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.

VOL. XXXIX. 1 MARCH, 1933. PART 3.

Event and Comment.

Greater Production and Less Loss.

FARMERS and graziers in Australia are, in spite of favourable exchange rates, continuing to lose money. It is quite obvious that there can only be one end to their getting further into debt. If their incomes could be increased by forcing up prices, the primary producers' road to prosperity would be as easy to travel as the Pacific highway. But it is impossible to fix the prices of our exportable commodities, and our influence on oversea markets becomes negligible the moment outward cargoes are entered on the ships' manifests. The only sound alternative then is to reduce production costs to the level at least of world's prices. How can it be done? Dr. A. E. V. Richardson (Director of the Waite Agricultural Research Institute in Adelaide and a representative of the Commonwealth at the Ottawa Conference) answers that question in the course of a brief review of the present position of agriculture in Australia. He finds that costs can be lowered not only by tariff adjustment and, perhaps, other forms of political action, but also by increasing yields and avoiding losses by the eradication of diseases and pests. The outstanding feature of the depression, he says, has been the catastrophic fall in the price levels of agricultural products. The fall has been much greater than in manufactured products, returns from interest, gilt-edged securities, and labour.

Some recovery in export prices may be expected to follow from a satisfactory adjustment of international problems, but it is improbable that price levels of the post-war period will be reached again for some time. A substantial and permanent loss of national income to Australia may therefore be expected. To some extent this loss may be recovered by expansion of production, but this can take place economically only when internal costs have been adjusted to the new level of prices of export commodities. Apart from a drop which would follow tariff adjustment and other political action, the application of scientific research to primary production offers one potent means of lowering costs.

The States have attempted to increase production by bringing new lands in areas of light and uncertain rainfall under cultivation. This involved heavy capital outlay for roads, railways, water supply, and for financing settlers. It is doubtful whether

much of this expenditure could be justified economically, even in a period of high export prices. In a time of low export prices and scarcity of long-term loans, such a policy would be impossible.

The alternative is to increase production on settled areas by applying knowledge and finding new scientific methods which will enable further intensification of production.

The most promising avenues for scientific research are analysis of the factors which are responsible for yield with a view to developing more productive varieties of wheat, control of the fungus diseases which exact such heavy annual toll of our wheat crops—take-all and flag smut—with the possible production, by cross-breeding, of strains which are resistant to these diseases, and the elucidation of the fertility problem involved in bare fallowing.

Notwithstanding the expansion of the wheat belt into drier and poorer areas during the past three decades, there has been a consistent increase in the yield per acre, and there is scientific evidence for the belief that in most wheat districts it could be greatly increased before the limits imposed by the rainfall are approached.

The application of scientific methods to the pastoral industries will pave the way for considerable economic development. First, there is the reduction of losses due to disease. In the aggregate millions sterling are lost annually from the ravages of blowfly, liver fluke, caseous lymphadenitis, braxy black disease, and intestinal parasites in sheep, and from tick, worm nodules, pleuro-pneumonia, abortion, and mammitis, &c., in cattle. Progress is being made by the Council for Scientific and Industrial Research in the attack on these diseases.

Stock Losses through Malnutrition.

A SECOND source of loss, Dr. Richardson adds, is caused by malnutrition of stock. The northern areas of Australia experience summer rainfall, followed by a long dry period in winter. The green herbage grown during the rainy season is highly nutritious, but the dry herbage progressively deteriorates and loses a large portion of its nutritive value, and is abnormally low in protein and minerals.

The division of animal nutrition has demonstrated that the yield of wool may be increased by over 30 per cent. by supplementing the natural pasture with a protein-rich concentrate when the pasture is dry and of low nutritive value.

In other areas mineral deficiencies in the herbage frequently occur. Lack of phosphorus is the chief trouble. In the heavier rainfall regions the deficiency may be overcome by top-dressing the pasture with soluble phosphates or by sowing down improved pastures. In areas of light rainfall, where economic considerations do not permit top-dressing, phosphate deficiency may be corrected by allowing stock free access to mineral licks. The practice of supplementing pastures with mineral licks needs to be placed on a sound basis by ascertaining the mineral deficiencies in each grassland region, and adjusting the composition of the lick to the ascertained deficiencies in the pasture, and to the special needs of the grazing animal.

A promising field for economic expansion, particularly in dairying and fat lamb raising, is the improvement of pastures. Regions of moderate to heavy rainfall, which already carry the bulk of the livestock, are most suited for intensive pasture development. The basic need of the livestock farmer is to obtain the maximum amount of nutritive pasture on his holding. This involves use of the most productive types of pasture plants and the application of methods of management that will maintain them in a good condition.

The systematic introduction and testing of herbage plants from other countries is of great interest to Australia. Perhaps the most important phase of pasture development is the determination of the most productive type for each climatic and soil region in the higher rainfall country, and the methods of manuring and management which will maintain it at a high level of productivity.

Continuing, Dr. Richardson says that recent research has shown that over considerable areas of the better rainfall country (over 25 inches) the carrying capacity may be greatly increased, at an economic cost, by ploughing the natural pasture and sowing permanent grasses and clovers with appropriate fertilizers, and that the productivity can be maintained by proper methods of management. Top-dressing of natural pastures increases the grass in regions of liberal rainfall. This practice has been extensively adopted, but it has limitations, because of the inherently low

productive capacity of the natural species. Recent work has shown that the fertilizers can be used to better effect if more productive species are incorporated into the pasture sward.

The discovery of means of transporting chilled beef from Australia would lead to great developments in the beef industry in Northern Australia and Queensland. Recent work at the low temperature research station at Cambridge on the use of gaseous antiseptics on meat has shown that by a 10 per cent. concentration of carbon dioxide in the atmosphere of a ship's hold the growth of mould is completely inhibited, the fat is unaffected, and the bloom and appearance remain satisfactory even after prolonged periods of storage at chilling temperatures.

One of the most interesting results of large-scale application of scientific research is the reclamation of land in Queensland affected with prickly-pear by the caterpillar, Cactoblastis cactorum.

The dairying industry is ideally suited for intensive production, as it is conducted principally in regions of liberal rainfall and fertile soil, and by a large number of individually small units.

The industry is entering an intensive stage of development, and the output will be largely increased when the present policies of encouraging herd testing, the use of purebred sires, improved methods of feeding, and the elimination of preventable disease, give results.

The carrying capacity of dairy country can be greatly enhanced by the more extensive use of sown pastures and the adoption of appropriate methods of pasture management. This is the direction in which we may look with confidence for a lowering of the costs of production and increasing our competitive power in British markets. The preferential duty of 15s. per cwt. for butter accorded under the Ottawa agreement will further enhance our competitive power against foreign countries.

Results of the Ottawa Conference.

DISCUSSING some results of the Ottawa Conference, Dr. Richardson contends that under the agreements substantial concessions have been granted by Great Britain for various groups of primary products. Free entry was accorded to dominion products and preferences were granted on a wide range of commodities. These preferential duties should prove of great assistance to Australia in meeting the competition of foreign producers on the British market.

From a dominion point of view the significance of the agreement is that Britain has agreed for five years to maintain preferential duties on a group of primary products, most of which are grown on mixed farms or intensive holdings.

The meat agreement is particularly valuable, because it virtually provides that while foreign supplies of mutton, lamb, and frozen beef will be restricted by 35 per cent. during the next eighteen months, and that foreign supplies of pig products will be substantially reduced, Australia will be able to export practically as much as ever to Britain, and will not be limited in the export of frozen pork. It is expected that the wholesale prices of meat will be substantially increased, and that Australia will benefit mainly by the enhanced prices of the products.

The determination of the United Kingdom to curtail her dependence on foreign imports of bacon and ham and develop a larger pig production locally should provide an excellent opportunity for Australia to play a much more important part in this trade. Natural conditions here are highly suited for pig production, and it is probable that on the irrigation areas of the Murray Valley a combination of grazing pigs on lucerne or irrigated pasture, together with the feeding of barley grown in close proximity, would provide a basis of production for a large export trade in frozen pork for the manufacture in England of bacon and ham.

This brief review suggests, Dr. Richardson says in conclusion, some specific directions in which scientific research can assist primary production. Increasing the output per acre and per animal by the use of the most approved scientific methods offers one sure means of reducing the costs of production per unit.

Future progress of primary production in Australia lies mainly in the intensification and diversification of agricultural production in settled areas of liberal rainfall.

The clear lesson of experience in all great agricultural countries is that a permanent economic expansion in the output from the land, and the power to survive in world competition with agricultural products, is possible only when all the resources of science and invention are applied to the cultivation of the soil and the raising of livestock.

Bureau of Sugar Experiment Stations.

CANE PEST COMBAT AND CONTROL.

OCCURRENCE OF SECOND AND THIRD-STAGE GRUBS OF "GREYBACK."

By EDMUND JARVIS.

It is proposed to publish each month a short paper describing the movements of this insect, either above or below ground, according to the time of the year; together with descriptive details of a nature calculated to assist canegrowers in the study of this pest in every stage of its life cycle. Mr. Jarvis's entomological notes are always interesting, and this additional monthly contribution will be welcomed by our readers who are engaged in the sugar industry.—EDITOR.

EXTERNAL INDICATIONS OF ROOT DAMAGE TO CANE STOOLS.

LAST month we saw that second-stage grubs of the greyback cockchafer were chiefly in evidence, although a few representatives of the first larval stage of this beetle could still be met with. Towards the end of March, however, those in the third stage of growth usually prevail, unmistakable indications of their presence in canefields being very clearly betrayed by wilting or death of the heart-leaves.

Widely spread destruction of stools is not generally witnessed, however, until later on, in April and May, throughout which period the economic importance of our so-called cane grub problem may be said to assume a startling significance to all interested in the welfare of the sugar industry.

Description of the Third-stage Grub.

Although closely resembling grubs of the second stage in general appearance the fully grown or third-stage larva possesses a few additional distinctive characters, and may be briefly described as follows:—Colour, creamy-white; anal segment or tail-end of body suffused with dark-grey, blue-black, or brown, due to the internal presence and varying colour of the soil being ingested showing through its thin semi-transparent skin. Head, brownish-yellow, edges of "jaws" blackish, shield-like plate on upper surface of first segment adjoining head, light yellow. Body clothed with a few rather long light reddish hairs. Length of body 2½ inches; across doubled up position 1¼ inches. (See life-size photo. of third-stage grub.)

PLATE 22.

Fully grown third-stage Grub of the greyback Cane-Beetle.

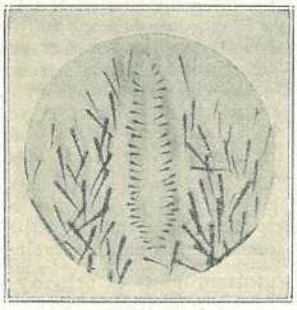

PLATE 23.

Arrangement of bristles on anal segment of Grub of greyback Cane-Beetle.

How to Identify this Grub in a Few Seconds.

On the lower surface of its last body segment will be seen two central parallel rows of small short reddish spines (about twenty-four in each row), which are partly surrounded by numerous longer scattered bristles (see illustration).

In addition to this curiously arranged vestiture, the width across the head in grubs of the third instar is invariably three-eighths of an inch (never more or less).

The only other root-eating grubs likely to be noticed by growers associated with those of the greyback, although naturally of somewhat similar shape and colour, happen to be of a darker shade of yellow, and also exhibit entirely different arrangements of the bristles occurring on the last body segment.

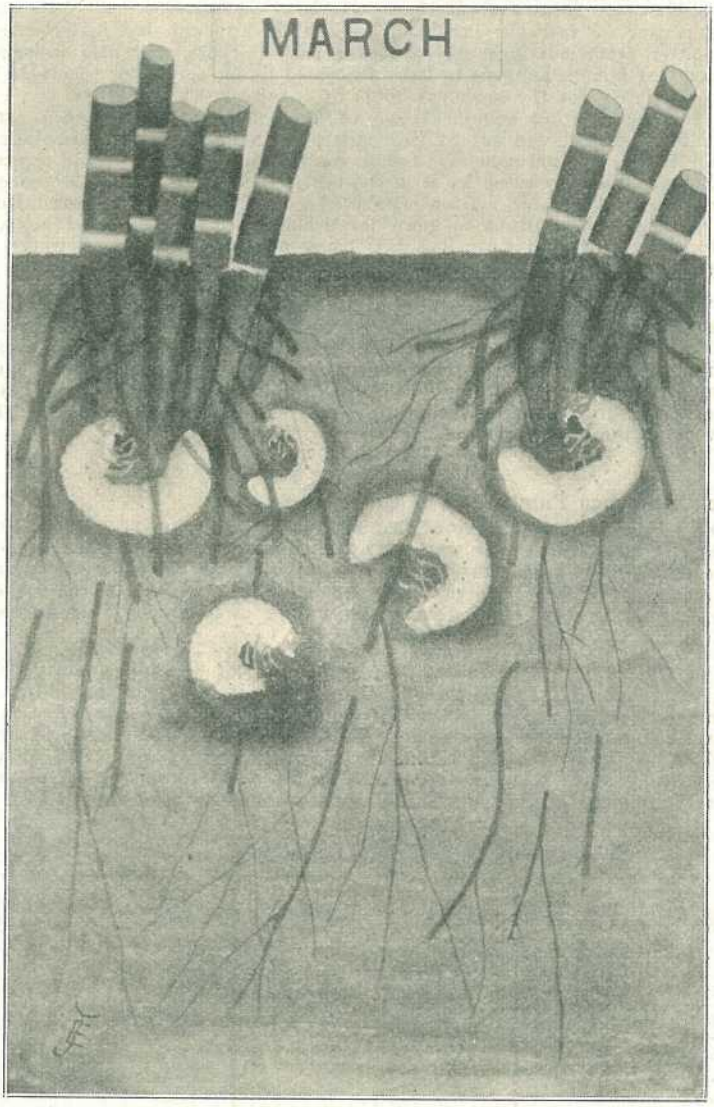

PLATE 24.

Grubs of the "Greyback" Cockchafer under Cane Stools, devouring the larger roots and affecting stability of the Sticks.

Subterranean Movements of the Mature Grub.

After its final change of skin, which denotes commencement of the third stage, the newly moulted grub appears of a pale bluish-white colour, and slightly translucent. At this stage, its new coat being rather soft, it eats very little during the next week or so, the skin meanwhile gradually toughening, becoming more opaque, and finally acquiring the normal yellowish-white colour.

Nature of Damage to Roots and Cane Sticks.

Some of our growers still seem inclined to believe that long continued dry weather is mainly responsible for severe grub damage; their assumption being that during such periods juicy cane roots are liable to be devoured for the sake of the moisture they contain.

As a matter of fact our greyback cockchafer, although habitually extracting organic matter from soil ingested by it for such purpose, and also consuming a small amount of humus, happens to have a decided liking for living vegetable tissue. Hence its partiality for the succulent roots of sugar-cane, blady grass, &c., and its fondness for the growing cellular tissue of English potatoes, damaged examples of which are often hollowed out by this cane pest; a single large third-stage greyback grub being not uncommonly found comfortably ensconced and apparently quite at home in a cavity eaten by it in the centre of a large tuber. Moreover, this taste for growing vegetable matter, combined possibly with an acquired fondness for sugar, induces these grubs to gnaw large holes into the centre of actual cane sticks which have attained maturity; this being a form of injury, however, which can be more fittingly discussed next month (April).

The principal damage inflicted by third-stage grubs during March is mainly due to severance and gradual consumption of a large percentage of the main cord-like roots which serve to support the stool and maintain a sufficient water supply. These succulent roots, varying from one-sixteenth to three-sixteenths of an inch thick, are generally bitten through at points ranging from 4 to 8 inches from ground level, the grub often following up a root as far as the base of the affected stool, devouring the juicy tissue as it proceeds.

When to Commence Fumigation of Greyback Grubs.

Owing to the first appearance of this cockchafer beetle having occurred towards the end of December, fumigation work on several farms may have to be delayed until about the middle of March. In seasons of such belated beetle emergence, however, we can realise more fully the value of the hand injector, which enables one to fumigate successfully cane stools that by the middle of March have grown too high to admit of the use of horse-machines.

The period occupied by grubs of the second stage of development may be taken as being thirty-eight days, while those of the third stage live for about sixteen weeks before transforming into pupæ. The table below indicates the correct dates on which to commence fumigation of grub-infested soil, and applies to beetle emergences taking place on any date between 16th December to 11th January, thus allowing a period of seventy days between appearance of the adult cockchafer to presence in the soil of third-stage grubs of sufficient size to damage the cane seriously.

WHEN TO FUMIGATE GRUB-INFESTED CANE LAND.

Beetles Emerge.	Time to Fumigate.	Beetles Emerge.	Time to Fumigate.	Beetles Emerge.	Time to Fumigate.
Dec. 16	Feb. 24	Dec. 25	Mar. 5	Jan. 3	Mar. 14
Dec. 17	Feb. 25	Dec. 26	Mar. 6	Jan. 4	Mar. 15
Dec. 18	Feb. 26	Dec. 27	Mar. 7	Jan. 5	Mar. 16
Dec. 19	Feb. 27	Dec. 28	Mar. 8	Jan. 6	Mar. 17
Dec. 20	Feb. 28	Dec. 29	Mar. 9	Jan. 7	Mar. 18
Dec. 21	Mar. 1	Dec. 30	Mar. 10	Jan. 8	Mar. 19
Dec. 22	Mar. 2	Dec. 31	Mar. 11	Jan. 9	Mar. 20
Dec. 23	Mar. 3	Jan. 1	Mar. 12	Jan. 10	Mar. 21
Dec. 24	Mar. 4	Jan. 2	Mar. 13	Jan. 11	Mar. 22

Our first step is to determine the degree of grub infestation (as described last month in the "Queensland Agricultural Journal") by examining the roots of cane stools situated about one chain apart throughout the area believed to be affected. If obtaining an average of four to eight or more grubs per stool the crop should be fumigated.

The chief points to be remembered in connection with such work may be considered under four headings, viz.:—

(1) Learn how to set and manipulate the hand injector.
(2) Before starting to fumigate, make certain your land is in an "open" or aerated condition.
(3) Inject the proper dose of fumigant at each stroke of the plunger at the correct depth, distance apart, and from the nearest stools in the row being treated.
(4) After each application press your foot on the hole after withdrawing the spear, to close same against escape of any of the fumes.

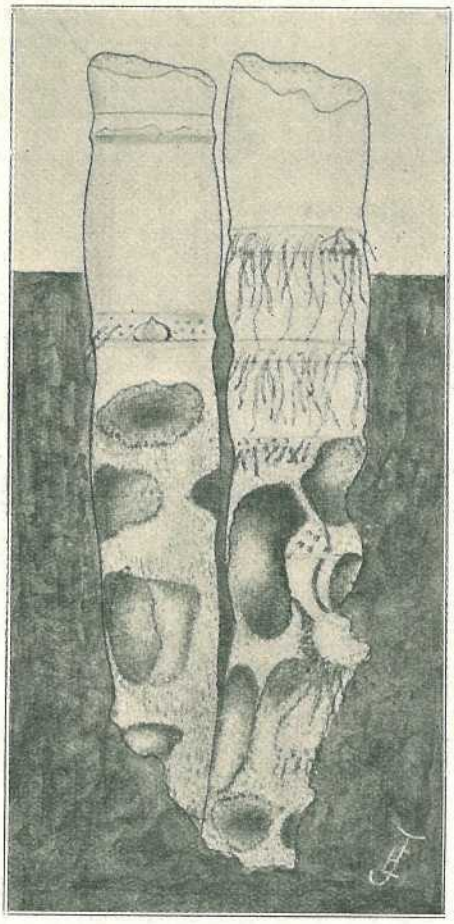

PLATE 25.
Basal portion of cane sticks gnawed by grubs of "Greyback" cane beetles.

Control of our cane grub by means of soil fumigants was described in last month's "Queensland Agricultural Journal," to which the reader is accordingly referred for detailed information.

It should, however, be mentioned here that familiarity with the internal construction of the Danks' hand injector, the one mostly used in our canefields, will often save a loss of much valuable time during field operations. In the event of a pump, for instance, failing to act properly the trouble is generally found to be due to some simple defect, such as a perished washer, dirt in the ball valve, a nut requiring tightening up, or blockage of some delivery passage.

Before starting work see that the foot-rest on the injector is in correct position for releasing the fumigant just above the level at which grubs chance to be feeding at the time; and that the regulator tube at top of the injector be set to No. 5 dose. The amount of carbon bisulphide given at each injection is one-sixth oz.; another favourite dosage being the 1 drachm 20 minims, which is the quantity discharged by Danks' injector when set at No. 5. These injections are usually made 12 inches apart on both sides of a cane row, 3 inches from stools, and 4 to 4½ inches deep, the number of stabs given depending to some extent on the age of the crop, size of the stools, and soil porosity. In certain cases it has been found desirable to give five or even six injections to large stools to ensure best results, this, however, being exceptional. If mixing paradichlorobenzene with carbon bisulphide, 60 lb. of the former are usually dissolved in about 5 gallons of the liquid carrier. This must be stirred well, and when liquified filtered through copper gauze before pouring into the injector.

During the course of fumigation do not forget to examine a few of the treated stools at intervals of a day or two, to note nature of results obtained. Test your injectors also above ground now and then to make sure the doses are being discharged in uniform and correct quantity, and at each stroke of the plunger.

External Indications of Root Damage.

Towards the end of this month the heart leaves of cane growing on badly grub-infested blocks begin to lose their normal bright green colour and assume a greyish somewhat wilted appearance. At midday, during dry weather, it will be noticed, too, that the blades of central leaves display a tendency to curl over from each side of the midrib, the entire leaf becoming of nearly tubular form. In the next stage of injury this curling of the leaves can often be seen on cloudy or wet days. The above symptoms indicate inability of such affected canes to obtain sufficient water, owing to grubs having severed most of the large main roots. A little later, these central heart leaves soon take on a yellowish colour, which gradually darkens to brown before the final drying up of the cane tops.

The plate for March illustrates second and third stage grubs of our greyback beetle destroying the larger roots of cane plants. Such weakened stools, after losing much of their hold of the ground, are liable to be blown over during wet windy weather.

TO SUBSCRIBERS—IMPORTANT.

Several subscriptions have been received recently under cover of unsigned letters. Obviously, in the circumstances, it is impossible to send the journal to the subscribers concerned.

It is most important that every subscriber's name and address should be written plainly, preferably in block letters, in order to avoid mistakes in addresses and delay in despatch.

Farm Fertility Trials

and

REVIEW OF THE WORK OF EXPERIMENT STATIONS.

[CONTINUED.]

RESULTS FOR THE 1932 SEASON.

In presenting the results of the Farm Fertility Trials harvested during 1932, advantage is taken of the opportunity to review also the work of the past year on the Northern, Central, and Southern Experiment Stations. The results of plot experiments harvested on these Stations have already been recorded in the Annual Report of the Director, but as certain of them are of special interest, a detailed discussion of their more valuable features is again presented. Attention is directed particularly to those trials which aimed at determining the manurial value of molasses, and the possibilities of irrigation in those areas which are at present dependent on natural rainfall.

BURDEKIN DISTRICT.

The results of the farm trials recorded below, provide unmistakeable evidence of the need for added nitrogenous fertilizers on the irrigated soils of this area. The average crop increase due to sulphate of ammonia is 9 tons of cane per acre; in each case the dressing was only 300 lb. of this fertilizer per acre. We are now attempting to determine the economic limit to which the dressings may be increased.

As regards superphosphate and potash, we are again unable to record positive evidence of increases due to the use of these constituents. At the same time it must be remembered that where heavy crops are harvested, it is imperative that the supply of all plant foods be restored in order that the productivity of the land may be maintained.

Location.—**B. Tapiolas's farm, Ivanhoe, Ayr.**

Soil Type.—Alluvial loam.

Variety.—Badila. Age of crop—Twelve months. Nature of crop—First ratoon.

RESULTS.

—	No Fertiliser.	300 lb. Sulphate of Ammonia.	300 lb. Sulphate of Ammonia + 300 lb. Super-phosphate.	300 lb. Sulphate of Ammonia + 180 lb. Potash.	300 lb. Sulphate of Ammonia + 300 lb. Super-phosphate + 180 lb. Potash.
Tons cane per acre	24·3	30·3	28·5	29·1	30·5
C.C.S. in cane	17·4%	16·4%	16·6%	16·9%	16·4%
Value of crop	£55 18 0	£64 13 0	£61 16 0	£64 11 0	£65 2 0
Less harvesting costs	£9 6 0	£11 12 0	£10 19 0	£11 3 0	£11 14 0
Return	£46 12 0	£53 1 0	£50 17 0	£53 8 0	£53 8 0
Increased return due to fertilizer	..	£6 9 0	£4 5 0	£6 16 0	£6 16 0
Cost of fertilizer and application	..	£2 0 0	£2 18 0	£3 9 0	£4 7 0
Profit from fertilizer	..	£4 9 0	£1 7 0	£3 7 0	£2 9 0

Location.—**Messrs. Hoey Brothers' farm, Pioneer.**

Soil Type.—Old alluvial loam.

Variety.—Badila. Age of crop—Twelve months. Nature of crop—First ratoon.

RESULTS.

—	No Fertilizer.	300 lb. Sulphate of Ammonia + 360 lb. Super-phosphate.	300 lb. Sulphate of Ammonia + 180 lb. Potash.	360 lb. Super-phosphate + 180 lb. Potash.	300 lb. Sulphate of Ammonia + 360 lb. Super-phosphate + 180lb. Potash.
Tons cane per acre	7·4	15·3	17·5	6·8	18·8
C.C.S. in cane	17·0%	17·1%	17·0%	17·2%	17·2%
Value of crop	£16 11 0	£34 9 0	£39 2 0	£15 8 0	£42 13 0
Less harvesting costs	£4 1 0	£5 14 0	£6 10 0	£4 2 0	£6 19 0
Return	£12 10 0	£28 15 0	£32 12 0	£11 6 0	£35 14 0
Increased or decreased return due to fertilizer	..	Increased. £16 5 0	Increased. £20 2 0	Decreased. £1 4 0	Increased. £23 4 0
Cost of fertilizer and application	..	£3 1 0	£3 9 0	£3 1 0	£4 11 0
Profit or loss from fertilizer ..	..	Profit. £13 4 0	Profit. £16 13 0	Loss. £4 5 0	Profit. £18 13 0

The use of sulphate of ammonia has converted a crop failure into what would be considered a fair ratoon crop in the Burdekin area. In the absence of ammonia, superphosphate and potash showed a complete loss.

Location.—**J. Ahern's farm, Airdale.**

Soil Type.—Alluvial loam.

Variety.—H.Q. 426. Age of crop—Fourteen months. Nature of crop—Plant cane.

RESULTS.

—	No Fertilizer.	300 lb. Sulphate of Ammonia + 360 lb. Super-phosphate.	300 lb. Sulphate of Ammonia + 180 lb. Potash.	360 lb. Super-phosphate + 180 lb. Potash.	300 lb. Sulphate of Ammonia + 360 lb. Super-phosphate + 180 lb. Potash.
Tons cane per acre	23·7	40·9	36·6	25·8	36·0
C.C.S. in cane	16·7%	15·7%	15·2%	16·4%	14·8%
Value of crop	£50 4 0	£82 8 0	£70 13 0	£55 1 0	£67 2 0
Less harvesting costs	£8 16 0	£15 3 0	£13 12 0	£9 11 0	£13 7 0
Return	£41 8 0	£67 5 0	£57 1 0	£45 10 0	£53 15 0
Increased return due to fertilizer	..	£25 17 0	£15 13 0	£4 2 0	£12 7 0
Cost of fertilizer and application	..	£3 1 0	£3 9 0	£3 1 0	£4 11 0
Profit from fertilizer	..	£22 16 0	£12 4 0	£1 1 0	£7 16 0

This trial presents unmistakeable evidence of the value of sulphate of ammonia on a plant crop of cane in this area. The c.c.s. values of the fertilized plots are unaccountably erratic, which detracts from the economic gain for the complete manure.

Location.—**S. Gibson's farm, Home Hill.**

Soil Type.—Alluvial loam.

Variety.—Badila. Age of crop—Eleven months. Nature of crop—First ratoon.

RESULTS.

—	No Fertilizer.	300 lb. Sulphate of Ammonia + 360 lb. Super-phosphate.	300 lb. Sulphate of Ammonia + 180 lb. Potash.	360 lb. Super-phosphate + 180 lb. Potash.	300 lb. Sulphate of Ammonia + 360 lb. Super-phosphate + 180 lb. Potash.
Tons cane per acre	11·3	20·2	18·8	12·1	20·1
C.C.S. in cane	15·1%	14·8%	15·1%	15·1%	14·9%
Value of crop	£21 12 0	£37 13 0	£35 19 0	£23 3 0	£37 16 0
Less harvesting costs	£4 1 0	£7 10 0	£6 19 0	£4 2 0	£7 9 0
Return	£17 11 0	£30 3 0	£29 0 0	£19 1 0	£30 7 0
Increased return due to fertilizer	..	£12 12 0	£11 9 0	£1 10 0	£12 16 0
Cost of fertilizer and application	..	£3 1 0	£3 9 0	£3 1 0	£4 11 0
Profit or loss from fertilizer ..	..	Profit. £9 11 0	Profit. £8 0 0	Loss. £1 11 0	Profit. £8 5 0

MACKAY DISTRICT.

The 1931-32 season saw a continuation of the unfavourable growing conditions experienced the previous year. As a consequence all crops were light, and plant cane showed little response to fertilizer. The first ratoon crops also lacked vitality following on a poor plant crop, in general.

Location.—**F. D. Pratt's farm, Kolijo.**

Soil Type.—Alluvial loam.

Variety—H.Q. 426. Age of crop—Twelve months. Nature of crop—Plant cane.

RESULTS.

——	No Fertilizer.	300 lb. Sulphate of Ammonia + 300 lb. Superphosphate.	300 lb. Sulphate of Ammonia + 150 lb. Potash.	300 lb. Superphosphate + 150 lb. Potash.	300 lb. Sulphate of Ammonia + 300 lb. Superphosphate + 150 lb. Potash.
Tons cane per acre	13·5	16·0	17·8	13·6	16·0
C.C.S. in cane	14·3%	14·7%	13·8%	14·6%	13·2%
Value of crop	£24 1 0	£29 11 0	£30 3 0	£24 18 0	£25 10 0
Less harvesting costs	£5 7 0	£5 19 0	£6 12 0	£5 8 0	£5 19 0
Return	£18 14 0	£23 12 0	£23 11 0	£19 10 0	£19 11 0
Increased return due to fertilizer	..	£4 18 0	£4 17 0	£0 16 0	£0 17 0
Cost of fertilizer and application	..	£2 17 0	£3 3 0	£2 11 0	£4 1 0
Profit or loss from fertilizer	..	Profit. £2 1 0	Profit. £1 14 0	Loss. £1 15 0	Loss. £3 4 0

There are very definite indications in these results that sulphate of ammonia may be used to advantage on the richer alluvial soils of the North Coast area. This would apply with particular force to ratoon crops.

Location.—**A. J. Watt's farm, Kuttabul.**

Soil Type.—Acid loam from sedimentary rock.

Variety.—M. 1900. Age of crop—Fourteen months. Nature of crop—Plant cane.

RESULTS.

——	No Fertilizer.	240 lb. Sulphate of Ammonia + 360 lb. Superphosphate.	240 lb. Sulphate of Ammonia + 180 lb. Potash.	360 lb. Superphosphate + 180 lb. Potash.	240 lb. Sulphate of Ammonia + 360 lb. Superphosphate + 180 lb. Potash.
Tons cane per acre	11·8	15·1	12·9	15·5	16·0
C.C.S. in cane	15·2%	15·1%	14·7%	15·3%	14·6%
Value of crop	£22 15 0	£28 18 0	£23 17 0	£30 4 0	£29 6 0
Less harvesting costs	£5 5 0	£5 12 0	£5 9 0	£5 15 0	£5 19 0
Return	£17 10 0	£23 6 0	£18 8 0	£24 9 0	£23 7 0
Increased return due to fertilizer	..	£5 16 0	£0 18 0	£6 19 0	£5 17 0
Cost of fertilizer and application	..	£2 15 0	£3 2 0	£3 0 0	£4 3 0
Profit or loss from fertilizer	..	Profit. £3 1 0	Loss. £2 4 0	Profit. £3 19 0	Profit. £1 14 0

A general response to nitrogen, phosphoric acid, and potash is in evidence here. Soils of this type certainly require heavy fertilizer dressings to restore them to a state of high fertility. In common with most highly acid soils, the response to superphosphate was particularly marked.

Location.—**P. Hand's farm, Wandaru.**

Soil Type.—Stony hillside loam.

Variety.—M. 1900. Age of crop—Twelve months. Nature of crop—First ratoon.

RESULTS.

—	No Fertilizer.	240 lb. Sulphate of Ammonia + 240 lb. Superphosphate.	240 lb. Sulphate of Ammonia + 120 lb. Potash.	240 lb. Superphosphate + 120 lb. Potash.	240 lb. Sulphate of Ammonia + 240 lb. Superphosphate + 120 lb. Potash.
Tons cane per acre	8·4	11·0	10·2	11·6	12·9
C.C.S. in cane	16·3%	16·1%	16·3%	16·9%	16·7%
Value of crop	£17 16 0	£22 18 0	£21 12 0	£25 15 0	£28 4 0
Less harvesting costs	£4 8 0	£4 18 0	£4 13 0	£5 3 0	£5 9 0
Return	£13 8 0	£18 0 0	£16 19 0	£20 12 0	£22 15 0
Increased return due to fertilizer	..	£4 12 0	£3 11 0	£7 4 0	£9 7 0
Cost of fertilizer and application	..	£2 8 0	£2 13 0	£2 4 0	£3 7 0
Profit from fertilizer	..	£2 4 0	£0 18 0	£5 0 0	£6 0 0

Though little evidence of the value of fertilizer was noted on the plant cane, the ratoon crop showed a general response, particularly with regard to superphosphate.

Location.—**F. Letchford's farm, Finch Hatton.**

Soil Type.—Sandy loam, outwash soil.

Variety.—M. 1900. Age of crop—Twelve months. Nature of crop—First ratoon.

RESULTS.

—	No Fertilizer.	200 lb. Sulphate of Ammonia + 250 lb. Superphosphate.	200 lb. Sulphate of Ammonia + 125 lb. Potash.	250 lb. Superphosphate + 125 lb. Potash.	200 lb. Sulphate of Ammonia + 250 lb. Superphosphate + 125 lb. Potash.
Tons cane per acre	9·8	9·7	10·6	9·3	10·6
C.C.S. in cane	17·5%	16·2%	17·4%	17·2%	16·9%
Value of crop	£22 14 0	£20 7 0	£24 8 0	£21 2 0	£23 10 0
Less harvesting costs	£4 18 0	£4 17 0	£4 16 0	£4 13 0	£4 16 0
Return	£17 16 0	£15 10 0	£19 12 0	£16 9 0	£18 14 0
Increased or decreased return due to fertilizer	..	Decreased. £2 6 0	Increased. £1 16 0	Decreased. £1 7 0	Increased. £0 18 0
Cost of fertilizer and application	..	£2 4 0	£2 10 0	£2 5 0	£3 4 0
Loss from fertilizer	..	£4 10 0	£0 14 0	£3 12 0	£2 6 0

Location.—**P. H. McLean's farm, Pinnacle.**

Soil Type.—Alluvial loam.

Variety.—H.Q. 426. Age of crop—Twelve months. Nature of crop—First ratoon.

RESULTS.

—	No Fertilizer.	280 lb. Sulphate of Ammonia + 280 lb. Super-phosphate.	280 lb. Sulphate of Ammonia + 140 lb. Potash.	280 lb. Super-phosphate + 140 lb. Potash.	280 lb. Sulphate of Ammonia + 280 lb. Super-phosphate + 140 lb. Potash.
Tons cane per acre	14·4	22·0	20·2	14·4	22·1
C.C.S. in cane	14·1%	14·0%	13·7%	13·8%	13·7%
Value of crop	£25 3 0	£38 1 0	£33 18 0	£24 8 0	£37 1 0
Less harvesting costs	£5 10 0	£8 3 0	£7 10 0	£5 10 0	£8 4 0
Return	£19 13 0	£29 18 0	£26 8 0	£18 18 0	£28 17 0
Increased or decreased return due to fertilizer	..	Increased. £10 5 0	Increased. £6 15 0	Decreased. £0 15 0	Increased. £9 4 0
Cost of fertilizer and application	..	£2 14 0	£3 0 0	£2 9 0	£3 17 0
Profit or loss from fertilizer	..	Profit. £7 11 0	Profit. £3 15 0	Loss. £3 4 0	Profit. £5 7 0

These results are interesting in that they indicate the decided value of sulphate of ammonia for ratoon crops on the rich alluvial soils of this area. The increased yield for a modest 280 lb. of sulphate of ammonia suggests that the dressings could be increased quite profitably.

Location.—**H. Barfield's farm, Tannalo.**

Soil Type.—Alluvial loam.

Variety.—E.K. 28. Age of crop—Twelve months. Nature of crop—First ratoon.

RESULTS.

—	No Fertilizer.	225 lb. Sulphate of Ammonia + 300 lb. Super-phosphate.	225 lb. Sulphate of Ammonia + 120 lb. Potash.	300 lb. Super-phosphate + 120 lb. Potash.	225 lb. Sulphate of Ammonia + 300 lb. Super-phosphate + 120 lb. Potash.
Tons cane per acre	11·0	16·4	15·8	12·1	16·5
C.C.S. in cane	14·1%	13·8%	13·7%	13·9%	13·3%
Value of crop	£19 4 0	£27 16 0	£26 10 0	£20 14 0	£26 11 0
Less harvesting costs	£4 18 0	£6 2 0	£5 17 0	£5 2 0	£6 2 0
Return	£14 6 0	£21 14 0	£20 13 0	£15 12 0	£20 9 0
Increased return due to fertilizer	..	£7 8 0	£6 7 0	£1 6 0	£6 3 0
Cost of fertilizer and application	..	£2 9 0	£2 11 0	£2 6 0	£3 8 0
Profit or loss from fertilizer	..	Profit. £4 19 0	Profit. £3 16 0	Loss. £1 0 0	Profit. £2 15 0

Again the value of sulphate of ammonia is in evidence on this crop of first ratoons.

Location.—**B. F. Hogan's farm, Mia Mia, North Eton.**

Soil Type.—Alluvial loam.

Variety.—E.K. 28. Age of crop—Fifteen months. Nature of crop—Plant cane.

RESULTS.

—	No Fertilizer.	300 lb. Sulphate of Ammonia + 300 lb. Super-phosphate.	300 lb. Sulphate of Ammonia + 200 lb. Potash.	300 lb. Super-phosphate + 200 lb. Potash.	300 lb. Sulphate of Ammonia + 300 lb. Super-phosphate + 200 lb. Potash.
Tons cane per acre	31·9	33·7	34·5	32·6	34·4
C.C.S. in cane	15·4%	14·8%	14·5%	14·6%	14·4%
Value of crop	£62 13 0	£62 17 0	£62 11 0	£59 13 0	£61 16 0
Less harvesting costs	£11 17 0	£12 10 0	£12 16 0	£12 2 0	£12 15 0
Return	£50 16 0	£50 7 0	£49 15 0	£47 11 0	£49 1 0
Increased or decreased return due to fertilizer	..	Decreased. £0 9 0	Decreased. £1 1 0	Decreased. £3 5 0	Decreased. £1 15 0
Cost of fertilizer and application	..	£2 17 0	£3 11 0	£2 19 0	£4 8 0
Loss from fertilizer	..	£3 6 0	£4 12 0	£6 4 0	£6 3 0

Fertilizers containing nitrogen appear to have effected a slight—though definite—increase in cane yield on this soil. All treatments recorded a loss, however, due largely to the depressed c.c.s. value where fertilizer was applied. Had the crop been normally matured at harvest time it is probable that the adverse influence would have been eliminated.

Location.—**Branscombe Plantation, Palms Estate, Pleystowe.**

Soil Type.—Alluvial loam.

Variety.—Q. 813. Age of crop—Ten months. Nature of crop—First ratoon.

RESULTS.

—	No Fertilizer.	240 lb. Sulphate of Ammonia + 240 lb. Super-phosphate.	240 lb Sulphate of Ammonia + 120 lb. Potash.	240 lb. Super-phosphate + 120 lb. Potash.	240 lb. Sulphate of Ammonia + 240 lb. Super-phospate. + 120 lb. Potash.
Tons cane per acre	4·8	6·3	7·5	5·9	7·0
C.C.S. in cane	14·0%	14·2%	14·7%	14·2%	14·2%
Value of crop	£8 6 0	£11 2 0	£13 17 0	£10 8 0	£12 7 0
Less harvesting costs	£3 2 0	£3 6 0	£3 10 0	£3 17 0	£3 5 0
Return	£5 4 0	£7 16 0	£10 7 0	£6 11 0	£9 2 0
Increased return due to fertilizer	..	£2 12 0	£5 3 0	£1 7 0	£3 18 0
Cost of fertilizer and application	..	£2 8 0	£2 13 0	£2 3 0	£3 7 0
Profit or loss from fertilizer ..	..	Profit. £0 4 0	Profit. £2 10 0	Loss. £0 16 0	Profit. £0 11 0

Location.—**C. H. Miles's farm, Te Kowai.**

Soil Type.—Alluvial loam.

Variety.—P.O.J. 2714. Age of crop—Eleven months. Nature of crop—First ratoon.

RESULTS.

—	No Fertilizer.	240 lb. Sulphate of Ammonia + 300 lb. Superphosphate.	240 lb. Sulphate of Ammonia + 120 lb. Potash.	300 lb. Superphosphate + 120 lb. Potash.	240 lb. Sulphate of Ammonia + 300 lb Superphosphate + 120lb. Potash.
Tons cane per care	9·0	12·1	14·0	10·1	13·5
C.C.S. in cane	15·1%	14·3%	15·0%	14·9%	15·0%
Value of crop	£17 1 0	£21 11 0	£26 11 0	£19 0 0	£25 12 0
Less harvesting costs	£4 10 0	£5 0 0	£5 7 0	£4 8 0	£5 6 0
Return	£12 11 0	£16 11 0	£21 4 0	£14 12 0	£20 6 0
Increased return due to fertilizer	..	£4 0 0	£8 13 0	£2 1 0	£7 15 0
Cost of fertilizer and application	..	£2 11 0	£2 13 0	£2 6 0	£3 10 0
Profit or loss from fertilizer	..	Profit. £1 9 0	Profit. £6 0 0	Loss. £0 5 0	Profit. £3 5 0

Nitrogenous fertilizer has again produced results under adverse conditions, where superphosphate and potash have given little or no result. Our knowledge of the plant food content of this land shows, however, that this type of soil is in need of these plant foods to build up its fertility.

SOUTHERN DISTRICTS.

The unprecedented drought conditions which prevailed in the Bundaberg and Maryborough areas resulted in an almost complete crop failure. In no case were the trial blocks fit to harvest as such, and many were allowed to standover. The only trials recorded herewith are those from the Maroochy River area, Nambour, where light rains at critical periods resulted in fair crops in that district.

Location.—**J. W. Tatnell's farm, Maroochy River.**

Soil Type.—Alluvial loam; better class soil of the district.

Variety.—Q. 813. Age of crop—Twelve months. Nature of crop—First ratoon.

RESULTS.

—	No Fertilizer.	240 lb. Sulphate of Ammonia + 320 lb. Superphosphate.	240 lb. Sulphate of Ammonia + 128 lb. Potash.	320 lb. Superphosphate + 128 lb. Potash.	240 lb. Sulphate of Ammonia + 320 lb. Superphosphate + 128 lb. Potash.
Tons cane per acre	14·7	18·2	18·8	17·6	18·8
C.C.S. in cane	15·4%	15·3%	15·3%	15·2%	15·6%
Value of crop	£28 17 0	£35 9 0	£36 12 0	£33 19 0	£37 11 0
Less harvesting costs	£5 9 0	£6 10 0	£6 15 0	£6 6 0	£6 15 0
Return	£23 8 0	£28 19 0	£29 17 0	£27 13 0	£30 16 0
Increased return due to fertilizer	..	£5 11 0	£6 9 0	£4 5 0	£7 8 0
Cost of fertilizer and application	..	£2 15 0	£2 16 0	£2 11 0	£3 15 0
Profit from fertilizer	..	£2 16 0	£3 13 0	£1 14 0	£3 13 0

The plots this year showed a general increase from the use of artificial manures, but it is not possible to state which particular plant food was in greatest demand. In all cases a net profit was shown.

Location.—**W. Niemi's farm, Maroochy River.**

Soil Type.—Alluvial loam, wet clay subsoil.

Variety.—Q. 813. Age of crop—Thirteen and a-half months. Nature of crop—Plant cane.

RESULTS.

—	No Fertilizer.	180 lb. Sulphate of Ammonia + 420 lb. Super-phosphate.	180 lb. Sulphate of Ammonia + 180 lb. Potash.	420 lb. Super-phosphate + 180 lb. Potash.	180 lb. Sulphate of Ammonia + 420 lb. Super-phosphate + 180 lb. Potash.
Tons cane per acre	18·7	22·3	19·7	21·5	22·9
Value of crop	£34 12 0	£41 5 0	£36 9 0	£39 16 0	£42 7 0
Less harvesting costs	£6 14 0	£8 0 0	£7 1 0	£7 14 0	£8 4 0
Return	£27 18 0	£33 5 0	£29 8 0	£32 2 0	£34 3 0
Increased return due to fertilizer	..	£5 7 0	£1 10 0	£4 4 0	£6 5 0
Cost of fertilizer and application	..	£2 15 0	£2 19 0	£3 5 0	£4 4 0
Profit or loss from fertilizer ..	..	Profit. £2 12 0	Loss. £1 9 0	Profit. £0 19 0	Profit. £2 1 0

This area was found to be decidedly acid, and it received a dressing of lime prior to planting. Consistent with previous experience on acid soils, the increased yield due to superphosphate was marked.

QUEENSLAND SHOW DATES, 1933.

Clifton: 1st and 2nd March.
Allora: 8th and 9th March.
Pittsworth: 14th and 15th March.
Goombungee: 23rd March.
Killarney: 24th and 25th March.
Toowoomba: 27th to 30th March.
Beaudesert Camp Draft: 30th March to 1st April.
Dalby: 5th and 6th April.
Beenleigh Camp Draft: 8th April.
Oakey: 8th April.
Sydney Royal: 10th to 19th April.
Chinchilla: 11th and 12th April.
Boonah Camp Draft: 15th to 17th April.
Miles: 19th April.
Nanango: 20th and 21st April.
Tara: 26th April.
Kingaroy: 27th and 28th April.
Goondiwindi Camp Draft and Show: 28th and 29th April.
Taroom: Camp Draft 1st, Show 2nd and 3rd May.
Boonah: 3rd and 4th May.
Monto: 3rd and 4th May.
Wondai: 4th and 5th May.
Blackall: 9th and 11th May.
Beaudesert: 10th and 11th May.
Mundubbera: 10th and 11th May.
Murgon: 11th and 13th May.
Ipswich: 16th to 19th May.
Gayndah: 17th and 18th May.
Mitchell: 17th and 18th May.
Goomeri: 18th and 19th May.
Kilkivan: 22nd and 23rd May.
Gympie: 24th and 25th May. Camp Draft: 27th.
Toogoolawah: 26th and 27th May.
Kalbar: 27th May.
Maryborough: 30th May to 1st June.
Marburg: 2nd and 3rd June.
Wowan: 8th and 9th June.
Lowood: 9th and 10th June.
Gladstone: 14th and 15th June.
Rockhampton: 20th to 24th June.
Mackay: 27th to 29th June.
Laidley: 28th and 29th June.
Gatton: 5th and 6th July.
Caboolture: 13th and 14th July.
Rosewood: 14th and 15th July.
Nambour: 19th and 20th July.
Ayr: 21st and 22nd July.
Esk: 21st and 22nd July.
Maleny: 26th and 27th July.
Pine Rivers: 29th July.
Royal National: 7th to 12th August.
Crow's Nest: 23rd and 24th August.
Nerang: 13th October.

Timber Borers.

By ROBERT VEITCH, B.Sc., F.E.S., Chief Entomologist.

THE very extensive use of timber for the construction of dwelling-houses and the smaller type of business premises in Queensland is frequently associated with a degree of borer infestation that is at least of decided interest, and sometimes of considerable importance to many property owners in this State. The species commonly associated with wooden buildings are four in number, and are of varying degrees of importance; two are of little consequence, the third is moderately important, while the fourth is decidedly so and is capable of inflicting severe losses.

Many property owners are unaware of the relative importance of the different species, and quite needless anxiety is frequently caused by the discovery of the tunnels of the unimportant species. It therefore seems desirable to briefly indicate the habits of all four species of borers, and to discuss the reasons for their varying importance. Control measures will be recommended where such are deemed necessary.

Perhaps the best procedure is to take the species in the order in which they will be encountered in the life of a building. The first species in such a sequence is the shot hole borer or ambrosia beetle, the tunnels of which will be found in the timber before it is worked into the building.

The Shot Hole Borer.

Shot hole borers leave traces of their tunnelling in practically every wooden building in Queensland, one of the commonest species being that known as *Platypus omnivorus* Lea. This species may be regarded as typical of the shot hole borers in Queensland, and, like other shot hole borers, it is of no importance in so far as the stability of the structure is concerned, although it is one of the two abovementioned species which frequently cause quite unnecessary anxiety.

The adults of the common shot hole borer are very small, dark reddish brown, cylindrical beetles, measuring about an eighth of an inch in length. They attack living trees in poor condition as well as newly felled logs, and will even infest the green timber sawn into boards and stacked for seasoning. Quite definitely, however, they will not attack seasoned timber worked into a building. Hence the number of shot holes observed in the timber when the building is being erected represents the final total from this type of borer attack. The presence of the tunnels, which are generally very straight and are about the diameter of small shot (Plate 26), does not in any way indicate the commencement of borer infestation, as is frequently thought to be the case. These tunnels merely indicate where the ambrosia beetles or shot hole borers have been at work, but their work is over for good so far as that timber is concerned.

The explanation of the cessation of infestation in the case of this species is at once apparent on reference to the generally accepted theory as to the feeding habits of the shot hole borers. The reader will note that the term ambrosia beetle was used as one of the two common names for this species of borer, and he may also remember that the ancient Greeks believed immortality was conferred on anyone who ate the food

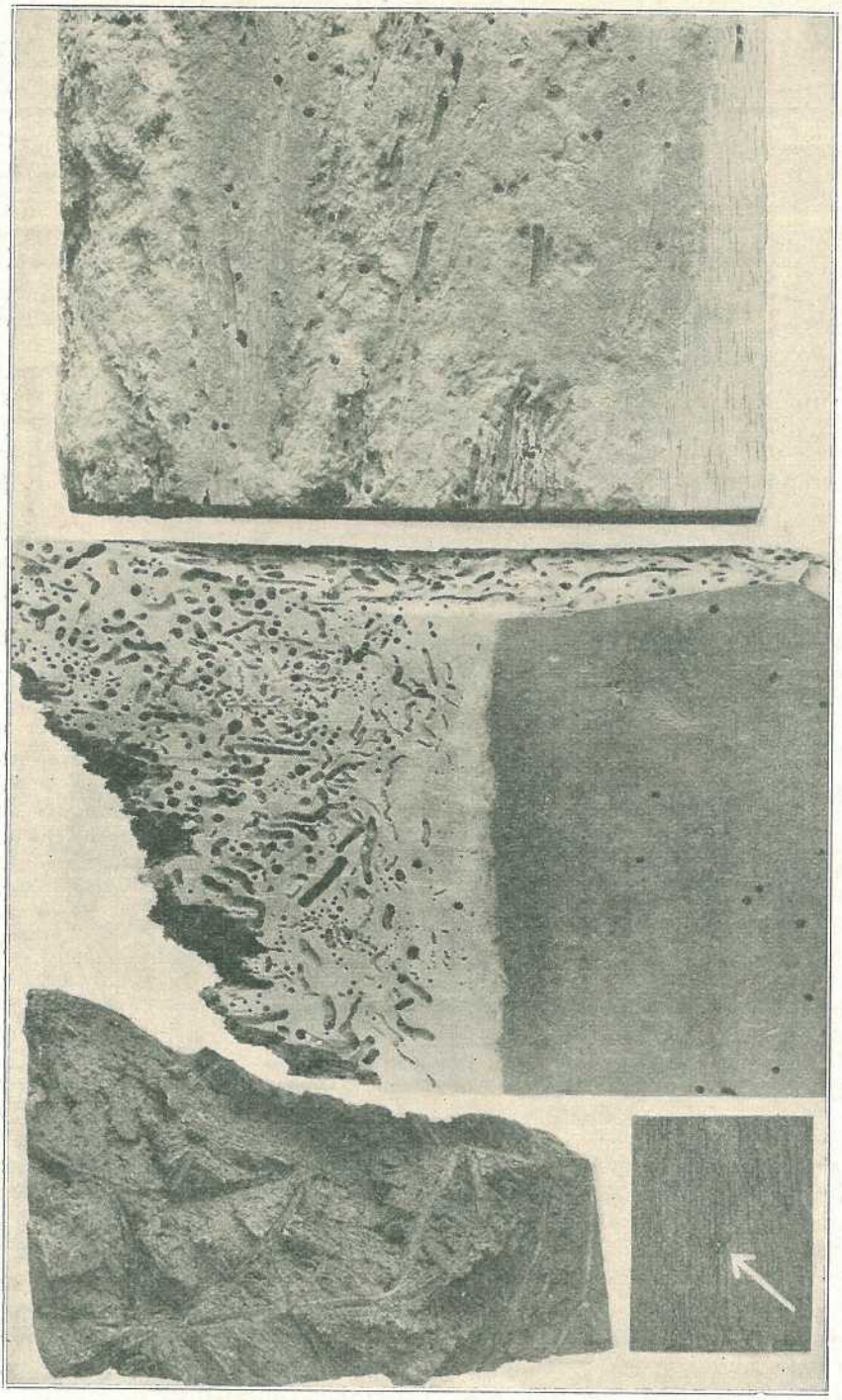

Plate 26.

Top: Hardwood showing sapwood damaged by the powder-post beetle. Note the powder-filled larval tunnels, and the flight holes of the beetles.

Centre: Pine lining board damaged by Queensland furniture beetle. Note the meandering larval tunnels and the flight holes of the beetles on the outer surface.

Bottom Left: Fragment of hardwood showing damage by shot-hole borer. Note the straighter, fungus-stained tunnels.

Bottom Right: Outer surface of previous, showing entrance hole. Note the discolouration immediately around the hole due to fungal infection.

of the gods, which they called ambrosia. By a series of transitions, the word ambrosia is now used to designate anything pleasant to taste or smell, and it has eventually become associated with the group of beetles under discussion on account of their peculiar feeding habits.

The peculiarity in this case is that, although the beetles are frequently present in great numbers in moist timber and logs, they do not feed on the wood. What actually happens is that the beetles bore into the moist wood, and on the walls of their very narrow tunnels there grows a fungus on which the beetles and their larvæ feed. As the sap dries out, the growth of the fungus ceases and the beetles move elsewhere, while the larvæ which have not then become fully grown naturally perish. The beetles, driven from the drying timber by the gradual diminution of the supply of the fungus, almost invariably carry spores of the fungus with them when they migrate, and these spores germinate and produce a fresh supply of food in the tunnels in the new logs.

It should, therefore, be obvious that the shot hole borer or ambrosia beetle cannot possibly go on breeding in a building. The presence of its old tunnels is therefore at worst a slight blemish, which in no way affects the stability of the building. The walls of these tunnels, when cut by the saw, are frequently seen to be slightly stained as a result of the presence of the associated fungus, but this is a matter of no consequence.

The Hoop Pine Beetle.

Attention must now be directed to a borer of an entirely different type—namely, the hoop pine beetle. This species (*Prospheres aurantiopictus* L. & G.) is very much larger and broader than the ambrosia beetle, being about two-thirds of an inch in length. The general colour of the beetle is black, broken by four transverse rows of golden yellow spots. It belongs to the family of large, brilliantly coloured insects very appropriately known as the jewel beetles.

The beetles belonging to this species lay their eggs in newly felled logs in the forest, and in many cases the larvæ hatching from these eggs complete their development in the timber when it is sawn up and built into a dwelling-house. The full-grown larvæ transform to pupæ, which in their turn give rise to the beetles. These beetles emerge from the infested boards by eating holes in the surface of the timber, the diameter of the holes being about the same as that of a lead pencil (Plate 27). The emergence of the beetles from the pine timber often does not take place until a year or eighteen months after the building has been erected. The presence of a number of these flight holes not unnaturally creates a considerable measure of anxiety in the mind of the owner, who sometimes visualises his house crumbling away in premature decay.

As in the case of the shot hole borer or ambrosia beetle, there is, however, no cause for anxiety, although the exit holes are admittedly disfiguring. The beetles will not lay their eggs in the seasoned timber of the building, for their egg-laying activities are restricted to newly felled logs.

The Powder Post Beetle.

As has been indicated, neither the ambrosia beetle nor the hoop pine beetle need cause the property owner any anxiety. Furthermore, control measures in so far as the buildings are concerned are not called for in either case.

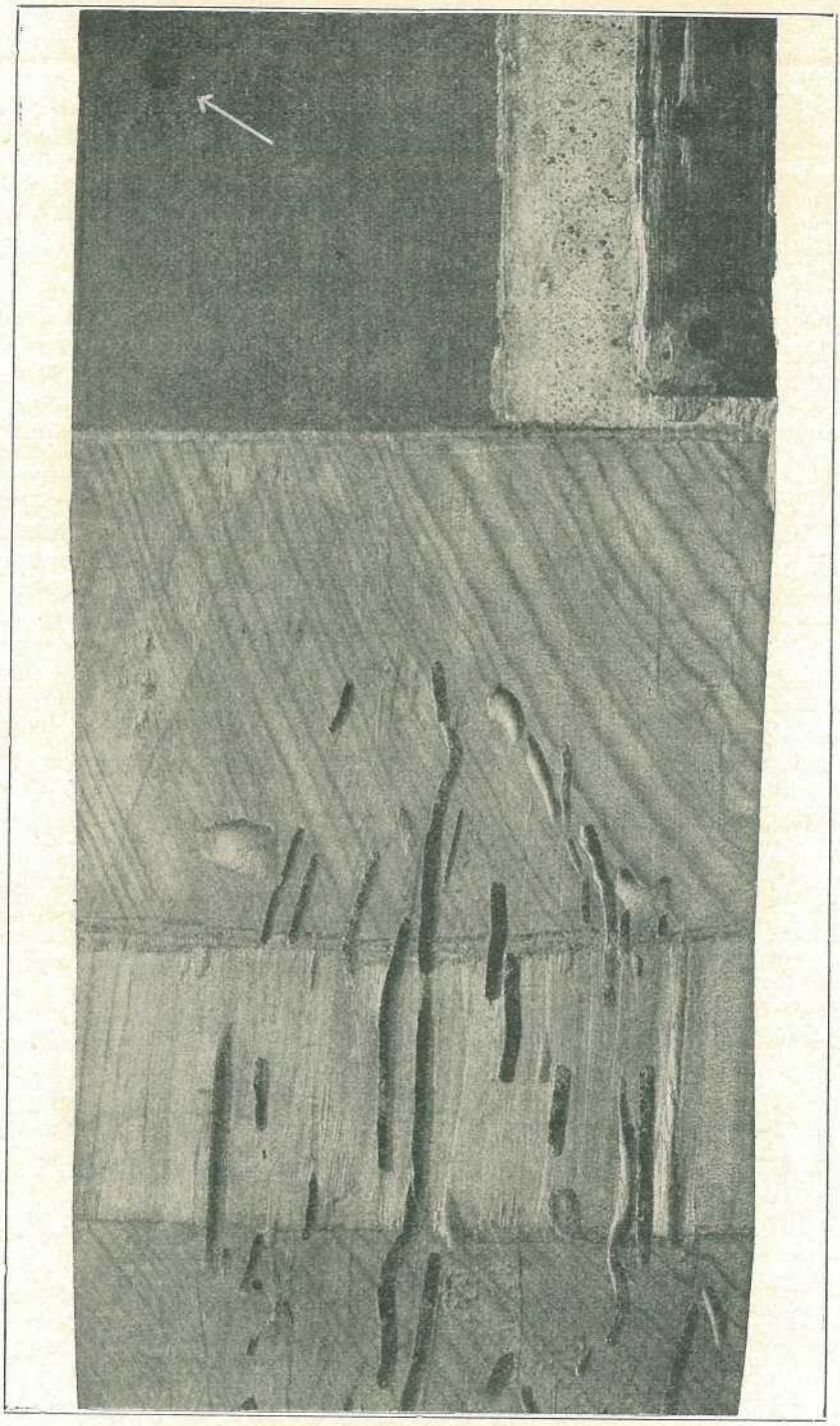

PLATE 27.

Pine timber, with oblique cuts, showing damage by the hoop-pine beetle. Note the flat larval tunnels and the flight hole of the beetle. (Flight hole indicated by arrow.)

The third species in the sequence is, however, of considerably greater importance, and is commonly known as the powder post beetle (*Lyctus brunneus* Stephens). This species is a small, somewhat flat, reddish brown beetle measuring about one-sixth of an inch in length. It lays its eggs in the sapwood of logs and sawn timber in the timber yard, but, according to W. W. Froggatt, infestation of timber does not take place until it is at least partially seasoned, say eight months or so after it has been sawn.

Its presence is generally noticed about eighteen months after the erection of the building, and is indicated by very small heaps of wood débris so fine in texture as to be appropriately referred to as powder or dust, hence the common name, powder post beetle. These tiny heaps will be found beneath the very small pin holes (Plate 26) made by the insects, and their presence and the texture of the powder or dust serves to distinguish this species from other borers likely to be encountered in Queensland buildings.

Several points are of importance in considering the status of this insect as a pest. In the first place it differs markedly from the shot hole borer and the hoop pine beetle in that it will go on breeding year after year until it reduces the infested portion of the timber to a crumbling mass that can readily be broken under light pressure. This may sound somewhat alarming, but for two reasons the position is not really very serious; firstly, the powder post beetle does not attack pine timber, its depredations being confined entirely to hardwoods; secondly, in hardwoods it attacks only the sapwood, the heartwood being immune. It will thus be seen that in a wooden building only a relatively small proportion of the timber is liable to infestation.

In Queensland the activities of this pest will be noticed chiefly in the stumps underneath the buildings. These frequently contain a proportion of sapwood, which will form an excellent breeding ground for the powder post beetle. Obviously this pest will be completely controlled by eliminating sapwood in hardwood timbers used in building. Such action is by no means universally taken; and as the sapwood in many of the timbers is well worthy of retention, its elimination merely to control the powder post beetle is hardly justified.

If, however, the house posts are painted with creosote or a mixture of creosote and kerosene in equal proportions, it will be found that the infestation is greatly diminished, if not entirely eliminated. Subsequent treatments may, however, be necessary. Creosote or creosote and kerosene in equal proportions can be applied only to stumps and to other parts of the building where staining is of no consequence. Where exposed hardwood flooring or other boards have to be treated and staining would be objectionable, the creosote will have to be heavily diluted by the addition of kerosene until the stain produced by the creosote in the mixture is of no consequence. The dilution may have to be as high as one part of creosote to eight of kerosene. The best procedure is to test the diluted mixture on a small piece of board of the same timber as that to be treated, and if the stain left is negligible, then the treatment of the boards may be proceeded with.

The Furniture Beetle.

The last insect to which reference will be made is the so-called furniture beetle (*Calymmaderus incisus* Lea), which is really the most serious of the four. Even in this case, however, there are certain compensations, for this species does not appear until a house has been built for quite a number of years. Most cases of infestation coming under the notice of this Department are of buildings erected for fifteen years or more, although in some cases the furniture beetle was undoubtedly present at an earlier date.

In discussing the powder post beetle, it was indicated that infestation frequently commenced while the moisture content of the logs or boards was still fairly high. In the case of the furniture beetle, however, the moisture content is evidently very low when the timber becomes attractive; hence its appearance only in older buildings.

The Queensland furniture beetle is a very small, dark brown insect about one-twelfth of an inch in length. It honeycombs infested timber (Plate 26), thereby producing débris in its tunnels which is much coarser in texture than the flour-like substance associated with the powder post beetle. Unlike the powder post beetle it attacks hoop pine and is present in both the sapwood and heartwood.

It goes on breeding year after year; and will eventually impair the stability of a building. In this connection it may be mentioned that pine floors are not infrequently so badly riddled where control of this pest is neglected that the boards break under the weight of heavy articles of furniture. The measures for its control are similar to those recommended in the case of the powder post beetle.

The European furniture beetle is quite distinct from the Queensland furniture beetle, the former being a species of *Anobium*. The nature of the attack, however, is somewhat similar.

Summary.

To summarise: When a house is being built, a number of small shot holes will probably be noticed in the timber, both of pine and hardwoods; these, however, may be ignored in so far as the stability of the building is concerned. After the elapse of about a year, large black beetles with golden yellow spots may emerge from the pine boards. These, however, will die without reinfesting the timber, and generally they occur in such small numbers as to be of very little consequence. Their emergence holes can be plugged up with putty, thus obscuring the blemishes. In about eighteen months after erection, the powder post beetle will show up in the sapwood of hardwood timber, but it can be controlled by painting the infested timber with creosote or a mixture of creosote and kerosene in equal proportions where staining is of no consequence. Where staining of the timbers is undesirable, the creosote will have to be very heavily diluted by the addition of kerosene so that no objectionable stain will be left on the treated boards. Finally, in old houses the pine timber in many cases will be attacked by the furniture beetle, which can be dealt with in a manner similar to that recommended for the control of the powder post beetle.

FRUIT GROWING IN NORTH QUEENSLAND.

The Secretary for Agriculture and Stock, Mr. F. W. Bulcock, M.L.A., has made available the following report by Mr. H. J. Freeman on the Fruit Industry of North Queensland.

CITRUS.

OCTOBER and November being particularly dry, resulted in the greater portion of the early blooms failing to set. Luckily, most of the trees bloomed a second time; some of this fruit setting, but the greater portion falling to the ground when the fruit was no larger than an ordinary pea. December rains produced even a third crop of blossom, and aided by the much-needed moisture practically every one of the flowers set, and if the weather conditions throughout the next three months remain favourable, a reasonably satisfactory crop should be harvested in due course.

From observations made, I should estimate that the grower irrigating his orchard during the early part of November, will be more than compensated for his trouble by the price that he will receive for his early maturing fruit, as the bulk of the Southern crop will be four to six weeks later than it was last year.

The present position of the citrus fruit in North Queensland is such that I would again voice my opinion regarding valuable possibilities for the opening up of some of this Northern land and entering into citrus growing on quite a big scale. As mentioned in my previous reports, capital would be required, but in addition to capital, a thorough knowledge of the requirements of the Southern markets, coupled with the latest information regarding favourable varieties of trees and the treating of various pests and diseases, and particularly the efficient artificial colouring of the early fruit, would undoubtedly prove the means of making a decent income.

With the area of land that is available at present, it is indeed remarkable that practically every case of citrus fruit produced in North Queensland is used to satisfy a few small local markets between Townsville and Cooktown, especially when this district allows us the wonderful privilege of picking sweet fruit from the trees, under ordinary conditions, early in March.

Pineapples.

During October, November, and December a large crop of pines was harvested locally, and very satisfactory prices were returned; the dry weather resulted in some of the "roughs" being undersized, but suited the "smooth" variety inasmuch as they were much smaller than usual, and so met with a better demand than they would have done under ordinary circumstances. (Under ordinary growing conditions in North Queensland, "smooths" are far too large, and the sale of them is seriously affected.) Of the consignments forwarded South, the returns were satisfactory, but the local price was such that most of the growers were quite content to supply the local market.

Granadillas.

Throughout the past three months, granadillas have been particularly scarce, and the dry weather during October and November had the result of killing out a large number of vines. Farmers wishing to plant out fresh stock were sadly disappointed, for the plantings prior to the December rains were rank failures in almost every case. Of the few that were marketed, a brown fungus spot caused serious disfigurement, and it was only the scarcity of the fruit that created the price per dozen recorded each week in my diary.

Passion Fruit.

This fruit has also been very scare throughout the past three months, but as often mentioned previously, when granadillas can be obtained, the loss of passion fruit is of little consequence. Just prior to Christmas, a particularly keen demand existed and one grower on the Russell River received 8s. to 10s. per quarter case, for as much fruit as he could possibly gather off his small area. I am of the opinion that it would be essential if a guaranteed crop of passions were required, that regular sprayings with Bordeaux mixture would be imperative as far as North Queensland is concerned.

Papaws.

As far as this splendid fruit is concerned, one cannot do other than repeat one's previous views each quarter. As far as Cairns is concerned, there appears to be a never-ending supply of papaws, and the demand remains practically the same throughout the whole of the year. The pity is that growers do not strive to grow a better variety than some of them possess at present, especially when seeds or young seedlings of really first-class quality are so easily procurable.

Tomatoes.

Dry weather and lack of sufficient irrigation played a serious part in reducing local supplies of tomatoes. When it is considered that during the driest months, diseases and pests generally are at the lowest ebb, it is indeed very unfortunate that some effort greater than that displayed throughout the local areas, was not adopted as far as irrigation was concerned.

The belief among the Chinese in the Northern districts is that during the wet season it is impossible to satisfactorily grow tomatoes in these areas, and though this may be true to a certain extent, it is mainly because these people do not understand the value of spraying that they make many of the statements attributed to them. Certain it is that, during the drier months, the best crops can be obtained if sufficient moisture were made available by some method of irrigation, and irrespective of what season of the year one harvested one's tomatoes, provided the production was not increased outside of all proportions, a ready sale would always be made throughout the North.

To my mind, tomatoes are allied to citrus, inasmuch as this Northern area possesses opportunities for the production of both these fruits, to a far greater extent than at present is accurately realised.

Bananas.

Were is possible to eliminate the effect of Thrip and fly and to lessen to some extent the result of Leafspot and Root Rot, the distance from the Southern markets would not be such a serious matter, but with all these combined, and in the majority of cases very little available finance, the Northern grower is certainly fighting a hard battle right through the year. New plantations must be planted, if only to supply the local markets with good fruit, but no greater quantity would be required for this purpose, and an average price of 3s. to 5s. for first-class bunches would be a fair estimate as far as any prospective planter is concerned. To even obtain clean plants is quite a difficult matter these times, and it was my unfortunate experience to have to condemn 500 plants, that were supposed to be selected for a special order, quite recently.

Deciduous Fruits.

Although the recognised wet season of January, February, and March is decidedly detrimental to the harvesting of the deciduous crop anywhere on the Northern tablelands, it still would appear possible, that by planting early varieties and forcing these to the greatest extent between the 1st September and the first or second week in December, remuneration sufficiently satisfactory to warrant this class of farming should be obtained. During my recent visit to the Herberton district I witnessed Kelsey plums of excellent flavour and size being sold from a small orchard at Wondecla, and there is no reason to doubt that were these orchards four times as large, no difficulty would have been experienced in disposing of this fruit. It would appear that deciduous growers throughout the Tableland areas have never seriously contemplated making fruit growing their sole means of livelihood, and as a consequence, the necessary study of varieties or marketing conditions or even cultivation and hygiene treatment of their orchards has never appeared to them to be a very serious matter. A small Red plum, particularly hardy in its growth, appears to be highly suitable in every way to the Tableland area, and matures early and sells well locally. This plum was originally sold under the name of "Precious," and although it appears to be one of the Japanese variety, nothing very concrete is known regarding its origin.

For some reason, apricots and Burbank plums, although covered in blossoms, did not set their fruit this year, and as a result of the repeated failure of the Burbanks to produce a crop in the Tableland area, it is my intention to work several of these trees over with Kelsey buds, during the month of February this year.

In this district the need for irrigation is most apparent, for most of the land is in a dry and unworkable state for July to December each year, and it is only that these growers are not compelled to make their livelihood from this source, that the installation of such an absolute necessity as an irrigation plant has not been installed by them years ago.

Various inquiries were received during December from Cairns fruitgrowers, regarding the possibility of obtaining supplies of deciduous fruits from the Northern Tablelands, but the quantity offering in each case was such that the local requirements necessitated its immediate sale in areas adjacent to where it was grown. I am firmly of the opinion that a splendid opportunity offers, were one to enter into the growing of plums, to supply the existing markets situated between Cairns and Townsville, especially when one had the opportunity of viewing the fruit forwarded from the South, and seeing repeatedly the very bad condition in which it arrives.

THE EMPIRE'S BEST BUTTERS.

SCIENTIFIC VERDICT FOR AUSTRALIA.

ONCE again scientists have brought their knowledge into the realm of everyday things. They have recently experimented with a commodity necessary to every household, and have found that the vitamin value of Australian and New Zealand butters is as great as that of the best home-grown summer butter. The details and results of the scientific investigation (made possible through the aid of the Empire Marketing Board) are available in a report issued by the Medical Research Council on the "Vitamin Content of Australian, New Zealand, and English Butters." The findings in this report should do much to increase the sale of Australian butter in the United Kingdom.

The prominence given to-day to food values and the vitamin contents of foodstuffs, coupled with the fact that Britain must obtain some of her supplies from overseas, emphasises the importance of knowing that those which come from far-distant Dominions can be accepted alongside the best that can be produced at home. This especially affects butter which possesses the two fat-soluble vitamins A and D. Vitamin A is essential to growth and helps resistance to disease, whilst vitamin D (the rickets-preventing factor) is necessary for the formation of strong bone and good teeth. The presence of these accessory food factors in butter makes it a most valuable food for children and gives it a place among the preventive medicines, for it forms a regular item in the normal person's diet.

The tested butters have been subjected to a rigid examination, beginning with a study of the cows supplying the cream, of the conditions under which they have been living, of the treatment of the cream and details of every process involved from the time when the butter left the farms in the Dominion until its arrival in England. To estimate the vitamin content tests were made with rats, whose previous family record was available. Two groups were used, the members of one being fed on an ordinary diet, the others receiving food from which vitamin A had been excluded. The rats on the restricted diet lost their glossy coats; their energy and their weight declined; some even developed disease. Their impoverished condition was arrested by daily doses of butter, and the ailing animals began to put on weight and to recover their spirits. Experiments were also carried out which demonstrated the presence of vitamin D and its necessity to the healthy life of the rats.

Cold Storage no Detriment.

The vitamins in the butters were also found to have remarkable stability during cold storage. The value of the vitamin content was tested soon after the butters arrived in England. The results were considered together with the information given about the state of the butters when they were first graded and packed, and no appreciable difference in the vitamin potency of the samples was found to exist. The same butters were tested after they had been in cold storage for at least two years, and even after that length of time the general conclusion was justified that no notable depreciation of food value had taken place. These experiments—so satisfactory in their results—demonstrate clearly that the Dominion butters suffer no ill effects during the two or three months which customarily elapse between the time of their production and of their consumption.

The butters subjected to this rigid scrutiny were prepared from mixed breeds and Jersey cows, which had been on open pasture throughout the year. The racial origin of the cows appeared to be without significant effect on the vitamin content.

Value for Growing Children.

This scientific investigation of the food value of certain butters and its eminently satisfactory results, is of great assistance to the housewife. Anxious for the well-being of those in her care, especially eager that the children should be strong-limbed and healthy, that they should be freed from the ills attendant on dental decay. she will take particular care that her supplies of butter—an item ever on her shopping list—should be those for which positive proof has been adduced as to its richness in the very substances which will aid her in her health campaign.

The Winter Market in Britain.

A perusal of the Report of the Medical Research Council leaves no doubt of the thoroughness with which the Australian and New Zealand butters have been examined. They have been provided by herds having the benefit of long hours of sunshine in the Southern hemisphere. It is known that the vitamin content of milk and butter produced in Northern countries during the winter months suffers considerably from insufficient sunlight, and from the necessity of stall-feeding for the cows. The importance, therefore, of being able to procure through the winter butter which is as rich in food value as the best English summer butter and as that prepared from the cream of cows fed with food especially rich in fat soluble vitamins, is very great.

The Empire Marketing Board has made it possible for scientists to demonstrate that the Dominion butters have a high and uniform vitamin potency which persists despite differences in methods of production and difficulties of transport. This news is particularly welcome to the British people, for it enables them to obtain excellent Empire butter in winter as well as in summer.

MILK INSURANCE.

L. VERNEY, Dairy Inspector.

RATHER a strange title for a note on dairying practice, but feeding a dry cow is an insurance against next year's low yield, and nothing else. The great majority of dairy farmers seem to think that when a cow is dry she does not need any special attention in feeding. This is a big mistake, because it is just as important to feed a good cow when she is dry as it is to feed her what she needs when in milk. The conclusion arrived at after many conversations with dairy farmers is that the dry cow, not being revenue-producing, is looked upon as a nuisance among the cows in milk; and also that a dry cow costs money to feed and maintain. They evidently do not appreciate the fact that nothing on four legs is nearer perpetual motion than the cow, either milking or dry. It must be thoroughly understood that the dry cow is doing three very important things for herself, her owner, and the dairying industry—building up the calf's body, storing up fresh tissue within her own body to draw upon when she freshens, and maintaining her own health. It is quite certain that water and dry grass will not do these things, and if a cow gets nothing else than water and dry grass the flow of milk when she freshens will soon diminish, and likewise the profits. In a newly-freshened cow the supply of milk is fairly good; when without any apparent reason the supply slackens off instead of keeping up for some months, you have silent evidence that she was not given the feed she should have had when dry. It must be thoroughly understood that the cow builds up her wornout body tissues, builds up flesh, blood, and bone of her unborn calf, and also makes the milk she gives from the feed that is given to her. If a cow is a heavy milker she makes great demands on the reserved nutrients and minerals stored in her body, and these can only be placed there by feeding. During the time she is dry she uses the feed she eats for body building and development of her unborn calf, but if you neglect to feed her during the dry period, it is the cow that goes short, but not the calf. In consequence, the cow calves in poor condition, and has no reserves to draw upon. It can be seen from this that the cow that is fed while dry lays up a reserve store of flesh and she has that to draw upon for some weeks after freshening. This will enable her to come to her full flow at about the time the cow that was not fed when dry begins to go off in her milk. The dry cow should be looked upon as a prospective milker and not as a nuisance. But is she? Where good pasturage is obtainable light feeding only is necessary, but on no account should she be allowed to approach the period of exhausting labour in a low or indifferent condition.

AGRICULTURE ON THE AIR.

Radio Lectures on Rural Subjects.

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

On Tuesdays and Thursdays of each week, as from the 3rd January, a fifteen minutes' talk, commencing at 7.30 p.m., will be given on subjects of especial interest to farmers.

Following is a list, continued from the February Journal, of lectures arranged:—

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

Thursday, 1st June, 1933—"Remarks on Manure and Manuring." D. H. Gurney, Senior Analyst.

Tuesday, 6th June, 1933—"Chicken Rearing." P. Rumball, Poultry Expert.

Thursday, 8th June, 1933—"Incubation." J. J. McLachlan, Poultry Inspector.

Tuesday, 13th June, 1933—"The History of Economic Entomology in Australia." Robert Veitch, B.Sc., F.E.S., Chief Entomologist.

Thursday, 15th June, 1933—"Establishing an Orchard." H. J. Barnes, Instructor in Fruit Culture.

Tuesday, 20th June, 1933—"Fiji Disease of Sugar Cane." A. F. Bell, Pathologist, Bureau of Sugar Experiment Stations.

Thursday, 22nd June, 1933—"Ratooning of Sugar Cane." H. W. Kerr, Agriculturist, Bureau of Sugar Experiment Stations.

Tuesday, 27th June, 1933—"Leaf Scald Disease of Sugar Cane." A. F. Bell, Pathologist, Bureau of Sugar Experiment Stations.

Thursday, 29th June, 1933—"Irrigation in Relation to Cane Production." H. W. Kerr, Agriculturist, Bureau of Sugar Experiment Stations.

DAD ON THE TESTS.

I reckon (said Dad) that the country's pests
Is this here wireless and these here tests,
Up to the house and round the door,
Stretchin' their ears for to catch the score,
Leavin the horses down in the crop:
Can you wonder a farmer goes off pop?
I'm yellin' at Jim or I'm cursin' at Joe,
All hours of the day; but it ain't no go—
Leavin' their work, and hangin' around,
When they think I'm down on the fallow ground:
Sneaking away when I start to rouse,
An', as soon as me back's turned, back to the house.
"How goes Wyatt? Is Sutcliffe out?"
What do they care if I rave and shout?
Bribin' young Bill for to leave his job,
To twiddle the switches an' twist the knob.
"Has he made his century? Who's in now?"
And I bought that machine for the price of a cow!
There's a standing crop, an' the rain's not far,
An' the price is rotten, and there you are:
As soon as these cricketin' games begin,
The farm goes dilly on listenin' in;
Not only the boys and the harvester crew,
But Mum an' the girls gits dotty too.
An' I reckon (said Dad) that a man's worst pests
Is this here *wireless* an' these here *tests*.

Answers to Correspondents.

BOTANY.

Milk Weed.

N.R.M. (Goovigen)—

The specimens belong to the Milk Weed, *Euphorbia Drummondii*. Much controversy is centred around the question as to whether this plant is poisonous or not. Even feeding tests have not proved decisive. However, the plant has been found at times to contain a prussic acid-yielding glucoside. It has been observed by stockowners that sheep feeding on this plant developed a pronounced swelling of the head and neck. As Dr. Herbert, when Government Botanist in Western Australia, found this to be a symptom of guinea pigs fed on the plant, it seems obvious that the species under some conditions is definitely harmful, and perhaps fatal. This swelling of the head and neck may not be connected with the effects of the prussic acid generated during digestion from the plant. Usually prussic acid poisoning does not exhibit such a characteristic symptom.

Giant Paspalum.

T.K. (Feluga, N.Q.)—

The specimen is *Paspalum Urvillei*, sometimes called Giant Paspalum. This grass is propagated either by seeds or by division of the clumps. Seed would have to be ordered under the name of *Paspalum virgatum*, as under that designation it is listed by most seedsmen. However, we now know the proper name is *Paspalum Urvillei*. This grass has been in cultivation in Queensland for a number of years, but has never taken on to the same extent as ordinary Paspalum, *Paspalum dilatatum*. We should think, however, that for a locality such as yours Giant Paspalum would be the better of the two.

Wild Millet.

E.T.F. (Kilcoy)—

The specimen is *Echinochloa Crus-Galli*, commonly known as Wild Millet or Barnyard Grass. In one form or another this grass is very widely spread over the warmer parts of the world, and several forms of it occur in Queensland. It is quite a good fodder, and is generally regarded as one of the wild parents of such well-known cultivated fodders as Japanese Millet and White Panicum.

Milk-tainting and other Plants

J.A.O'N. (Gayndah)—

Your specimens have been determined as follows:—

1. *Chenopodium carinatum*, a species of Goosefoot. This is a member of the Saltbush family and would taint milk if eaten in any quantity, but I have never seen stock eat it to any extent.
2. *Geranium dissectum*. Quite a good fodder. I do not know that this plant would taint milk at all other than the taint given by most herbs.
3. *Lepidium ruderale*, the Pepper Cress. Commonly called Mustard Weed, though this vernacular is applied in Queensland to a number of plants of the same family, Cruciferæ. It is very abundant in pastures, and is one of the worst milk-tainting weeds we possess.
4. *Glycine tabacina*, a native legume, and a rather valuable constituent of the average native mixed pasture. It is very common, but I have never heard a local name applied to it.
5. *Eurycles Cunninghamii*, a native plant allied to the Lilies; moderately common in some localities. Its properties are not known, but the plant is not generally eaten by stock, or at least not to any extent.
6. *Tetragonia expansa*, New Zealand Spinach. This might give a weedy or herbage taste to milk if eaten in any quantity, but we have no particular knowledge of it in this respect.
7. *Digitaria marginata*, the common Summer Grass.

Broad-leaved Carpet Grass.

A.J.C. (Cooroy)—

The specimen is *Paspalum platycaule*, the Broad-leaved Carpet Grass. This grass is a native of the warmer parts of America, but is now spread over the tropical and subtropical regions of the world. It is fairly common in coastal Queensland, having been established in the North for many years. More recently it has made its way south, and is generally regarded as a useful fodder for places where better-class grasses, such as ordinary Paspalum and Rhodes, will not thrive. The grass has its limitations, but is quite useful for growing on much of our coastal second-class country.

Phalaris Minor.

C.H. (Proston)—

The specimen is *Phalaris minor*, an annual Phalaris, but a valuable fodder either as green feed or hay.

Grasses Identified.

C.T. (Palmwoods)—

The specimens of grass are as follows:—

1. *Cynodon dactylon* (Couch Grass), a good grass for the dairy farm.
2. *Sporobolus berteroanus* (Wire Grass), an inferior grass which is becoming a pest on some North Coast farms. I think it would be advisable for you to grub out this grass.
3. *Axonopus compressus* (Broad-leaved Carpet Grass). I would also suggest that this grass be eradicated if it is spreading over a paspalum pasture, as the Broad-leaved Carpet Grass is decidedly inferior to ordinary paspalum.
4. Probably *Digitaria didactyla* (Blue Couch), though it is impossible to say definitely in the absence of seed heads. Blue couch is a fairly useful grass on a dairy farm, although on the whole it is not such a good grass as paspalum, as it does not stand dry weather. It may run out blady grass which is fed down by stock.

Native Plumbago—Whitewood.

J.H.McC. (Hughenden)—

1. We doubt if any of the specimens forwarded are responsible for the losses referred to. We are also doubtful if poisonous plants are the cause of the trouble, but if this is so we would advise you to look for the Native Plumbago, *Plumbago-zeylanica*, a shrub usually growing about 3 feet high with a bluish or dirty white flower. This shrub commonly grows as undergrowth on low wooded hills and is readily trimmed by stock. It was recorded some years ago in the neighbourhood of Julia Creek as being the cause of deaths in pregnant ewes, the trouble extending over a considerable period.
2. *Atalaya hemiglauca*, Whitewood. Whitewood has, as you know, been proved by feeding tests to cause staggers or shivers in stock, and to be at least one cause of the Kimberley Horse Disease and probably the Gilbert River trouble as well.

The Blind Snake.

A.B. (Mundubbera)—

Mr. Heber A. Longman, Director of the Queensland Museum, advises that the mummified snake sent by you for identification is a species of blind snake, known technically as *Typhlops polygrammicus* Schlegel. These are true snakes, but they belong to a special family, the Typhlopidæ, the members of which are subterranean in habits. They are quite harmless, and they feed on small insects and their larvæ and ants' eggs. The eyes are very degenerate. The body scales are very smooth, and except that the tail ends in a tiny point it is difficult to distinguish this from the head end. There are no fangs, and the few teeth are confined to the upper jaw and are very tiny. This species is widely distributed in Queensland, and is not uncommon in places. It grows to over 2 ft. in length, and is one of the largest species of blind snakes.

General Notes.

Stanthorpe Fruit and Vegetable Levy.

A Regulation has been approved under the Fruit Marketing Organisation Acts, extending the Stanthorpe Fruit and Vegetable Levy Regulations for a further period of twelve months.

These Regulations were issued in December, 1930, for twelve months, and extended for a similar period in December, 1931. They empower the Committee of Direction of Fruit Marketing to make a levy on growers of all fruit and vegetables grown in the district situated within a radius of 40 miles from Wallangarra, and railed from any railway station from Wallangarra to Dalveen, both inclusive, and from Amiens to Fleurbaix, both inclusive.

The levy is at the rate of 10d. per ton, and is payable to the Commissioner for Railways at the time of railing the various consignments. The amount raised by the levy is expended in payment of expenses incurred in the collection of the levy, and for administrative purposes, which latter amount is credited to the Deciduous Sectional Group Committee.

Sense of Duty.

"Our young people must be given the opportunity to learn to rule, always remembering that 'he who ruleth his spirit is greater than he that taketh a city,'" declared Mr. F. W. Bulcock (Minister for Agriculture and Stock), in an address in a city church recently.

To be able to examine oneself critically was being made more and more essential by the stress and turmoil of modern life, said Mr. Bulcock. Self-examination, facing the good and bad facts of their personalities, would enable them to see more clearly their aim in life and to go on towards that aim. The youth of to-day would be the rulers of to-morrow, and the aims and aspirations of the youth of to-day would become the aims of the nation to-morrow. It was necessary for them to learn to be "hard" on themselves, to live as their highest ideal of duty indicated.

The word "duty" was the most sublime word in the English language. "No matter how difficult the task that is set us, we must go through with it to the end," said the speaker. "Duty may be for the State, the community, or for the individual, but duty to self must be attained first, then to the family, then the community and the State. Each individual must act decently, think quickly, and give of his very best to the rest. There have been changes in the conception of duty. Our heroes of old—knights and the great sea rovers—were, we realise only marauders, but they discharged what seemed to them to be their duty. We have learned that wrong done with a good motive is not good; we see duty more clearly.

"The present world position is based on selfishness—nation against nation, individual against individual. We have competition and rivalry, while the world cries for brotherhood and unselfish service. To serve the people, irrespective of personal gain, and to ascertain how much one can give, rather than get, is an idea worth striving for. From duty comes happiness and good, and these represent the beauty of life, and where there is beauty created there is the divine vision, for God is beauty as well as love."

Barley Board.

An Order in Council has been issued under the Primary Producers' Organisation and Marketing Acts which will provide that the members of the Barley Board elected in 1933 shall hold office from 24th April, 1933, to the 30th September, 1934, and those elected in the year 1935 shall hold office until April, 1937.

The Barley Pool Board was constituted on the 24th April, 1930, for a period of seven years, and the members of the Board are elected annually. The present Board's term of office expires in April next, and the Board are desirous that the time of election should coincide with the beginning and completion of the work entrusted to it in the finalisation of the marketing of the commodity. This period extends roughly from 1st October to the end of September, and the Order in Council issued to-day will bring the term of the Board within the desired period, those elected in October, 1935, however, continuing until the Pool expires in April, 1937.

Sanctuaries.

An Order in Council has been issued under the Animals and Birds Acts declaring the Molle Group Islands, Hayman Island, and the Double Cone Islands, all situated in Whitsunday Passage, to be sanctuaries under and for the purposes of the above-mentioned Acts. It will now be unlawful for any person to take or kill any animal or bird on these islands.

In connection with these sanctuaries, Messrs. W. D. K. MacGillivray and E. M. Embury, Ornithologist and General Organiser, respectively, of the Great Barrier Reef and Whitsunday Passage Biological Station, and also Mr. E. F. Pollock, the Organiser of the Barrier Reef Expedition, have been appointed Honorary Rangers under the Acts.

An Appreciation of the Department.

Thus the "Townsville Bulletin" of 13th December:—"Illustrating the readiness of the Department of Agriculture and Stock to render assistance to enquirers, when preparing data for the article on mango budding and grafting in this issue, Zan wrote to the Under Secretary asking for any information available on the subject. The obliging officers of the Department forwarded a series of articles, some of them going as far back as 1900, covering a wide range of information. It is with pleasure that this courtesy is acknowledged."

Tobacco Growers and the Excise Law.

With the great influx of new growers into the tobacco-growing industry in recent years, it is possible that some are not fully conversant with what is required under the Commonwealth Tobacco Excise Law. In the first place registration (for which no fee is charged) is necessary, a £20 penalty being provided for those who neglect this obligation. Leaf may be grown only on the areas in respect of which the grower is registered. The owner or the lessee of the land is the proper person to be registered—share-farmers or partners are covered if the owner or the lessee be registered. Application forms are obtainable from the Collector of Customs.

A grower may store his leaf on his own premises, but not elsewhere without the Collector's permission. A registered grower may sell leaf of his own production only. He is not permitted to buy leaf from any other person, and may sell leaf only to licensed dealers and manufacturers. No person other than a registered dealer or a licensed manufacturer may trade in leaf. A grower must keep an account of all leaf produced and disposed of, and must furnish a return setting out his operations up to 30th June each year. This return must be forwarded to the Collector of Customs not later than 15th July following. Total failure of a crop must be notified in the return. A grower who ceases to grow must at once notify the Collector or continue to furnish annual returns.

No person other than a licensed manufacturer is permitted to prepare tobacco for smoking, under a penalty of £100. Hence, a grower or any other person who prepares tobacco, even for his own smoking, renders himself liable to a heavy fine. Heavy penalties are prescribed for failure to conform to the law in any of the foregoing matters.

Provisional Maize Board.

Executive approval was given to-day to the issue of an Order in Council amending the constitution of the Provisional Maize Board to provide that such Board shall operate for a period of two years instead of one year.

The Provisional Maize Non-marketing Board was constituted in October, 1931, and applied to all maize grown in Queensland, except that grown on the Atherton Tableland. Until such Board is empowered by Order in Council, subject to an affirmative vote of the growers, to undertake marketing functions, the Board shall not be a marketing board.

The Board consists of a representative of growers from the Moreton district, one from the Darling Downs, one from the Burnett, together with the Director of Marketing, the Chairman of the Executive Committee of the Council of Agriculture, and, when necessary, a representative of the Atherton Tableland Maize Board.

The functions of the Board, amongst other things, consist of arranging with produce merchants and agents with a view of improving existing marketing conditions; arranging for the submission of marketing proposals to growers at a time considered opportune, and conducting such organising arrangements as may be considered desirable to ensure the acceptance of same by growers, and taking action to improve the conditions of growers pending the application of control to the marketing of the commodity.

Rural Topics.

Heat Apoplexy in Pigs.

It is unlikely that heat apoplexy will occur among pigs at any time, other than during hot weather, or as a result of abnormal exertion by the animal, whether fat or not. Death often results from such an attack. During the early stages the animal is considerably distressed, and is in a feverish condition. Later it reaches a comatose stage, and will be found stretched out as though already dead. The final struggle is a prolonged one, but the animal does not then appear to be in great pain. Similar symptoms may be noticed because of other afflictions such as severe constipation, and in each case observation will assist in determining the nature of the illness. In a case of snake bite death is usually sudden, and the symptoms are not as pronounced, although partial paralysis may set in at an early stage. It is sometimes possible in these cases to note severe inflammation at the spot attacked by the snake. This would probably be on an exposed portion of the pig's body where the skin is thin and easily punctured. Few pigs, however, die from snake bite, for they appear to understand the habits of the reptile, and keep away from their enemy. In cases of this and like description there is a tendency by the animal to hide, and there is also a loss of appetite. It is difficult to recommend treatment for snake bite, for there are few instances in which it is possible to determine definitely that the trouble is due to snake bite. Similarly, it is difficult to treat an animal for apoplexy, but in both cases strong stimulants are helpful. Keeping the pigs in a reasonably cool condition during hot weather, providing them with ample supplies of clean drinking water, and with succulent green food is strongly recommended in preference to treating animals that have already sickened and have probably passed beyond human aid before the trouble is noticed.

Constipation in Pigs.

In severe cases of constipation, particularly in breeding sows close to farrowing, and in cases where the trouble has been prolonged and immediate bowel action is necessary, a powder consisting of 5 grains of calomel and one teaspoonful of sugar should be prepared and be mixed in a small ball of moistened pollard and fed to the animal early in the morning, while still hungry. Rolling the ball of pollard in table salt before giving it to the pig will very often induce the animal to take it readily when otherwise it might refuse food. Compel the animal to take plenty of exercise a few hours after giving the calomel, and follow this treatment up by giving 2 oz. of Epsom salts in a small quantity of food or fresh milk. It is essential in cases like this to be sure that the bowels are cleansed of accumulations of dung, otherwise ill-health will continue, and the animal will have little or no desire for food. Feeding the affected animal on light, nutritious, appetising rations in which there is a good supply of green lucerne, pumpkins, sweet potatoes, skim milk, or similar foods, is advised. Little grain is required, but plenty of clean drinking water should be allowed. On the third day of treatment add to the food one dessertspoonful of finely powdered Nauru phosphate and 10 grains of boracic acid, this to sweeten up the stomach and put the animal in better heart. The drugs in powdered form should be mixed with a small quantity of meal and then be moistened to a paste, and finally be added to the food. Continue this treatment for fourteen days in cases where the animal has been very ill.

Grease better than Oil for the Farm Implements.

An exchange informs us that grease is better than oil for protecting farm implements, buckets, &c., from rust when they are stored after use. Grease stays where it is put, whereas oil often runs off.

A Thought for the Itchy pig.

In common with all other animals, pigs are often tormented by flies and lice to such an extent that they can have no peace, and instead of lying down and sleeping comfortably, they are restless and continually getting up and down. The trouble can largely be prevented by giving the pigs a daily dressing—only a very small quantity need be used—of petroleum jelly or carbolised vaseline. This will not only help to keep the pests at bay, but will also act as an antidote to fly stings, cuts, and bruises. Though the pig has a tough skin, flies bite, mosquitoes sting, and lice suck the blood. All three tend to reduce the animal's resistance to diseases and check its growth.

Care of Harness.

Harness perishes very quickly if neglected, but if reasonable care is exercised it will last for years. Plated harness should not be kept in the stables, as the gases arising from the decomposition of the excreta tarnish the fittings. Immediately the harness is brought in the dust should be carefully wiped off with a soft cloth or leather, and mud or sweat removed by washing with water, but on no account should too much be used. The bits should be well washed in clean water, thoroughly dried, and rubbed over with a little neatsfoot oil. The leather should be kept soft and pliable by using some dressing, of which there are a number of cheap and satisfactory commercial preparations.

Heavy harness does not require the same attention, but it must be kept pliable and tough by oiling at regular intervals. Leather which is not treated soon becomes hard under our dry conditions, and cracks, while the stitching decays. A very suitable dressing is pure neatsfoot oil. Some very effective and cheap mixtures are on the market for dressing heavy harness.

Silage and Grass—Relative Feeding Values.

The question is frequently asked: Is silage equal in feeding value to green grass? It must be said at once that silage is not equal to an ordinary mixed pasturage, though it is a very good substitute. Mixed pasture, on a fairly good soil, is almost ideal feed, as it is made up of many kinds of true grasses, legumes, and other herbs. It is therefore fairly well balanced in regard to protein and carbohydrates, and is also extremely palatable, which is an important feature. Pastures made up entirely of one kind of grass, such as those of the coast, where paspalum has possession, are not entirely satisfactory owing to the lack of variety.

As a rule, silage is made from one crop only—generally either maize, sorghum, or winter cereals, and as these are weak in protein the silage is somewhat deficient in that very important food constituent. For this reason it has been found economical to add concentrates when feeding. Silage will maintain stock in good condition without the admixture of other feeds, but much better results are obtained by using with it such foods as bran, pollard, oilcake, or lucerne hay.—"A. and P. Notes," New South Wales Department of Agriculture.

When to Feed-off Millet.

Millet should be allowed to attain a height of at least 6 inches before it is fed off. After it has been well eaten down the stock should be removed until another growth is made, which, under favourable conditions, should be only a matter of days.

When the majority of the seed-heads or panicles have formed in the green pendulous stage is the correct time to cut for green fodder. It is better to err on the side of greenness, though millet cut too green has a laxative effect on stock; if too ripe there is a possibility of the feed becoming unpalatable.

The green crop contains much moisture in both stalks and foliage, and in consequence takes longer to cure than ordinary wheaten hay. If the crop is intended for silage, it may stand a little longer after heading out, but it must be cut prior to ripening.—*A. and P. Notes, N.S.W. Dept. Agric.*

Be Kind to the Cow.

One of the duties a dairy farmer too often neglects is to train his boys how to milk properly. To begin with, father himself must be neat and clean at the job, otherwise he cannot set a good example. He must never permit wetting a cow's teats when milking, as it is a dirty practice, and it makes the teats chap and become sore in cold weather. A small amount of vaseline may be rubbed on the hands if there is difficulty in milking dry, and it proves beneficial.

Another thing to instill in a boy's mind is, that it pays to be kind and patient with the cows at milking time—in fact, at all times. It is well known that one man can get more milk than another man from the same cow and with the same feed.

Beating a cow with a milk stool when she kicks or switches her tail sometimes "adds insult to injury." The milker is more often to blame for the cow's fear in letting down her milk than is the cow. The only way to overcome this fear is for her caretaker to be patient and gentle with her.—"The New Zealand Farmer."

Iodine in the Sty.

Tincture of iodine is a remarkably good thing for use in treatment of skin abrasions and other injuries to the body of the pig, for if promptly applied, it will reduce or entirely overcome the swelling, reduce the irritation, and encourage rapid healing.

Why Cattle Eat Nails.

The perplexing question, why cattle, and especially milch cows, are so prone to search for and swallow bits of metal like rusty nails, pieces of wire, old tins, spent cartridges, &c., has often been discussed without getting beyond the argument that it either indicates a depraved appetitie in the animals or a lack of minerals in the feeding.

The latter is likely to be the more probable reason, writes "Autolycus" in the "Live Stock Journal."

At any rate, it is the lean class of cows and stirks which are the most liable to acquire this bad habit.

When cattle are provided with mineralised salt licks, or fed concentrates containing minerals, they are less liable to swallow pieces of iron.

Old boots which frequently reach the pastures or arable fields by way of the manure cart, are a source of danger; but portions of soles, studded with sprigs or nails, are even a greater danger, because the cattle are likely to swallow the pieces of leather, while they can only chew or gnaw the whole boot, swallowing bits of the leather.

Rusty nails sticking in pieces of decayed timber are a twofold source of danger.

Nails and pieces of wire, when swallowed by cattle, are likely to become sharp from the action of the stomach juices, and to pierce its walls.

Four Faults in Milking.

There are many points at which cream can be contaminated, and if his product is to be consistently graded "choicest" it is necessary for the farmer to be watchful at them all. Careless milking methods are a common cause of trouble. Second-grade taints may be introduced as a result of any of the following:—

1. Failing to wash the hands regularly and frequently while milking, and to change the water as soon as dirty.

2. Failing to wipe the cow's udder free of dust, mud, and manure, and to wash the teats prior to milking, preferably with water to which a little hypochlorite has been added.

3. Using unclean cloths for the cow's udder, or dirty towels for the milker's hands.

4. Failing to discard the first few squirts of milk from each teat.

The Stud Piggery at Kairi.

With its choice herd of Tamworth pigs and a few well-bred Berkshires, the stud piggery at the State Farm, Kairi, North Queensland, is an attractive and profitable section of the farm's activities. Ten sows and a well-bred boar comprise the herd of Tamworths, and for general average quality they compare favourably with any stud pig herd in the Commonwealth. The Berkshire stud is small, for pure-bred Berkshires are not as good a sale proposition in the North as the red pigs. The pigsty accommodation is mostly portable, enabling the pigs to be used in grazing off crops. Eight pig paddocks all under cultivation and two additional grass paddocks are available for breeders and young pigs, while other areas will be made available as the section extends. Two lucerne paddocks adjoin the piggery.

The manager of the farm, Mr. W. H. Bechtel, has evolved a special type of portable water fountain for the pigs, which is very useful for the purpose. The crops under cultivation include field peas, rape, barley, lucerne, corn, and grasses in addition to other crops grown on the farm for stock food.

Three Wessex Saddleback pigs from imported strains have now been added to the stud, and are to be used in a series of cross-breeding experiments in the production of bacon for the local and export markets. Stud pigs from this farm have been distributed to many parts of Northern and Central Queensland, and have been instrumental in building up the quality of the pigs in those divisions of the State.

Wild Pigs Declared a Pest.

In the North of Queensland in the sugar-cane growing areas around Mossman and the newly settled areas of the Daintree River, wild pigs have become such a nuisance that a special regulation under the Sugar Experiments Stations Act has been provided, in which wild pigs have been declared a pest of canefields. Much has been done by poisoning and other means to reduce the numbers, but with dense tropical scrub bordering many of the cane farms, wild pigs and marsupials become serious pests.

Retirement.

Sir Francis Goodenough, speaking perhaps more particularly of the wealthy classes, says: "I think that a man, who at the same time loves his work and is keenly conscious of the duties of citizenship, will regard his retirement when it comes, not as a rest-cure, but as a chance of devoting himself to those larger issues."

There is, of course, the other sort of retirement. There are men who, when they leave the office for the last time, rub their hands and say: "Well, now I shall be able to improve my golf handicap."

Frankly, I don't envy them. Don't misunderstand me. I should soon get tired of improving my golf handicap as a daily and primary occupation. Heaven defend me from using up all my days—the brief, numbered days of this mortal life—on a pastime!

I think that all true workers hope to die in harness, with the sword in their hand worn down to the hilt. I think that they hope to retire from effort only when they retire from this world to turn gladly to whatever activity awaits them beyond.—"The Professional Officer" (Brisbane).

Rain to Order—Experiments in Artificial Production.

The prospect of inducing a greater reasonableness in nature with respect to its rainfall habits is a matter of perennial interest to the farmer, and that it is within the realms of the possible is indicated by an article in the November "Agricultural Gazette" of New South Wales. Two American scientists, Professors Warren and Bancroft, it is stated, have successfully produced rain in a series of experiments based on the natural process which takes place in the upper atmosphere. Moisture is always present in the upper atmosphere in the form of minute drops, so light that they remain in suspension. When particles of dust come in contact with the drops of moisture they are absorbed, thus increasing the weight of the drops. As a result of their electric charge (positive or negative) the particles tend to become aggregated into masses too heavy to remain in suspension and then fall as rain. Thus, clouds formed of vapour too light to fall as rain may be artificially weighted by electrically charged dust and immediate rain produced.

Acting on this theory a load of electrically charged sand was dropped from captive balloons on to clouds. Rain fell immediately. Professor Bancroft calculates that 40 lb. of electrified sand would be sufficient to dissolve into rain 1 square mile of clouds.

In subsequent experiments an aeroplane was used carrying sand with a charge, partly positive and partly negative, of 12,000 volts. The machine rose and disappeared among the clouds while spectators below awaited the miracle, which proved even more dramatic than before. The clouds burst in a violent shower of rain, while at the same time the sky cleared and the sun shone again.

In the Netherlands Professor Veraat has succeeded in producing rain over an area of about 8 square kilometres by throwing finely divided "dry ice," *i.e.*, solid carbon dioxide, form an aeroplane on to clouds. Similar experiments had been tried previously by various scientists using powdered kaolin, but had not given satisfactory results. Professor Veraat rose to a height of 2,500 metres in an aeroplane carrying 1½ tons of "dry ice" and fitted with a special spreading apparatus; he then let the powder fall on to clouds 200 metres below. Abundant rain immediately fell. The experiment was officially controlled by observers in four military aeroplanes.

Professor Veraat explains the formation of rain by supposing that during the fall from the aeroplane to the clouds the particles of solid carbon dioxide become electrically charged and transformed into microscopic drops of liquid carbon dioxide, which caused condensation in the clouds and consequently a fall of rain. According to Professor Veraat this method will also make it possible to ensure fine weather when desired. By converting the clouds into rain early in the day he holds that a clear sky may be assured in a given locality for the rest of the day.

Repair of Iron Tanks—Two Effective Methods.

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

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

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

When this is sufficiently set, a ⅝-in. coat of a stronger mortar (equal parts sand and cement) should be trowelled on and finished to a smooth face. Finally, a coat of wash, made of 1 lb. washing soda to 4 gallons of water, should be applied. Holes punched from the outside of the tank with a 4-in. nail are a help to the keying of the cement, and a convenience for the tie wires. The outside of the tank should be painted when the repairs are finished.

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

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

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

The materials required to line a 2,000-gallon tank will be: Nine 9-ft. sheets of 26-gauge corrugated iron curved to 7 ft. 10 in. diameter, 3 dozen ½-in. galvanised roof bolts, 10 yards of 72 x 2 in. x 18-gauge netting, 1 cubic yard of coarse sand, and ten bags of cement. Total cost in Sydney, £6. The concrete should be gauged one part cement to three parts sand.

It must be remembered that both these treatments, and, especially the latter, add considerably to the weight of the tank, and it is necessary to make sure that the stand or supports are strong enough for the purpose.—"A. and P. Notes," New South Wales Department of Agriculture.

Australian Citrus Fruits in Canada.

In a report on the shipment of citrus fruit he accompanied to Canada as part of his investigation into citrus fruit problems, the Director of Fruit Culture of the New South Wales Department of Agriculture stated that the shipment, which consisted of 3,814 cases of oranges and 776 cases of lemons, arrived at Vancouver on 12th August in excellent condition, the fruit being clean and bright and the quality good. As far as could be gathered from an inspection on the wharves no waste had occurred. The Government fruit inspector and the selling agents' representative both remarked upon the fine appearance of the fruit, which they considered was equal to the best of the Californian pack. At the time of writing the oranges were being sold in Vancouver shops at a price equivalent to about 2d. each. Good publicity was given the shipment, and in many instances the fruit was being displayed in the shop windows alongside Californian Late Valencias, which, it was stated, were certainly showing it off to advantage.

While the lemons did not carry quite as well as the oranges, the fruit mostly had a bright appearance on arrival and was favourably commented upon. The larger lemons were found to carry better than the smaller fruit. The selling agents intimated that there was a better market for lemons than for oranges, and they expected to sell the whole of the shipment of the former at a good price, straight from the wharves.

Common Causes of Colic in Horses.

Perhaps the commonest cause of colic is giving horses food to which they are not accustomed. A sound physiological reason exists for not doing this. It has been proved that the character of the food influences the quantity and quality of the gastric and pancreatic juices. A definite and constant diet produces juices capable of digesting it, but utterly incapable of dealing with sudden changes of food. Under proper conditions, no food will cause colic, although some (as for example, wheat and barley) are more indigestible than others; but many foods will do so if given in excess, or at the wrong time, such as giving lucerne to a horse that has been starved for a time. Horses can be made to exist on practically any food that is digestible, provided they are gradually accustomed to it; but to give a horse a full feed of, say, maize, if he has never had the grain before, is to invite digestive troubles that may cause death. Again, grass-fed horses suddenly put on to dry feed on being taken on a long journey get colic, owing to the sudden change of food.

If you wish to avoid colic, give food at regular intervals, and see that the food is of good quality and of proved dietetic value. Mouldy corn, damaged oats, or musty hay very often produce colic, while proprietary foods of unknown composition, and frequently of doubtful feeding value also, often do a great deal of harm. Do not give green forage in an immature, fermented, or over-ripe condition.

Bran mixed with maize is a favourite food, but it is much too laxative for a horse in work, and is a frequent cause of an attack of colic. Do not give large quantities of bran to a working horse. Because of its laxative properties, bran is a good food, especially during periods of rest; but its nutritive value is practically nil owing to all the flour being extracted from it.

Do not suddenly alter the amount of food given. It is a common practice to have horses fed up for a day or two prior to severe work, and this causes much intestinal trouble, such as stomach staggers.

Never forget that young horses cannot digest as much corn as old ones. Horses, when rested, even for a day or two, should have their food, especially corn, reduced. Failure to do this is the cause of much colic.

Another common cause of repeated slight attacks of colic, especially with working horses on farms, is the dry, rough, coarse, and indigestible nature of the herbage found in many paddocks. Too much coarse food prevents digestion by reason of its irritative effect on the stomach. A certain amount of bulky fodder increases the digestibility of the more concentrated foods, such as oats, but too great a quantity of such food greatly weakens the power to digest. A good example of the results of this is seen in so-called "wild melon poisoning."

The horse's stomach is not adapted for the digestion of coarse food, and any coarse food that it eats is digested in the large intestines. Farm horses, as a rule, eat far too much rough bulky fodder, and many suffer in consequence. A working farm horse does not require more than 12 lb. of hay a day, and the rest of the ration should be made up of grain, such as oats, or half oats and maize.—A. and P. Notes, N.S.W. Dept. Agric.

The Home and the Garden.

OUR BABIES.

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

THE ONLY CHILD.

THERE seems to be special difficulty in rearing satisfactorily an "only" child, and this applies equally to the physical and mental aspects of the child's development. This may be due in part to the fact that an "only" child is usually the first child and the child of inexperienced parents. Conversely the first child in any family is usually the only child in the home until a second child is born, and during this period has to face many of the early difficulties of the only child; while the youngest child of a larger family may meet with some of the later difficulties of an only child, especially if there is a big difference in age between it and the next elder child.

The Physical Aspect.

To take first the physical aspect; the only or first child is likely to meet more than an average share of the common difficulties which often interrupt the smooth course of such natural processes as birth, the establishment of breast feeding and its successful continuity, and the change over to mixed feeding called weaning; and it is, unfortunately, possible that a child may be seriously handicapped in life by a serious disturbance associated with any of these processes. The mother is usually young or inexperienced, or both, and she has to get most of her experience by learning from the mistakes she may make with her first child. If she has been fortunate enough to have good ante-natal and post-natal care, so that she is as physically fit as possible for nursing, she and the baby will escape many miseries, such as cracked and inverted nipples, breast abscesses, and other difficulties lying in wait for the inexperienced mother, and by keeping in touch with the nearest baby clinic, by post if necessary, she will be saved from making many mistakes as the months go on and helped to give her babe that good, sound, physical health which will enable him to face his moral and social problems as they arise, with a great measure of success.

Too Much in the Limelight.

The only child is in danger of spending his early days in an atmosphere of excitement, surrounded by admiring relatives and friends, all of whom are intensely interested in the first baby, and, naturally, desirous of seeing him—when awake, if possible. If he is the one and only grandchild on either side, the position may be even more acute. It is a wise plan for the nurse to refuse admission to all visitors, except two or three near relatives, during the first week after the birth, so that the mother and babe may be kept quiet and placid until the milk flow is well established. Even after this time the mother is often easily exhausted by seeing visitors, and this is bad both for her and the child. After her convalescence the "only" child remains an object of unusual interest, and he may develop into a "nervous" child if his surroundings are too stimulating. He is too much "in the limelight," receives too much attention and nursing, and does not learn how to lie quietly amusing himself during most of his waking hours. He then becomes dependent on others for entertainment and cries if left alone—he is becoming a "spoiled" baby. As "only" children are more common in the families of the well-educated and well-to-do, the child may naturally be of a highly-strung temperament, and a lack of placidity in his environment will increase his tendency to be restless and excitable. These "nervous" babies frequently kick, wriggle, or laugh until they vomit their food. Some vomit

very readily on slight movement by themselves or on being handled by others. Unless quiet surroundings can be secured, this vomiting may seriously interfere with the child's nutrition.

After the Nursing Stage.

Once our "only" baby successfully passes the nursing stage, he meets further dangers after weaning as his intelligence develops, and he learns to note the emotional reactions of those around him. His anxious mother may hang over him at meals, watching each mouthful, perhaps coaxing him to eat foods specially prepared, and voicing her grief when he refuses. He soon may learn to get more "thrill" out of being coaxed than out of eating. Next, he may learn to like the excitement of watching his mother's face "register" disappointment, anxiety, and fear because he has refused some food. The next stage is that he gets into the habit of refusing food, especially the milk foods, whose refusal causes such dramatic despair around him, and possibly the substitution of more appetising but less desirable dishes so that he often becomes truly under-nourished. At this stage his mother usually seeks medical advice, but much depends on her own self-control and intelligence if her baby is to be restored to normal health. In many cases she is by this time quite unfit to tackle the problem firmly, being more or less a nervous wreck, but, fortunately, it is often easy for another person to overcome the child's bad habits, especially in surroundings where other normal children are eating their meals with relish. Suitable foods must be chosen for three or four meals in the day, according to the child's age and requirements. Then a suitable meal must be attractively served and placed before him in a cheerful, matter-of-fact way, which does not anticipate any difficulty. If he refuses the meal no comment should be made, but only drinks allowed until the next meal is fully due, when the procedure must be repeated. With regard to milk, it is helpful to remember that every child begins by liking milk, his natural food, very much indeed, and he will like cow's milk, too, unless some error arises in his management during or after weaning. Perhaps the commonest mistakes are to give too many more tasty foods like sugar, jam, cake, &c., or to leave weaning until rather late, when the child is old enough in intelligence to notice and remember the different associations of cow's milk and breast milk. The mother of an only child is often reluctant to wean and commences the gradual process of establishing the child's independence of her, but it is very important for the child's sake that this process should not be retarded at any stage, unless made necessary by some such emergency as illness. Sometimes the trouble with milk is due to the fact that the parents have made a special effort to get rich Jersey milk for their one and only child, in their aim at giving him everything of the best, and he may have become unable to digest the fat and need dieting for a time. The company and example of other normal children at meals is a great help. Sometimes the milk is found more attractive when made into junket, milk jelly, weak cocoa, boiled or baked custard or milk puddings (made with plenty of milk). One child drank milk readily when it was coloured pink with a little cochineal. The "boiled" flavour can be avoided by pasteurising or scalding the milk instead of actually letting it boil vigorously.

Coddled and Petted.

As the months go on and the "only" child develops trifling illnesses, the mother is apt to suffer anxiety quite out of proportion to the seriousness of the case. One such mother said, "I get so afraid that my mouth is dry and I cannot swallow food." The "only" child is apt to be so carefully guarded that he leads an unnatural life. He is coddled and petted after getting little bumps and bruises, and may develop into a "cry-baby," who will run to his mother instead of facing little difficulties for himself, while each little accident brings agony to the apprehensive mother, who has not other children to give her balance and a sense of proportion. The father is often a help at this stage, as usually he sees more clearly the situation, but in some cases the father is the more anxious and fussy of the parents. He also sometimes makes the natural mistake of over-exciting the child on his return home from his day's work, even perhaps waking the child up for a romp because he "has not seen the little chap all day." Yet he does not appreciate the exactly parallel situation when his son wakes at 5 a.m., when the little chap is feeling ready for a romp!

As the years go on the mental and social development of the only child needs special understanding and treatment from time to time, and a few hints in regard to this matter will be given in a later article.

Orchard Notes for April.

THE COASTAL DISTRICTS.

IN the Orchard Notes for March the attention of citrus-growers was called to the necessity of their taking the greatest possible care in the gathering, handling, sweating, grading, and packing of the coming crop of fruit, as the returns for the labour expended in the upkeep of their orchards will depend entirely on the condition in which the fruit reaches the market. Many growers fail to realise the very important fact that the success of fruitgrowing does not depend merely on the proper working and management of the orchard, so essential for the production of a good crop of high-class fruit, but that the manner in which the fruit is handled and placed on the market is of even greater importance. In no branch of fruit culture is this more evident than in the case of citrus fruits, as no fruit pays better for the extra care and attention necessary to enable it to be marketed in the best possible condition. Every season there is more or less loss in the consignments sent to the Southern markets, the percentage depending mainly on the weather conditions, the loss in a wet year being much heavier than that in a dry year.

A very large percentage of the loss is due to what is known in the trade as specking—viz., a rotting of the fruit caused by a mould fungus—and this loss can be prevented, provided necessary precautions are taken. Although this matter was dealt with last month, it is of such vital importance to our citrus-growers that it is necessary to again refer to it.

In the first place, growers must clearly understand that specking cannot occur on perfect fruit, the skin of which is free from injury of any kind. The fungus causing specking can only obtain an entry into the fruit through an injury to the skin; it will thus be seen that the remedy for specking is to take every possible care not to injure the skin of the fruit in any way.

Few growers realise how easily the skin of citrus fruits is injured, especially that of fruit grown under moist and humid conditions, when the skin is full of moisture and so tender that the least sign of rough handling causes serious injury, as the cells of the skin are so brittle that they are easily broken, and when so broken a ready means of entry for the mould fungus is provided, and specking follows in due course.

The remedy for specking is in the hands of the grower, who must learn so to gather, handle, and transport the fruit from the orchard to the packing-shed that it does not receive the slightest injury, and further, that when it has reached the packing-shed it must be carefully placed in shallow bins or on trays and be exposed to the air for at least seven days, so that the surplus moisture in the skin may be removed, and the skin thus become toughened and less easily injured. This drying of the skin is known as "sweating," and during the time the fruit is being sweated it should be kept under observation, and all fruit showing signs of specking or injury from fruit flies, sucking or boring insects, mechanical injury or bruising, should be removed.

In order to prevent injuring the skin when gathering, all fruit must be cut and not pulled. Gloves should be used to handle the fruit, and when cut it should be placed in padded baskets or other suitable receptacles. Any fruit that falls or is injured in any way should be rejected, as it is not fit to send to a distant market. At the same time, if the injury is only slight, it can be sent to a local market for quick sale.

For Southern markets only perfect fruit should be selected, and further, it must be graded for size, colour, and quality, and properly packed, only one grade of fruit being packed in a case. The cost of cases, freight, and marketing is now so high that only the best fruit will pay to send to the Southern States, and even the best fruit must be properly graded and packed in order to produce the best returns.

All orchards, vineyards, and plantations not thoroughly clean should receive immediate attention, as from now till the next rainy season the ground must be kept in a thorough state of tilth and free from weeds in order, in the first place, to retain moisture in the soil, and, in the second, to enable birds, ants, and predaceous insects to get at and destroy the pupæ of fruit flies and other pests harbouring in the soil.

Banana and pineapple plantations must be put into good order, and kept free from weed growth.

Land to be planted with trees should be got ready, as, if possible, it is always advisable to allow newly-cleared land time to sweeten before planting.

Farm Notes for April.

FIELD.—Those areas already lying in fallow for subsequent sowing with wheat should be kept in good tilth, using field implements that have a stirring effect in preference to those which tend to reverse the surface soil. The surface should never be allowed to cake; consequently all showers must be followed by cultivation, as soon as conditions will permit of teams and implements working freely.

Early fodder crops, such as barley (skinless or Cape) and certain varieties of wheat may be sown during April. Growers of winter fodders will be well advised to study the article dealing with dairy fodder plots which appeared in February, 1922, Journal.

Potatoes should now be showing good growth and must be kept free from all weed growths by means of the scuffler. If sufficiently advanced, and any doubt exists as to the prevalence of blight, advantage should be taken of fine weather to give a second spraying of "burgundy mixture," a calm and somewhat cloudy day being chosen if possible for the spraying.

Where land has been previously well prepared, lucerne sowing should be carried out this month, and intending growers of this fodder will be well advised to ascertain the germinating qualities of seed submitted to them for purchase. The difference between a good and bad "strike" is often traceable to the poor class of seed sown.

Maize and cotton crops should now be in the harvesting stage, and, once matured, are better in the barn than the open paddock, where weevils and other insects are usually prevalent at this season of the year.

Root crops sown last month should now be making fair growth, and during the early period of such should be kept free from weeds, and where necessary thinned out. Sowings of mangels, swedes, field carrots, sugar-beet, and rape may still be made where conditions of moisture will permit.

As the sowing season is close at hand for certain varieties of wheat—i.e., those which require a fairly long period to develop in—every effort should be made to bring the seed-bed into the best possible tilth and to free it from foreign growths of all kinds. The grading of all seed-wheat is strongly recommended, and growers who favour certain varieties should adopt a system of seed selection from prolific strains with a view to the raising of larger quantities of pure typical grain for ultimately sowing in their larger fields.

Pickling of wheat to prevent smut (bunt) is necessary. Germination tests should be carried out prior to commencing seeding operations.

Sorghums which have matured and are not immediately required as green fodder should, wherever possible, be conserved as ensilage to provide for a reserve, to tide over the period when grasses and herbage are dry. Succulent fodder of this description is the best possible form of insurance against drought, and for maintaining dairy and other stock in thrifty condition.

CLIMATOLOGICAL TABLE—JANUARY, 1933.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature. Means. Max.	Means. Min.	Extremes. Max.	Extremes. Date.	Extremes. Min.	Extremes. Date.	Rainfall. Total.	Rainfall. Wet Days.
	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Coastal.									
Cooktown	29·81	90	75	100	6	71	4, 13	534	9
Herberton	..	86	65	90	12, 13	57	12	655	12
Rockhampton	29·81	91	73	103	12	69	30	1,244	11
Brisbane	29·86	86	70	94	16	65	8	1,001	14
Darling Downs.									
Dalby	29·82	91	66	104	12	58	31	444	10
Stanthorpe	..	83	60	97	13	48	31	752	13
Toowoomba	..	84	62	99	13	52	31	940	14
Mid-interior.									
Georgetown	29·77	94	73	102	13, 14	69	6	1,034	22
Longreach	29·73	104	75	110	19, 2, 11	66	31	221	5
Mitchell	29·76	98	68	107	11, 12	56	6, 31	92	11
Western.									
Burketown	29·78	97	78	106	15	70	31	261	4
Boulia	29·75	104	73	114	10	64	7, 8	17	1
Thargomindah	29·76	99	71	112	10	61	8	9	3

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF DECEMBER, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING JANUARY, 1933, AND 1932 FOR COMPARISON.

Divisions and Stations.	Average Rainfall. Jan.	Average Rainfall. No. of Years' Records.	Total Rainfall. Jan., 1933.	Total Rainfall. Jan., 1932.
North Coast.	In.		In.	In.
Atherton	12·12	32	8·41	15·74
Cairns	17·00	51	5·59	37·13
Cardwell	16·86	61	12·16	23·99
Cooktown	14·71	57	5·34	29·34
Herberton	9·67	47	6·55	11·39
Ingham	16·02	41	2·45	14·14
Innisfail	20·68	52	6·12	38·76
Mossman Mill ..	17·86	20	8·40	28·12
Townsville	11·20	62	5·99	8·86
Central Coast.				
Ayr	11·36	46	5·16	12·31
Bowen	10·23	62	7·36	9·96
Charters Towers ..	5·55	51	1·76	4·64
Mackay	14·56	62	9·05	29·49
Proserpine	16·64	30	5·34	25·02
St. Lawrence ..	9·57	62	3·40	5·79
South Coast.				
Biggenden	5·28	34	9·31	1·23
Bundaberg	8·90	50	12·50	0·52
Brisbane	6·49	82	10·01	3·06
Caboolture	7·78	46	4·91	1·49
Childers	7·66	38	8·23	0·39
Crohamhurst ..	12·75	40	7·09	0·90
Esk	5·73	46	5·96	0·46
Gayndah	4·67	62	6·40	0·45
Gympie	6 72	63	6·67	0·26
Kilkivan	5·61	54	5·46	0·05
Maryborough ..	7·39	61	5 61	0 62
South Coast—continued—				
Nambour	10·00	37	5·72	0·90
Nanango	4·69	51	4·48	1·19
Rockhampton ..	7·76	62	12·44	1·88
Woodford	7·98	46	4·89	0·84
Darling Downs.				
Dalby	3·26	63	4·44	0·96
Emu Vale	3·14	37	5·08	0·98
Jimbour	3·52	45	4·12	0·88
Miles	3·63	48	3·46	0·62
Stanthorpe ..	3·51	60	7·52	0·59
Toowoomba ..	5·00	61	9·40	0·48
Warwick	3·50	68	7·48	1·23
Maranoa.				
Roma	3·15	59	2·22	0·44
State Farms, &c.				
Bungeworgorai ..	1·87	19	1·38	0·57
Gatton College ..	4·12	34	10·26	2·29
Gindie	3·78	34	5·51	1·33
Hermitage ..	3·12	27	..	1·72
Kairi	9·55	19	5·04	17·68
Mackay Sugar Experiment Station	14·77	36	7·27	25·51

GEORGE E. BOND, Divisional Meteorologist.

ASTRONOMICAL DATA FOR QUEENSLAND.

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

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	March, 1933.		April, 1933.		MOONRISE. Mar., 1933.	Apr., 1933.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	5·48	6·21	6·5	5·47	9·50	11·19
					p.m.	p.m.
2	5·49	6·20	6·6	5·46	10·45	12·13
3	5·49	6·19	6·6	5·45	11·32	12·59
					p.m.	
4	5·50	6·18	6·7	5·43	12·33	1·47
5	5·51	6·17	6·7	5·42	1·27	2·27
6	5·51	6·16	6·8	5·41	2·19	3·4
7	5·52	6·15	6·8	5·40	3·8	3·37
8	5·52	6·14	6·9	5·39	3·53	4·8
9	5·53	6·13	6·9	5·38	4·32	4·41
10	5·53	6·12	6·10	5·37	5·8	5·16
11	5·54	6·11	6·10	5·36	5·51	5·52
12	5·55	6·9	6·11	5·34	6·13	6·33
13	5·55	6·8	6·12	5·33	6·45	7·24
14	5·56	6·7	6·12	5·32	7·19	8·26
15	5·56	6·6	6·13	5·31	7·56	9·30
16	5·57	6·5	6·14	5·30	8·41	10·35
17	5·57	6·4	6·14	5·29	9·34	11·39
18	5·58	6·3	6·15	5·28	10·33	..
						a.m.
19	5·59	6·2	6·15	5·27	11·37	12·45
20	5·59	6·0	6·16	5·27	..	1·46
					a.m.	
21	6·0	5·59	6·17	5·26	12·42	2·43
22	6·0	5·58	6·18	5·25	1·48	3·39
23	6·1	5·57	6·18	5·23	2·51	4·34
24	6·1	5·56	6·19	5·23	3·52	5·29
25	6·2	5·54	6·19	5·22	4·50	6·23
26	6·2	5·53	6·20	5·21	5·45	7·21
27	6·3	5·52	6·20	5·21	6·40	8·17
28	6·4	5·50	6·21	5·20	7·37	9·10
29	6·4	5·49	6·21	5·19	8·33	10·3
30	6·5	5·48	6·22	5·18	9·30	10·54
31	6·5	5·47	..	..	10·24	..

Phases of the Moon, Occultations, &c.

4 Mar.	☾ First Quarter	8	23 p.m.
12 ,,	○ Full Moon	12	46 p.m.
19 ,,	☽ Last Quarter	7	5 a.m.
26 ,,	● New Moon	1	20 p.m.

Apogee, 4th March, at 4.6 a.m.
Perigee, 16th March, at 2.30 a.m.
Apogee, 31st March, at 11.12 p.m.

On the 6th Mercury will reach its greatest height, 18 degrees above the horizon at sunset, being apparently near the borderline between Aquarius and Pisces, and Venus and Saturn having set before the sun, Mercury will be favourably placed for general observation as the twilight deepens and the planet comes into clearer view.

An interesting occultation of Regulus, the principal star in Leo, will take place in Northern Queensland at an early hour on the 10th, and should attract the attention of many naked-eye observers, who will find the Moon approaching Regulus as soon as they become observable after sunset.

Mars and Neptune will reach the meridian almost exactly at the same time, shortly before midnight on the 11th, but Mars will be 3 degrees further north than Neptune. Jupiter will reach the meridian 6 hours earlier.

On the 21st at midday the Sun will be on the equator, crossing from south to north, and the Australian autumnal equinox will occur. The rising and setting of the Sun will then be due east and west.

The conjunction of Saturn with the Moon at 1 p.m. on the 22nd should form an interesting daylight spectacle, as they will be halfway between the meridian and the western horizon. Saturn will be 2 degrees north of the moon.

On the 23rd, when Mercury is passing from the east to the west side of the Sun, it will be as much as 4 degrees southward of it.

Mercury and Venus will be in conjunction with the Moon at 2 and 3 a.m. on the 26th before rising. When above the horizon their grouping together will be too near the Sun to be observable.

Mercury sets at 7.6 on the 1st and at 6.32 p.m. on the 15th.

Venus rises at 4.48 a.m. on the 1st and at 5.12 a.m. on the 15th.

Mars rises at 6.41 p.m. on the 1st and at 5.19 p.m. on the 15th.

Jupiter rises at 6.54 p.m. on the 1st and at 5.56 p.m. on the 15th.

Saturn rises at 3.23 a.m. and sets at 5.2 p.m. on the 1st; on the 15th it will rise at 2.45 a.m. and set at 4.1 p.m.

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3 Apr.	☾ First Quarter	3	56 p.m.
10 ,,	○ Full Moon	11	38 p.m.
17 ,,	☽ Last Quarter	2	17 a.m.
25 ,,	● New Moon	4	38 p.m.

Perigee, 12th April at 9.12 p.m.
Apogee, 28th April at 2.0 p.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 23 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.