sheep property near Cadarga, New South Wales. All the lambs are living, and are being successfully reared by the mother—a Border Leicester-Corriedale crossbred ewe.

It is well known that British breeds, notably Dorset Horns, generally produce a higher percentage of lambs than pure merinos. They also produce a greater proportion of lambs than the Corriedale ewe, which generally yields more than ninety per cent., and sometimes more than a hundred per cent. drop.

Prolificacy varies remarkably in breeds, flocks, and among individual units of a flock. Instances are, however, known where breeders have improved the productivity of their sheep by making a careful selection of mothers which have succeeded in rearing twins regularly. Outside influences—climate, management, feed, and other considerations—all have a bearing on the subject.

Menace of Water Hyacinth.

It is well known what a pest water hyacinth is once it becomes established in rivers and other waterways. In the Albury district (New South Wales) farmers felt, recently, some alarm at its introduction to a lagoon by some misguided person who apparently had an idea of adding floral beauty to his surroundings. A general warning was issued against the seriousness of the calamity that might follow such an unwise action.

The appearance and rapid growth of hyacinth in places along the Murray has convinced the farmers concerned of the menace of such a water weed to irrigation settlements. Fortunately, through prompt and concerted action, it was eradicated, but not a day too soon. The lagoon at Albury has been cleaned out and a warning given to all the residents of the Murray Valley that it is a serious offence to place roots of water hyacinth in any watercourse.

One single plant has been known to spread to 700 square yards in one season. The Albury Municipal Council, which acted so promptly, had twenty-five dray loads of hyacinth taken from one lagoon, the result of six months' spread from three plants.

War Time Beef Needs.

The responsibility of producing more beef to meet the war time needs of Britain has infused new life into the stud beef cattle industry.

With beef prices made more stable by the completion of the Imperial beef contracts, a decided impetus has been given to breeding, the result of which is that good lines of herd bulls of most breeds are now at a premium.

It is true that prices for commercial and stud cattle have not reached the dizzy heights attained towards the end of the last war. Yet, with the likelihood that stud cattle importations from Britain will be cut off till, at least, the end of the war, Australian breeders are confident that the law of supply and demand will have an ultimate effect in lifting values to generally higher levels.

Making Full Use of Our Farms.

In the days before we had good roads and modern cars the farm was much more self-sufficient. Those were the days of the farm garden and orchard, when the farmer's wife kept the family fed on the produce of the farm. Now we have swung to the other extreme. It has become an age of specialisation, even with farmers. We have left off mixed farming in order to devote all our time to practically a single crop. The family fruit garden is, on many farms, no more—the vegetable garden a neglected weed patch; and some farm families eat most of the food out of tin cans. One often has to go a long way to find a farmer who has discovered the true art of living cheaply and well. It is, unfortunately, a rare sight to see a good vegetable garden on a farm. Home-grown products have become unfashionable, and the result is that many farmers wonder why their living costs are so high. By reviving the custom of our fathers and mothers in making the farm furnish more of our living, we would find that we had solved part of our economic problems and at the same time be living better. To-day, thanks to refrigeration, the farmer's wife has actually better chances of making more use of the products of the farm for her own table.

—*New Zealand Farmer Weekly.*

Farm Notes

JULY.

WHEAT sowings may now be completed in Darling Downs districts where seasonal conditions may have delayed operations because of unsatisfactory soil moisture. Early-maturing varieties, such as Florence, Novo, and Seaspray, are very suitable for late sowing, while the popular medium-early varieties Flora, Three Seas, and Pusa may also be sown with every chance of success.

Stock should be removed from early-sown wheat subjected to grazing by the end of the month, if a satisfactory yield of grain is desired.

Canary seed, which has proved suitable for the black basaltic Downs soils, may be sown during July, drilling in approximately 15 lb. sound seed per acre. Although usually harvested for seed, the crop will make excellent hay or provide useful grazing.

Potato planting will be commencing on lands east of the Main Range where late frosts are not a deterrent. Cut sets may be used, dusting the cut surfaces with wood ashes or slaked lime shortly after cutting, but whole seed not less than 2 oz. in weight is to be preferred.

Seed-borne disease can be prevented by treating with either hot formalin or with corrosive sublimate, as advised in a leaflet issued by this Department.

Old potato lands deficient in humus can be made more productive by ploughing in green manure crops, and the application of suitable fertilizers when planting.

After the harvesting of late maize, old stalks should be ploughed in and allowed to rot. All headlands will be improved by clearing up weeds and rubbish, preferably with a good fire.

Mangolds, swede turnips, and similar root crops which are making satisfactory growth, should be thinned out to suitable distances apart in order to encourage full development, while the necessary inter-row cultivation should not be overlooked. The root system of autumn-sown lucerne should now be well established, and will be strengthened by an early mowing if fair top growth has been made.

Any infestation of weeds during the spring can be kept in check by frequent mowing without regard to the quantity of hay secured. When fully established, cuttings can be regulated to coincide with the commencement of flowering.

TO SUBSCRIBERS.

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 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 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.

Orchard Notes

JULY.

THE COASTAL DISTRICTS.

CITRUS fruits, with the exception of the late-ripening varieties, will have been harvested by now, and cultural operations should be receiving attention.

Trees which show indications of impaired vigor will require a somewhat heavy pruning both in respect to thinning and shortening the branches. Where the trees are vigorous and healthy a light pruning only will be necessary, except in the case of the Glen Retreat mandarin. The densely-growing habit of this variety leads to a profusion of weak shoots, which, if allowed to develop, will cause overbearing with resultant small and inferior fruit at an early age.

Where trees show signs of failing, look for collar rot at or near ground level. The roots should be examined for disease, and in the North Coast districts for the citrus root bark channeller. A light application of paradichlorobenzene buried a few inches deep in circular drills around the tree and with the surface stamped firmly has been recommended for controlling this pest. The distance between the circular drills should be not more than 18 inches, and care should be taken to prevent the crystals of paradichlorobenzene from coming into contact with the roots. It may be necessary to repeat the application after an interval of three or four weeks.

Where it is necessary to control brown spot of the Emperor of Canton mandarin, black spot, melanose, and scab, the fungicide should be applied at the correct time. The control measures recommended are—

For Brown Spot.

Home-made cuprous oxide mixture (3-80)—

(1) At ½ to ¾ petal fall (i.e., as soon as the majority of the fruit has set).

(2) Two months later.

(3) In late February.

For Black Spot.

Home-made cuprous oxide mixture (3-80)—

(1) At ½ to ¾ petal fall.

(2) Two months later.

For Melanose and/or Scab.

Home-made cuprous oxide mixture (3-80)—

(1) At ½ to ¾ petal fall.

Certain applications of these copper sprays may be combined with various insecticides and mixtures to correct mineral deficiencies, such as zinc. Information regarding these mixtures can be obtained from this Department.

Where for any reason healthy trees of vigorous constitution are unprofitable, they may be headed back—in fact, have the whole of the top removed—leaving a few selected arms. All other branches should be cut away at their source of origin. The three or four remaining arms, of which lengths will vary from 2 to 4 feet, will form the future framework of the tree. Care must be taken to cover the whole of the exposed bark with a suitable coating of whitewash to prevent sunburn. The numerous shoots which will grow from main arms should be suitably reduced, leaving from two to four on each arm. Under favourable conditions, these will be in a fit condition to receive selected buds from desirable trees by the following autumn. It is desirable that when shoots intended for budding have attained a length of from 6 to 9 inches, their terminals should be nipped off in order to stiffen their growth and guard against the possibility of damage by strong winds.

Fertilizing should be finished as early as possible, the mixture for the spring application being high in readily available nitrogen. Ploughing should then be completed, the depth being regulated by local conditions and the nature of the

original preparation of the land. After the ploughing, the land should be worked down to a fine state of tilth. On hillside orchards, attention should be given to the control of possible storm waters. Cultivation should be so arranged as to form shallow drains or banks along the tree rows and across the heaviest slope, leading into suitable side drains which may be grassed to prevent erosion.

The planting of trees may be continued and, with the exception of custard apples, expedited. The attention of citrus growers should be confined to varieties suited to their local conditions.

The pruning of grape vines should be completed, and where cuttings for planting are required these should be selected, trimmed, and heeled-in in slightly dry soil. Canes intended for cuttings should not be allowed to lie about and dry out, but should be treated the day they are severed from the plant. Cuttings are frequently made too long. From 10 to 12 inches is a suitable length which allows for insertion in the soil so as to permit of the top bud, with a short section of the internode, protruding above the surface.

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 finished 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. When there are indications of the swelling of the buds, the time is opportune for working over unprofitable trees, where the stock is reasonably vigorous. 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 whether any effort is being made towards raising a local supply of nursery stock.

Plate 154.
A JUNGLE SHADOWED REACH OF THE GREGORY RIVER, GULF COUNTRY, NORTH QUEENSLAND.

Maternal and Child Welfare.

Under this heading is issued each month an article, supplied by the Department of Health and Home Affairs Maternal and Child Welfare Service, dealing with the welfare and care of mother and child.

BABY'S OUTFIT.

OUR article last month dealt with baby's clothing in regard to the purpose, comfort, economy, making, and laundering. This month we are going to talk to you about baby's outfit in detail.

The following articles are usually included in baby's outfit:—Binders, napkins, vests, petticoats, frocks, nightdresses, bonnets, bootees, and shawl. A full description of these may be found in the "Expectant Mother," a booklet issued at the Maternal and Child Welfare Centres, where simple patterns may also be obtained.

Binders.

The binder is simply a bandage for keeping in place the dressing applied to the navel, and not a garment to support baby's back. It should be made of cellular cotton material, not flannel, and should be discarded as soon as the navel has healed.

Napkins.

These should be made of medium quality turkish towelling or good quality white flannelette. A double thickness of butter muslin joined on two sides makes a soft absorbent pad specially recommended for use in baby's early weeks, or if any soreness is present. Knitted pilchers or a triangle of fine flannel may be placed over the napkin as a protector. Rubber garments should not be used.

Vests.

The woven silk and wool vests are very suitable although hand-knitted ones may be used. It is advisable to have a woven cotton or aertex singlet under the woollen one, as wool next to the skin can be very irritating, especially to baby's tender skin.

Petticoats.

These are designed to last the child from birth to the age of twelve months. They should be made of light-weight woollen material such as viyella or a soft flannel that is not too closely woven.

Dresses or Frocks.

Any light-weight material which washes well is suitable for making frocks. For winter wear Radianta, nun's veiling, cashmere, or viyella are suitable, for summer cotton voile, handkerchief linen, silk, or rayon may be used.

Nightdresses.

These are made on the same lines as the frocks, but are rather longer. Viyella or flannel is probably the best material, although in hot climates a lighter material such as Radianta may be preferred.

When train travelling or motoring in cold weather a wide sleeping bag made out of flannel or viyella provides a cosy covering for baby.

Bootees.

Usually a baby is more comfortable with bootees in cold weather and happier without them in hot weather. Babies whose feet are apt to get cold easily should wear bootees even in the summer.

Bonnets.

For a young baby knitted bonnets are very comfortable. They may be made of wool for winter use and silk or cotton for summer. If made of wool it is advisable to line them out with silk as we have seen babies with delicate skins develop a rash on the face from the irriation of a woollen bonnet. Do not pin a handkerchief to the front of baby's bonnet to place over his face when he is out. This only deprives him of air. Baby's face should be guarded from strong light by holding him in a shaded position or carrying a sunshade. Do not attach ribbon strings to the bonnet as baby will usually get them in his mouth. Fasten a short piece of ribbon to one side of the bonnet, carry it under the chin, and attach to the other side by means of a press stud. As baby sits up a bonnet or hat with a brim should be used.

Shawl.

In selecting a shawl do not choose one with a large open pattern in which baby will tangle his fingers, nor a fluffy shawl from which wisps of wool collect on his fingers and are carried to his mouth. A square of Radianta, cashmere, or wool voile bound or with scalloped embroidery at the edges makes a nice shawl particularly for indoor use.

Next month we shall talk about the clothing of baby's older brother or sister.

You may obtain information on all matters concerning infant and child welfare by visiting the nearest Maternal and Child Welfare Centre (Baby Clinic), or by writing to the Sister in Charge, or by communicating direct with the Maternal and Child Welfare Centre (Baby Clinic), Alfred Street, Fortitude Valley, N.1, Brisbane.

MILK IN THE HOME.

The keeping quality or "life" of milk is dependent primarily on the care exercised in its production and handling on the farm. The neglect on part of the householder to observe certain precautions, however, may seriously impair its keeping quality; conseqeuntly the milkman is blamed for what should really be the responsibility of the customer.

Every utensil into which milk is put adds its quota of germ life to the milk. It cannot, therefore, be expected that milk, even if produced under careful conditions and thus having a low bacterial count, will keep well if it is subsequently treated carelessly in the consumer's home. The consumer must accept his share in ensuring that this most valuable food is kept as pure as possible. In the home, the prevention of the introduction and growth of germs in milk depends chiefly on the cleanliness of the jugs or other vessels in which it is contained and the temperature at which it is held.

The cleaning of any vessel which is intended for milk requires a slight modification of the usual procedure in washing dishes and pots and other household articles. The following instructions should be observed:—

1. Rinse with cold water.
2. Wash in hot water, or hot water to which washing soda has been added.
3. Scald with boiling water.
4. Invert to dry. Cloths should never be used for drying, as they simply reintroduce numerous germs which, if favourable conditions exist, will multiply extensively in and reduce greatly the period of sweetness of milk placed in the vessel afterwards.

Any milk vessel cleaned in the way described will add very few additional bacteria to those already present in the milk on its delivery, whereas a neglected or carelessly washed container might add countless numbers. The influence of an improperly cleaned vessel in reducing the "life" of milk will be appreciated readily if it is remembered that bacteria double in number every twenty to thirty minutes at ordinary temperatures. Their multiplication is markedly restrained at lower temperatures until below 50 deg. Fahr., when it is practically suspended. The object in keeping milk as cool as possible in the home is, therefore, evident.

To preserve the freshness of milk in the home, the chief things to be done are:—

1. Use only vessels free from cracks and chips and cleansed scrupulously in the way already described. Plain vessels are preferable to those of fancy design, because of the greater ease in cleaning them.
2. Keep the milk in a cool, clean place.
3. Always cover the milk jug to exclude insects, particularly flies, as they, especially, transport numerous objectionable bacteria.
4. Since milk fat readily absorbs odours from its surroundings, milk should be kept apart from any substance possessing a penetrating odour, onions, certain fruits—such as pineapple—meats, and fish in any form.
5. Remove the jug from the door-step, or wherever it is placed, as soon as possible. See that the milk is protected from the sun, preferably in a cool, dark place.

IN THE FARM KITCHEN.

NOURISHING SOUPS.

Good nourishing soup is always welcome in winter, and there is plenty of variety to offer the family.

Stock forms the essential basis for all meat soups, such as consommé, thick soups, sauces, and gravies. Stock is the liquid into which the juices of meat and vegetables have been extracted by slow and very gentle cooking.

The nutritive and flavouring qualities of a properly prepared stock of good quality are:—Albumen, gelatine, osmazome, fat, and alkaline salts. There are four kinds of stock—meat, game, fish, vegetable. The last two are known as "maigre," as no meat is used in their preparation.

Now to prepare the stock.

Chop meat and bones into pieces, place in a large saucepan with double the weight of water to bones—say about 1 quart water to 1 lb. stock, bone, &c. Stand aside in a warm place for one hour with a little salt. By soaking for a while, the salted water draws out and dissolves the meat juices. Now bring to boiling point, slowly, of course. Skim well, then add vegetables, &c. Continue to simmer for about four or five hours.

Spinach Soup.

Well wash and drain ½ bunch spinach; place in a saucepan with a little salt, cover closely with a tight-fitting lid, and cook for 10 minutes over a very low gas. Put spinach through a fine mincer or sieve. Grate a small onion finely and add it to 2 cups milk and bring to boil. Melt 1 large tablespoon butter in saucepan, add 1 large tablespoon flour, cook a little, add hot milk, and stir until thickens. Add 1 bay-leaf and simmer for 5 minutes. Remove bay-leaf and add spinach, salt, and pepper and 2 tablespoons cream. If too thick, add a little white stock or milk.

Pot-au-Feu.

Procure 3 lb. fresh brisket and cover with cold water. Bring to boiling point very gently, skimming well all the time. Add 2 onions in which 3 or 4 cloves are stuck, 3 chopped leeks, ½ small grated cabbage, 2 stalks celery, 2 carrots, 2 turnips, 1 small parsnip, 12 peppercorns, a little thyme, marjoram, parsley, add a little salt to taste, and simmer the whole very gently for about 4 hours. Remove meat and put aside to serve as the meat course. Add more salt if necessary and 2 teaspoons chopped parsley. On the Continent, a French roll is cut into slices, and the broth poured over.

Corn Soup.

Chop 2 slices fat bacon into small pieces and fry until crisp. Remove from pan and fry 3 chopped onions in the fat which remains in the pan from the bacon. Add 1 large tin sweet-corn and 2 cups hot water; simmer for 15 minutes. Add 3 pints milk to ½ cup mashed potatoes, then add it to corn, also fried bacon. Season with salt and pepper and serve piping hot.

Onion Soup.

Peel and chop 4 large white onions and fry them in a little butter or margarine and cook for a few minutes without browning them. Add 1 tablespoon flour, stir well, then gradually add 1½ pints stock, bring to boiling point, and simmer for a few minutes. Skim well and add salt and pepper and 2 bay-leaves, and 3 celery stalks cut into fine dice. Simmer for 1 hour or until vegetables are cooked. Now add 2 cups milk and thicken with 1 dessertspoon cornflour diluted with a little of the milk. Season with a little grated nutmeg and serve with sippets of toast.

Mutton Broth.

Cut about 2 lb. scrag end mutton into joints and remove meat. Cut meat into dice, and take care to remove as much fat as possible. Put meat and bones into saucepan and cover with cold water. Add salt and bring slowly to boiling point. Skim well, then add following vegetables cut into dice:—2 onions, 2 carrots, 2 turnips, 1 stick celery, 1 cup grated cabbage (optional), 1 tablespoon pearl barley. Add pepper and a little more salt if necessary. Simmer very slowly until meat is tender. Remove bones and add 1 dessertspoon chopped parsley and serve.

ORANGES AND LEMONS.

Here are some new ideas for using citrus fruit in dessert courses:—

Orange Charlotte Russe.

Take 6 oz. sponge fingers, ½ packet lemon jelly, 1 orange.

For the filling: Take 2 oranges, 1 oz. gelatine, 2 eggs, ¾ pint milk, 2 oz. sugar, 1 gill cream.

Peel one orange, divide it into sections, and remove the pith. Dissolve the jelly in half a pint of hot water. Rinse a cake-tin in cold water and pour in enough jelly to cover the bottom. Let it set, and lay on it a circle of orange sections with three in the middle. Pour on a few spoonfuls of jelly to keep the orange in place, and let it set, then pour on the rest of the jelly. Cut the sides of the biscuits straight and make them all the same length. When the jelly is firm, arrange the biscuits standing in it side by side all round the tin. To make the filling, grate the rind of one orange and put it in a double saucepan with the eggs and sugar. Whisk with an egg-whisk and add the milk. Stir the custard till it is thick enough to coat the back of the spoon. Let the custard stand where it will keep warm. Squeeze the juice from the oranges on to the gelatine and add half a gill of cold water. Dissolve the gelatine slowly over a low gas, stirring all the time, and when cool strain it into the custard. Whip the cream and add it to the mixture when quite cold. Stir as it cools, and when it thickens (but not before) pour it into the prepared tin. When set, dip for a moment into hot water to loosen the jelly from the tin. Place a dish on top, turn upside down, and shake very gently.

Orange Mould.

Take 1½ level tablespoonfuls cornflour, 3 large sweet oranges, 1 oz. sugar, ½ pint water.

Squeeze all the juice from two of the oranges and peel the other, dividing it into sections and removing the pith. Mix cornflour and sugar smoothly with the orange juice. Boil the water and pour it on the mixed cornflour, stirring well. Pour back into the pan and boil for ten minutes, stirring all the time. Rinse a half-pint mould or basin in cold water and pour in the mixture. When cold and set, turn out carefully and decorate with orange sections. Sufficient for two persons.

Orange Sponge Custard.

Take 1 tablesponful butter, ½ cup sugar, 1 tablespoonful self-raising flour, juice 2 oranges, rind of one, 1¼ cupfuls milk, 2 eggs.

Cream the butter and sugar, add the flour, orange rind (grated), and juice, and mix well. Add the milk, mix well again, and stir in the beaten egg-yolks. Whip the egg-whites to a very stiff froth and fold in last mixing lightly. Pour into a fireproof dish and bake as ordinary custard, standing in a dish of water. It will cook with a firm, light, spongy top and a creamy custard underneath.

Lemon Meringue Pudding.

Take 4 oz. breadcrumbs, 2 oz. butter, 2 oz. castor sugar, 2 eggs, ½ pint milk, rind 1 large lemon.

Bring the milk to boiling point, and pour over the crumbs; leave until cool, then with a fork mix in the butter, sugar, and grated lemon rind. Separate the yolks from whites and stir the yolks into the pudding mixture, beating the whites to a stiff meringue, ready for when the pudding has been cooked. When the meringue is piled on top, sprinkle with sugar, and return to the oven for about five minutes to set it firmly. Time to bake the pudding mixture, about twenty minutes.

Lemon Dumpling.

Take 6 oz. grated suet, 8 oz. fine breadcrumbs, 4 oz. brown sugar, grated rind and juice 2 lemons, 1 egg, ½ pint milk.

Make the milk hot, and pour it over the crumbs. When cool, beat in the grated suet, lemon rind, sugar, and beaten egg, with a pinch of salt. Fill buttered cups, tie down with greased paper. Cook in a steamer for one hour. Turn out and serve with a transparent sauce made with the juice of the lemons, a little water, and butter, thickened with a teaspoonful of cornflour and sweetened with sugar to taste.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1940 AND 1939, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	April.	No. of years' records.	April, 1940.	April, 1939.		April.	No. of years' records.	April. 1940.	April. 1939.
North Coast.	In.		In.	In.	*South Coast—contd.*	In.		In.	In.
Atherton	4·14	39	3·45	3·87	Gatton College ..	1·90	41	0·51	2·45
Cairns	11·08	58	9·00	10·09	Gayndah	1·49	69	0·41	3·38
Cardwell	8·60	68	3·79	7·70	Gympie	3·43	70	1·69	4·35
Cooktown ..	8·76	64	4·07	15·82	Kilkivan	2·25	61	0·93	3·21
Herberton ..	3·69	54	2·28	2·78	Maryborough ..	3·84	69	1·39	3·16
Ingham	7·50	48	4·63	15·40	Nambour	6·14	44	3·78	8·27
Innisfail	19·71	59	15·40	22·98	Nanango	1·96	58	0·91	3·60
Mossman Mill ..	8·04	27	..	13·69	Rockhampton ..	2·53	69	1·97	1·77
Townsville ..	2·55	69	1·46	1·75	Woodford ..	4·60	53	2·98	5·29
Central Coast.					*Central Highlands.*				
Ayr	2·37	53	20·62	0·24	Clermont ..	1·58	69	1·74	2·94
Bowen	2·63	69	17·52	1·54	Gindie	1·14	41	..	1·53
Charters Towers ..	1·47	58	1·47	2·36	Springsure ..	1·52	71	0·80	2·26
Mackay P.O. ..	6·07	69	10·62	9·81	*Darling Downs.*				
Mackay Sugar Experiment Station	4·64	43	10·10	9·37	Dalby	1·41	70	0·31	3·03
Proserpine ..	5·67	37	17·93	11·26	Emu Vale ..	1·39	44	0·26	1·86
St. Lawrence ..	2·72	69	1·32	2·45	Hermitage ..	1·36	33	..	..
South Coast.					Jimbour	1·41	52	0·91	3·16
					Miles	1·48	55	0·35	2·47
Biggenden ..	2·18	41	1·10	3·31	Stanthorpe ..	1·76	67	0·20	2·87
Bundaberg ..	3·26	57	1·48	3·27	Toowoomba ..	2·62	68	0·63	3·50
Brisbane	3·76	88	0·50	4·47	Warwick	1·65	75	0·07	3·00
Caboolture ..	4·48	53	2·86	5·91	*Maranoa.*				
Childers	2·88	45	1·26	3·99					
Crohamhurst ..	6·64	47	5·55	9·20	Bungeworgorai ..	1·08	26	..	0·80
Esk	2·99	53	0·34	3·59	Roma	1·28	66	0·77	2·16

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—APRIL, 1940.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Mean Atmospheric Pressure, 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	29·89	84	73	90	7	63	19	407	17
Herberton	..	74	65	81	8, 9, 10	50	17	228	21
Rockhampton	30·05	82	65	87	11	51	18	197	8
Brisbane	30·14	78	61	84	1	51	18	50	9
Darling Downs.									
Dalby	30·13	79	53	87	1	37	18	31	5
Stanthorpe	..	72	49	85	1	30	18	20	3
Toowoomba	..	71	54	79	1	40	17	81	7
Mid-Interior.									
Georgetown	29·93	90	65	92	1, 3, 4, 9, 11-14, 18, 26, 27, 30	53	17	12	2
Longreach	30·03	87	60	94	7	47	15	4	1
Mitchell	30·10	80	55	87	12	38	17	150	2
Western.									
Burketown	29·94	88	68	94	6	56	17	193	5
Boulia	30·03	86	62	97	8	48	18	217	2
Thargomindah ..	30·05	84	61	97	6, 7, 10, 12	45	17	148	3

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	June, 1940.		July, 1940.		June, 1940. MOONRISE.	July, 1940. MOONRISE.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	6·35	5·5	6·44	5·8	1·57	2·23
2	6·36	5·5	6·44	5·9	2·48	3·17
3	6·36	5·4	6·44	5·9	3·39	4·12
4	6·36	5·4	6·44	5·9	4·34	5·7
5	6·36	5·4	6·44	5·10	5·29	6·2
6	6·37	5·4	6·43	5·10	6·24	6·54
7	6·37	5·4	6·43	5·10	7·18	7·43
8	6·38	5·3	6·43	5·11	8·10	8·31
9	6·39	5·3	6·43	5·12	9·0	9·14
10	6.39	5·3	6·42	5·12	9·48	9·54
11	6·39	5·3	6·42	5·12	10·33	10·39
12	6·39	5·3	6·42	5·13	11·15	11·22
						p.m.
13	6·40	5·4	6·41	5·13	11·56	12·5
					p.m.	
14	6·40	5·4	6·41	5·14	12·38	12·51
15	6·41	5·4	6·41	5·14	1·21	1·39
16	6·41	5·4	6·41	5·15	2·5	2·30
17	6·41	5·4	6·40	5·15	2·53	3·23
18	6.42	5·5	6·40	5·15	3·44	4·18
19	6·42	5·5	6·40	5·16	4·37	5·14
20	6·42	5·5	6·40	5·17	5·32	6·9
21	6·42	5·5	6·39	5·18	6·29	7·3
22	6·42	5·5	6·38	5·18	7·24	7·56
23	6·43	5·6	6·38	5·19	8·19	8·48
24	6·43	5·6	6·38	5·19	9·13	9·39
25	6·43	5·6	6·38	5·20	10·6	10·30
26	6·43	5·6	6·37	5·20	10·58	11·22
27	6·43	5·7	6·37	5·20	11·48	..
						a.m.
28	6·43	5·7	6·36	5·21	..	12·14
					a.m.	
29	6·43	5·7	6·36	5·22	12·39	1·6
30	6·43	5·8	6·35	5·22	1·31	2.0
31	..	..	6·34	5·23	..	2·54

Phases of the Moon, Occultations, &c.

6th June	●	New Moon	11 5 a.m.
13th ,,	☽	First Quarter	11 59 a.m.
20th ,,	○	Full Moon	9 2 a.m.
28th ,,	☾	Last Quarter	4 13 a.m.

Perigee, 15th June, at 1.0 a.m.
Apogee, 27th June, at 9.0 p.m.

Jupiter will be a brilliant object in the morning sky, rising at 2.30 a.m. at the end of the month when Saturn will precede it by about 10 minutes. Both planets and also the invisible Uranus are in the constellation Aries.

Neptune, which takes more than 164 years to complete its journey around the Sun, has moved only a very little way in Virgo.

Mercury rises at 7.34 a.m.; 57 minutes after the Sun, and sets at 5.48 p.m.,, 45 minutes after it, on the 1st; on the 15th it rises at 8.24 a.m., 1 hour 42 minutes after the Sun, and sets at 6.40 p.m., 1 hour 38 minutes after it.

Venus rises at 8.53 a.m., 2 hours 16 minutes after the Sun and sets at 7.19 p.m., 2 hours 16 minutes after it, on the 1st; on the 15th it rises at 7.58 a.m., 1 hour 16 minutes after the Sun and sets at 6.20 p.m., 1 hour 18 minutes after it.

Mars rises at 8.47 a.m. and sets at 7.5 p.m. on the 1st; on the 15th it rises at 8.29 a.m. and sets at 6.49 p.m.

Jupiter rises at 3.47 a.m. and sets at 2.57 p.m. on the 1st; on the 15th it rises at 3.4 a.m. and sets at 2.10 p.m.

Saturn rises at 4.11 a.m. and sets at 3.17 p.m. on the 1st; on the 15th it rises at 3.21 a.m. and sets at 2.27 p.m.

At midnight on 21st of June the Sun will reach its furthest limit, 23½ degrees north of the equator and with it our Winter Solstice will arrive. If we take note of the Sun's position on the western horizon it will seem to stand still for a short time, as if to take its bearings. After this we shall see it travel, slowly at first, along its southward course. "Seeing is believing" we say, but the great Astronomers, from Copernicus on, believed what they did not see and could demonstrate that the Sun is at rest and that the planets move, and how they move, around it.

So that sowing and reaping may not cease on our most favoured planet Earth it leans more or less towards or away from the Sun in its revolution from Solstice to Solstice.

5th July.	●	New Moon	9 28 p.m.
12th ,,	☽	First Quarter	4 35 p.m.
19th ,,	○	Full Moon	7 55 p.m.
27th ,,	☾	Last Quarter	9 29 p.m.

Perigee, 10th July, at 5.0 a.m.
Apogee, 25th July, at 3.0 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.