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PART 2.

Event and Comment.

Cane Crop Prospects.

THE approximate estimates of the several sugar-mills in Queensland for the present month show an anticipated yield of 3,500,000 tons of cane, which should give, when crushed and manufactured, about 440,000 tons of sugar. Should these figures be realised, this would be an excess of some 50,000 tons of raw sugar above last year's output, but much less than the production in 1925. On the whole the season has been very favourable, and the yield in the southern sugar districts will be considerably higher than last year. The output of raw sugar in New South Wales this season is expected to be 26,000 tons, in addition. The Director of Sugar Experiment Stations, Mr. H. T. Easterby, who recently returned from an extensive tour of duty through the Northern sugar areas, informs us that at Mackay, this year, there is a particularly fine crop and all the mills are anticipating large tonnages. It is expected that this district will cut 700,000 tons of cane, which should yield 87,000 tons of sugar. At Cairns the crops are reported to be weighing on the light side, and as a result of the February cyclone the mill estimates show a reduction on the crops of the past three years. At Babinda, last year, 235 farmers delivered cane to the mill; the crop was cut by 275 men, the daily average being 3.9 tons per man. At the end of June this year wet weather was continuing and greatly hampering factory operations. In the Innisfail district the crops are also cutting on the light side. The rainfall there for the half year amounted to some 123 inches. February was the wettest month, when 45.42 inches were recorded. May was the driest, with 9.82 inches. During the half year over 100 wet days were experienced.

Many of the new seedling canes at the South Johnstone Experiment Station show great promise, particularly the Badila seedlings. It is hoped to make a small distribution of a limited number of these next year.

The Tully district has experienced more rain than either Babinda or Innisfail, the total for the first six months of the year being 153 inches. The mill commenced crushing on the 26th May, and is putting through a weekly cane weight of about 7,000 tons.

In the Lower Burdekin, the Inkerman and Pioneer mills, which had been stopped by rain, resumed on the 12th July. The cane has made good growth this year, and the fine rains will save large irrigation costs. Kalamia mill is now crushing, and is expecting to receive a heavy tonnage at the carrier. A large acreage has been planted for Pioneer and Kalamia for next year, the estimate being over 9,000 acres for the two mills. The young cane looks particularly well, and if the season continues favourable the mills will have some difficulty in getting through the 1928 tonnages.

The Queensland crop generally, while not so heavy as in 1925, will be greater than that of last year. The commercial cane sugar in the cane is not too high in Cairns, Babinda, Innisfail, and Tully at present, owing to excessive rain, but is good in the Lower Burdekin and Mackay districts.

The Citizen of To-morrow.

“ANYONE noticing them could not fail to be struck with the exceptionally healthy physique and cleanliness of the boys and girls who attended the schools in Queensland. When the Empire parliamentary delegates visited Brisbane the fine types of school children impressed them, and I was told that the system of education in vogue certainly must be conducive to the building up of citizenship of character.”

The Minister for Education (Mr. T. Wilson) incorporated these words in his speech at the opening ceremony of a new State school recently. Mr. Wilson added that the well-dressed children who attended the schools expressed the undoubted prosperity and happiness of the whole community. He referred to the frequency with which he was called on to perform such functions, and said that it was a clear indication of the growth and progress of the State. The standard of civilisation attained by any country might be estimated by the number and character of its educational establishments, and considering the fine institutions which Queensland could boast of, they must recognise that, in common with the other States, Queensland had a foremost place among the progressive components of the British Commonwealth.

“Queensland and Loyalty Synonymous Terms.”

A HEARTY welcome was tendered to his Excellency the Governor of Queensland, Sir John Goodwin, on 27th June, by ex-members of the A.I.F. Responding to the toast of his health, Sir John said:—“Englishmen one and all know the sterling metal of which the Australian troops were composed—how they could work, and how they could fight. It is with intense pride that we feel that we are of the same blood. . . . I do not believe that any man, even for an instant, could doubt the loyalty of Australia or of Queensland. It would be impossible for anybody to do so. Queensland and loyalty are synonymous terms, and this has been proved over and over again. Queensland must feel very proud of the fact that nearly 50,000 of her sons went overseas to enter on a fight for humanity's sake.”

The Fuel of the Future—Modern Road Transport.

WHILE in Brisbane recently the chairman of the Development and Migration Commission (Mr. H. W. Gepp) described the work and ramifications of the new Federal organisation at a representative public gathering. He added interest to the address by picture demonstrations of transport machinery which it was proposed to use in the moving and conservation of fodder in Australia.

At present, he said, the Commission was investigating the economics of the gold-mining industry throughout the Commonwealth, the effects of tariffs, of legislation, or regulations under the Mining Acts, and the effect of taxation on investments in gold mining.

Regarding mechanical transport, Mr. Gepp added that he believed that special mechanically propelled vehicles would be co-ordinated with the railways, and that there would also be road trains of the right type, possibly driven by our own fuels. The fuel side of the question was interesting. Coal, coke, and charcoal were all likely fuels. In France to-day they had completely solved the problem of the utilisation of charcoal in place of petrol. The comparative costs of petrol and charcoal in Australia made the charcoal a means of saving the westerner a great deal of expense in his transport.

The transport problem was almost inseparable with that of fodder conservation, which in itself offered a wide range of possibilities.

"This Pacific Eden."

A NEWFOUNDLAND member of the Empire Parliamentary Delegation which visited Australia last year has set down his impressions in a book brightly and carefully written, and from which it is evident that he found Australia a good country and Queensland a land of beauty, progress, industry, and hospitality. After a short stay in the capital on his way North with the Delegation, he has this to say of his Brisbane visit:—

"As the train steamed out from the station, the consensus of opinion was that whatever experiences the visit held in store, the kindness, goodwill, and cheery friendliness of the Queensland capital, though it were equalled, could not be excelled."

About the Doctrine of White Australia, he writes:—

"... The courage with which the task has been enterprised, one which would have been regarded as impossible of successful issue a few years ago, commands admiration. Queensland has proved, beyond question, that the adaptability of the white race, though it may be at its best in the temperate zones, is not confined to them. What Greely and Peary, Steffansen, our own Bartlett, and others have proved by their arctic experiences, Queenslanders are daily proving in the tropical regions of the State—that the British race, by sheer courage and grit, is able to overcome all handicaps of either tropical or arctic temperatures."

Enthusiasm is expressed concerning the scenery in North Queensland, and he is amazed at the beauty of the Barron Falls. He writes, too, of the Atherton Tableland, Yungaburra, Lake Eacham, Cairns, Townsville, and the towns all down the coast at which the party stopped. His last chapter on the visit to this State is called "Farewell to Wonderland," and his words are—

"One would fain linger longer amid the infinite variety of this delightful land, yet to omit some reference to the three Queensland—North, Central, and South—as a fruitgrowing paradise, would be unpardonable. The claim made that Queensland can produce all the cultivated fruits of the world is not without ample warrant. . . . (Here is quoted a poem on Queensland.) Such is the rhapsody of an unknown patriotic poet, and, if somewhat extravagant in its claims, it interprets in large measure the feelings of those who in their ten days' tour gained many glimpses of this Pacific Eden, and desired more."

The remainder of the book deals with the party's journey from Brisbane to Fremantle. One gathers from this book that all members of the Parliamentary Delegation left Australia filled with vivid and pleasing impressions of the country and its people.

Tobacco Growing in Queensland.

IN commenting on the interest his Department was taking in the revival of tobacco-growing in Queensland, the Acting Premier and Minister for Agriculture, Mr. W. Forgan Smith, informed the Press recently that the position of the grower of tobacco in Queensland at present is not at all satisfactory, and without some encouragement is not likely to improve in the immediate future. The limited amount of pipe-tobacco leaf grown here is raised principally in the Inglewood and Texas districts. As this leaf is air-dried and not flue-cured in the manner required by the manufacturer, lower values must be expected. Queensland, however, has the quality of soil required to produce a good leaf, and, apart from seasonal irregularities, climatic conditions are favourable. The Bowen and Proserpine districts have already demonstrated their fitness to produce a high-class cigar leaf, but market fluctuations have prevented any expansion of the industry there. Some years ago, an appreciable tonnage of tobacco leaf was grown in Queensland, the figures for 1905 being 1,145,760 lb. of dried leaf from an area of 933 acres. In 1925, the return was only 103,523 lb. of dried leaf from 96 acres. These comments are advanced merely to indicate that serious consideration of ways and means is required in order that the tobacco-growing industry could aspire to some degree of importance in Queensland, and, among other matters, it is Mr. Forgan Smith's intention to have personal consultations with the Federal authorities and with the managing director of the British Australasian Tobacco Company when he is again in the South next month. It may be of interest to note that from 1920 to 1925, there were introduced into the Australian Commonwealth, an average of 21,060,779 lb. of tobacco per annum. Roughly, this can be put down as the produce of at least 20,000 acres of land. This will give some idea of the possibilities of tobacco as a primary industry for Australia. The bulk of the tobacco imported into the Commonwealth is what is known as unmanufactured, and the value of the importations of this particular form of tobacco into the Commonwealth in 1924-25 was £2,005,939 sterling. The duty on tobacco ranges from 2s. a lb. payable on unstemmed unmanufactured tobacco to 13s. a lb. for cigars.

Bureau of Sugar Experiment Stations.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (23rd June, 1927) of observations for the period May-June 1927, from the Southern Assistant Entomologist at Bundaberg, Mr. R. Mungomery:—

Red Markings on Cane Leaves.

Along the midrib of certain cane leaves, during almost any period of the year, can be seen a number of reddish markings or blotches, which have often been regarded with suspicion by many growers. These blotches vary in colour from light pink when they first appear, to a darker red in their older stages, and ultimately the tissues involved present a dark, dead appearance. In certain varieties of cane this is very noticeable, and at times constitutes an almost complete reddening of the whole midrib. The variety D. 1135 is not usually badly affected, but Q. 813 is very outstanding in this respect, and from the frequent occurrence of these conspicuous markings one often hears the opinion expressed that the particular cane stick, or paddock of cane, as the case may be, is badly diseased. In this connection I would like to emphasise that these red patches have no relationship to the "gum streaks" which are commonly referred to as a means of identifying the gumming disease of sugar-cane. No doubt this mistake is often made by those unacquainted with the true symptoms, and for a description of these distinctive "streaks" the reader is referred to the various reports of the Pathologists of this Bureau.

If these red patches be carefully examined, it will be seen that in their centres, or at intervals along them, appear longitudinal slits of a somewhat deeper colour than the surrounding tissues, and these slits are the punctures which certain insects make in the midrib when laying their eggs. On the top of each slit can be seen, with the aid of a small magnifier, a thin, white, thready substance which the female insect has also left behind, when engaged in the operation of egg deposition.

Sorghum, Johnstone grass, &c., are similarly affected, and the insects concerned are numerous species of leaf hoppers. In the Southern districts the principal hopper associated with cane is *Perkinsiella saccharacida* Kirk., other species being of secondary occurrence. Some of these latter invariably lay an egg mass flat across the leaf blade similar to certain species of moths, whereas *P. saccharacida* seems to be the only species found attacking cane in this locality, which punctures the midrib in the following manner:—The epidermis of the midrib is pierced by the hopper's sharp ovipositor, and tiny banana-shaped eggs are inserted at an angle into the inner tissues, there to remain during the incubation period, after which the hopper nymph emerges. During these processes the plant tissues are broken, and this affords an entry for the spores of a fungus organism, which, on germination and further growth, invades the surrounding plant cells, causing the reddening already referred to above, and a corresponding increase of the red patch as the fungus continues to grow. At most this may cause a slight interruption in the flow of cell sap, but such an injury is usually regarded as being of minor importance only.

The midrib borer, *Cosmopteryx dulcivora* Meyr., which is a caterpillar of a small moth, is also responsible for injury to the midrib, being characterised by irregular tunnels, which as they become older produce the reddening similar to that produced by leaf hopper attack, but this insect has not been observed by the writer south of Mackay.

Parasites of the Leaf Hopper.

In reference to the leaf hopper *P. saccharacida*, this insect is kept from doing great injury to sugar-cane, by the number of parasites and predators that attack it. Some of these have been successfully introduced into other countries for the control of this pest, where its ravages had hitherto assumed serious proportions. In this respect it will be of interest to note that several specimens of a small chalcid wasp, *Paranagrus optabilis* Perk., have been bred at the Bundaberg Laboratory from the eggs of this hopper, the material having been collected on the Southern Sugar Experiment Station.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterly, has received the following report (18th July, 1927) for the month of June-July, 1927, from the Southern Assistant to the Entomologist, Mr. R. W. Mangumery:—

In the course of the period Mackay and the outlying districts were visited, for the purpose of ascertaining the extent of the injuries caused to cane through insect attack this year, and of advising farmers of the best methods to follow when undertaking control measures. On the whole this large district is relatively free from pests, and this fact, combined with the excellent growing conditions which have obtained since the early part of the year, places Mackay in a very satisfactory position as regards the total tonnage of cane which the various mills anticipate treating in the coming season. Individual growers have incurred rather severe losses, and, at first, this would seem to falsify such a generalised statement concerning the losses through pests, but fortunately such instances are comparatively few, and the actual damage amounts to a small figure when examined against the total of the season's estimate. The chief insect pests met with the grub of the "greyback" cane beetle *Lepidoderma albohirtum* Waterh., and the weevil borer, *Rhabdocnemis obscurus* Boisd.

Cane Grubs.

As in former years, the chief damage is that inflicted by the notorious "greyback" cockchafer grubs, and the centres that have suffered the worst infestations are Sarina, Mount Jukes, Kungurri, and Habana. This sequence gives roughly the order of severity. In certain areas the degree and extent of the infestation has increased in comparison with that observed last year. Especially is this noticeable at Kungurri, whilst infestation in the Habana area appears to be of a milder nature.

Sarina and Mount Jukes have again suffered bad losses, and it is a veritable scene of destruction which confronts the eye when viewing these otherwise potential sugar-producing areas. Both of these areas were visited last year, and farmers were advised to try soil fumigation with either carbon bisulphide or paradichlorobenzene in the first months of the year, when the grubs are in their younger stages. However, the current year opened up very auspiciously with its copious rains, and most growers were under the impression that, with such a wonderful growing season, grubs would be of small consequence, and the idea of fumigating their cane land was temporarily abandoned. This proved a fallacy, for it is well known that grubs are able to do extensive damage in wet seasons as well as in dry ones, though dry conditions always augment the actual grub damage. At the present time acres of cane may be seen levelled to the ground, and this is a repetition of happenings in previous years, when only about one-half of the tonnage estimated in the preliminary estimate was realised when harvesting operations had been completed. Good crops of Badila, E.K. 28, Pompey, Black Innes, and D. 1135 were destroyed this year by grubs, therefore, when some of these deeper rooting canes have been unable to withstand the attack, it is futile to plant the shallower rooting types like Q. 813 and Clark's Seedling in friable soils which are liable to become grub infested. The results in nearly all cases are sure to be disastrous. Grub attack may affect cane in the following ways:—

- (1) Reduction or total loss in tonnage.
- (2) Lowering of the sucrose content of the juice.
- (3) Failure to produce ratoons, or, at best, subsequent ratoons are spindly, and are liable to the whole complex of root fungus troubles.

Since last visitation it is particularly pleasing to notice the increased interest growers are taking in control work, and during the coming year I anticipate a much greater activity in fumigation work. The collecting of beetles and grubs must be supplemented by fumigation, and every means must be employed to oust the grubs from cane lands, otherwise it follows as a necessary corollary that the cane must simply be abandoned to them. Fumigation is effective and also practicable, as shown from the large scale operations that are being conducted on some of the plantations in the North of Queensland against the same grub. Moreover, a subsidy is granted by the Mackay Pest Destruction Board, amounting to half the cost of the fumigant used in the destruction of these pests, so this brings down the cost of application considerably, coming well within the reach of all growers. In grubby areas fumigation is a form of crop insurance, and now is the time to procure injectors and fumigant in anticipation of another severe infestation in the coming year. Such preparation will pay in the end.

Weevil Borer.

A somewhat sporadic infestation of this borer is noticeable throughout the district. The larvæ were found tunnelling cane at Mount Jukes, Habana, Kungurri, and Pleystowe. Mostly standover canes are the ones affected, but otherwise the infestation is light. This is no doubt due to most of the cane being cut last year and sent to the mill, thus killing off developing larvæ, and leaving few breeding places for the adult weevils. Growers are urged to continue cutting all cane harbouring these pests, and to burn off the trash and any rotting cane in a badly infested field.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following supplementary report (5th July, 1927) on the Mackay district, from the Assistant Pathologist, Mr. E. J. F. Wood:—

Mosaic is present in every area, but only to a small extent, except in Farleigh, Mount Jukes, and the district round Gargett, Finch Hatton, and Netherdale, and at Habana. There are a few farms, too, at Sarina that have more than their share of the disease. Where there is no grub infestation, Q. 813 is a very desirable variety for its resistance to the disease, and in the grub areas Q. 855 should be substituted. I should advise the farmers in the more heavily infested areas to procure clean seed and to plant this. I saw at Finch Hatton several blocks of plant cane in which Mosaic is already showing up, though the plants are only about a month old. There is no need for this sort of thing if the farmers are careful, and select clean seed. On a farm at Habana I found some Shahjahanpur 10, the worst cane for Mosaic, and nearly every other variety on the farm had become infected through this cane.

Leaf Stripe was seen by Mr. Mungomery at Hatton in green D. 1135, and the specimen was shown to me for identification. The farmers and millers in this area should make every effort to eradicate the diseased stools before infection becomes general.

Red Rot is to be found from Inneston north to Mackay, and maybe beyond. Specimens shown at Field Day were procured from a farm not far away, and a field of E.K. 28 was seen to be full of it at Habana.

This is a warning that this rather complex root and stem trouble is liable to become a serious epidemic, and the rules that I laid down at Field Day should be followed as closely as possible till further experimental work is carried on. From the nature of the disease they should prove effective if correctly applied. I am afraid that with the methods of cultivation employed the disinfection of plants would be useless, as the ploughing away and chipping will cause wounds which will be sufficient to enable the fungus to enter the tissues. Still this might be tried on a small scale by any farmer who is experimentally inclined.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received from the Assistant Pathologist, Mr. E. J. F. Wood, the following report (14th July, 1927) on the Proserpine district:—

Proserpine is a district comparatively free from disease, but this does not mean that the farmers should relax their vigilance on this account. On the other hand it behoves them to work the harder so that the little that is in their district should be eradicated. It is only natural that many farmers in a lightly infected area may not be able to recognise many of the diseases, so it will be well to get rid of any plants which have any unusual appearance in order to be on the safe side. If an officer of the Bureau is near at hand it is, of course, best to ask for his advice on the trouble, or to keep a record of the symptoms, as these are often sufficient to characterise a disease. To do this it is necessary to observe any peculiar leaf symptoms, note the appearance of the root and stem, and cut the latter lengthwise at the butt end and tip, and note any red streaks or patches, any pithiness or hollowness, &c.; also cut the stem across and place in a billy-can near the kitchen fire for some hours. This will serve to identify gumming disease, by the yellow gum on the end of the cut stick. If you do this carefully it will be possible for the officer to give you some idea of the trouble. I was asked several times on Field Day at Mackay, "Some of my cane died off from the top; what

was wrong with it"? The farmers could give me no more information, and expected an answer. They were quite surprised when I gave them a list of half a dozen diseases, and several insects that could cause these symptoms.

Many farmers in this area have a strong desire to bring in plants from outside, but this is considered highly inadvisable. The district has all the main varieties; and also several classes of soil—scrub, forest, river flat—so what need is there for this introduction. If the area were highly diseased I could understand the request for clean seed, but not as things are now.

Against this introduction is a very strong argument—that the introduction of plants to a comparatively clean area is fraught with considerable risk of bringing in new troubles.

In the Mackay district is Red Rot, which seems to have a wide distribution, and is much influenced by the seasons, so that it is hard to tell at present just where it is distributed. Now Red Rot influences the density and tonnage, and gives trouble to both the farmers and millers, so it is not worth while for the farmers to introduce this disease along with plants from Mackay. Of course the plants might be healthy, but on the other hand they might not, and I am unwilling to undertake the responsibility of certifying to plants from the Mackay area.

Farther south, in Bundaberg and Nambour, is gumming, another serious trouble which once practically drove the farmers at Cudgen and other parts of the Northern Rivers from their lands, and is threatening to do so again at Broadwater. No sane farmer would wish to introduce plants from these areas.

Maryborough and Beenleigh have Fiji disease, and are quarantined.

Innisfail and Babinda have Leaf Scald, and Ingham has gum, and further north Leaf Stripe is prevalent.

Need I say more on the advisability of keeping to your own plants? Change about on your own soils but do not go outside. This moral applies to other places than Proserpine, especially to Koumala, Carmila, and Flaggy Rock, and to Bucca and Pialba. In fact, it would be ideal to institute a quarantine in each district, whereby plants could only be sent to another district through the two Local Producers' Associations concerned, and that after an inspection of the field by a pathologist. Then you would insure clean plants, but until these highly necessary protective measures are taken, imported seed cane is bound to be an uncertain proposition.

With regard to the canes distributed by the experiment station at Mackay, these restrictions do not apply, for the canes are tested and examined by a pathologist frequently, and the chemist in charge also knows the diseases well, so that now these canes are under the frequent supervision of experts and are perfectly safe. It will be well for the farmers to try and procure the best of the available new varieties. P.O.J. 2714 has the reputation of being immune or highly resistant to Mosaic. I am personally unable to vouch for this as the cane has never been tested in this respect in Australia. It is, however, a heavy cropper with so far a good density, and as far as the Mackay station is concerned is free from all signs of disease. It is a green to bronze cane rather like E.K. 28, but with much longer joints, more waisted, and without the short joint of the latter variety. The eye is pointed and the top fairly long and dark, rather like the top of E.K. 28.

Cane-killing weed (*Striga*) is still present on a farm at Kelsey Creek, and the planting of a legume crop on the affected field is suggested as a remedial measure; frequent ploughing is also essential. The white bands on the leaves of some varieties, such as Q. 813, M. 1900 S., D. 1135, M. 189, &c., are not due to a disease, but to the chilling and sudden heating of water in the leaf spindle, owing to a cold night followed by a hot morning. (This theory was propounded by Mr. D. S. North at the Sugar Conference at Hawaii some years ago.) Ice inserted into the spindle will produce the same result. For want of a name it is known as Sectional Chlorosis.

The red midrib of the leaves is, as stated previously, due to insect agency, and not to any disease. Mosaic is slight on a few farms, and those that have this trouble are advised to get rid of the diseased stools as soon as possible. With regard to this disease, Q. 813 and H.Q. 5 are the most resistant varieties known in Queensland and are grown in this area.

Leaf Scald is still present on several farms at Conway, and was till recently on a farm in the Proserpine area itself, so that it may easily be still more widely distributed. It is at present in the acute stage and is hard to identify as such without the appearance of the chronic symptoms. These include a white pencil line

along the leaf, especially in side shoots and suckers. The sticks die, and the buds sprout all down the stem, these having the leaf symptoms and red fibres inside running down through the stick. In the acute stage death occurs without any definite symptoms. Fields showing Leaf Scald should be ploughed out as soon as possible and fallowed under green manure for a spell.

Red Rot is appearing on farms in the Glen Isla, Strathdickie, and Up River areas, and may be even more widespread, though it does not as yet seem to cause any appreciable damage. But it will be as well to look carefully to plants of Clark's Seedling and to reject any showing a red butt to the stem. If the farmers have read my previous report on the Sarina area, they will have some idea of the seriousness of the Red Rot problem in that area, and also know something of the methods suggested for its control. This disease will cause serious fluctuations in the density, and, I believe, these have been occurring to some extent at the mill; the existence of this disease helps to explain them. The cane in Cannon Valley seems to be on the whole healthy, and Red Rot was not observed there. Q. 813 is healthy throughout except for a little Leaf Scald at Conway.

Finally, grubs are occurring at Conway, and Linear bugs were seen there in profusion on the Badila, while the stem borer is doing some damage, which may easily be confused with the damage due to Red Rot or Leaf Scald in its present stage. Breaking the stick will serve to identify this latter pest.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report from the Entomologist at Meringa, Mr. E. Jarvis, in connection with the work of that Experiment Station during the period April to May 1927:—

Field Experiments in Grub Control.

A series of experiment plots were laid out during October last on high land of volcanic origin at Meringa, the soil being of a friable nature, well drained, and situated on land which is usually grub-infested more or less badly each season.

A couple of acres on this site were rented about the end of October. A heavy disc plough and three horses were used to turn up the ground from 8 to 10 inches deep. After the first harrowing it was still very lumpy, owing to the hard dry state of the soil. Early in November an acre was planted with top sets of Badila, in hopes of getting a strike by the time beetles were ready to oviposit. The soil, however, was dry to a depth of 7 or 8 inches, so that unless rain fell before the end of the month replanting would be necessary.

It so happened that no rain worth mentioning fell until 28th December, when 1.16 inches were registered at Meringa. On 30th December we replanted this area of Badila with D. 1135, and early in January put in a second acre with the same variety. During the cyclone experienced on 10th February the young cane on our experiment plots, being only 12 to 18 inches high, did not suffer much; but three days later, on the 13th when 14.70 inches of flood rain fell, growth of these plants was checked owing to the planting furrows having been filled to the top with fine soil, silted into them by the surface water.

Notes on Soil Fumigants.

Amongst results obtained up to the present those relating to the use of paradichlor. and carbon bisulphide will interest cane farmers. Our tests with the former of these fumigants proved that, when treating very young plant cane growing in friable soil during midsummer in dry weather, injections should not be made nearer than 5 to 6 inches from the plants.

Past experimentation has demonstrated the danger of injecting either paradichlor. or carbon bisulphide amongst tender roots of young cane shoots, such procedure being always liable to injure or kill them, especially at a time when the sets are beginning to root freely. Later on, when cane has attained a height of 3 to 4 feet and is well rooted, no ill-effects occur, although carbon bisulphide, if injected into the centre of a big cane stool, will sometimes check plant growth for a few weeks.

Ratoon cane 3 to 4 feet high is not injuriously affected by either of these soil fumigants; conclusive proof of which was secured in 1924, when it was observed that on experiment plots laid down in canefields free from grub attack at Highleigh, Freshwater, Sawmill Pocket, and Woree the stools on both treated and control plots, when examined a couple of months after application of the chemical, were found to be of uniform height, colour, and general appearance; proving that such fumigation had not in any way injured root development.

The latest quotations for paradichlor, from the Solway Sales Corporation, New York, is 8½d. per lb., in barrels containing 250 lb. (f.o.b. Solway, America). It can also be procured from Messrs. Buzacott Limited, of Brisbane, in 32-lb. tins at 1s. 1d. per lb.

Interesting details in connection with results obtained on our experiment plots this season against cane grubs by the application of other insecticides and fumigants will be available for report in the near future.

Propagating Tachinid Fly Parasites.

In response to a letter received last February from Mr. G. F. Hudson (secretary of the South Johnstone Cane Pest Destruction Board), asking us to liberate tachinid flies in that district, two consignments of this useful parasite were forwarded from here to Innisfail on 13th April, in charge of Mr. J. H. Buzacott, Assistant to Entomologist. These flies were released next day on two different selections at Japoon, each grower concerned receiving twenty-five living specimens of the parasite, and six sticks selected from a breeding-cage at our laboratory, and containing collectively from 200 to 300 puparia from which fly parasites were due to emerge about a week later.

The living flies were let go amongst borer-infested cane; and the breeding-boxes holding the sticks with puparia established also in affected canefields in the usual manner—viz., by being supported on four legs standing in tins of water to prevent subsequent invasion by ants.

Later, on 25th April, a consignment consisting of twenty-three living specimens of *Ceromasia sphenophori* was sent to the South Johnstone Sugar Experiment Station, in order to restock a large breeding-cage built at the station recently for the purpose of rearing specimens of this parasite for local distribution.

Notes on French's Cane Beetle *Lepidiota frenchi* Blackb.

While ploughing out or preparing cane land on forest country for early planting, growers are very likely to notice numbers of small grubs turning up in the furrows.

These will most probably prove to be second-stage larva of *Lepidiota frenchi*, which during the present year may be expected to occur in considerable numbers, owing to the big general emergence of beetles of this species witnessed in December and January last. Gross infestations of such grubs should be carefully noted, with view to possibility of future trouble in September and October next, by which time these grubs (although comparatively harmless at present) will have assumed the third or final stage of growth and be able then to severely damage young plant cane. Such risk could, however, be avoided or reduced to a minimum by hand-picking these second-stage grubs of *frenchi* during June, before they have gone down out of reach of the plough to construct chambers in which to pass the colder months and ultimately moult into the third instar.

Ants Nesting near Cane Stools.

Carbon bisulphide should prove a successful fumigant for destroying colonies of ants situated around stools of cane or tree-trunks, &c. Before treatment it is of the utmost importance to see that the soil be thoroughly free from excessive moisture to a depth of about 9 inches, as otherwise the fumes will not be able to penetrate deeply enough to destroy all the ants.

Well-worked soils of light mechanical nature are eminently suitable for such fumigation, but carbon bisulphide should not be applied to them until about a week has been allowed to elapse after heavy soaking rain. Clays or clay loams, on the other hand, naturally retain their moisture for a longer period, and unless well drained and cultivated a fortnight should elapse before injecting the above

fumigant. In the meantime, however, much good may result from the use of poison-baits. Amongst the many advocated for this purpose the following has proved one of the best:—9 lb. granulated sugar, 9 pints of water, 6 grams tartaric acid (crystallised), 8.4 grams sodium benzoate; these should be boiled for thirty minutes and allowed to cool. At the same time 15 grams sodium arsenite should be dissolved in hot water and cooled. The poison should then be thoroughly stirred into the syrup and the whole carefully mixed with 1½ lb. of honey.

This bait is weak in action, with the result that it is continually attended, the workers carrying it to the nest and feeding it to the queen and the larvæ, until eventually the entire colony is exterminated. The best container is said to be a can, so dented that the ants can get in under the lid, while the lid still keeps out the rain. A sponge should be floated in the syrup, or a sponge dipped in it may be placed in a paraffined paper bag pierced with holes to admit the ants, and another paper bag, similarly waterproofed, used to cover the whole from the weather.

CANE BEETLES AND CLIMATE.

PAST AND PRESENT POSITION OF THE CANE GRUB PROBLEM.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (30th June, 1927) from the Entomologist at Meringa, Mr. E. Jarvis, dealing with the subject of climatic controlling influences exercised by our annual rainfall on the numerical increase of cane beetles during the past twenty-three years, 1904-1926.

Early Occurrence of the Grub Pest.

Although it is about forty-four years ago since the larvæ of our well-known "greyback" cockchafer (*Lepidoderma albobirtum* Waterh.) were first noticed damaging sugar-cane in the Mackay district, this species was not generally recognised as being a serious cane pest until about twelve years later in 1885.

During the following years (1885 to 1888) cane beetles were reported to be especially injurious on various plantations in the above district, so much so that in some cases hundreds of acres were totally destroyed by grubs and had to be ploughed out.

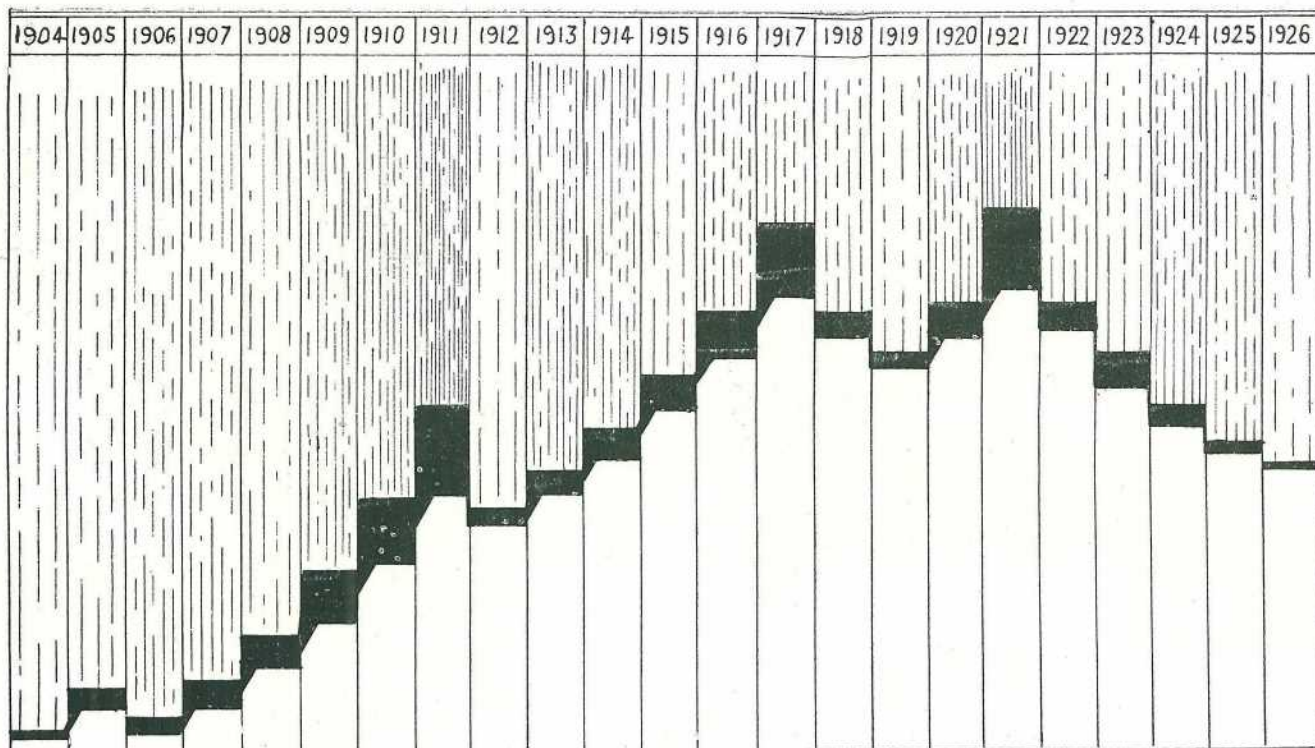
More recently, in the nineties, the trouble became so acute on the Herbert River that concerted action was taken by the growers at Ingham and elsewhere to combat or control the ravages of this insect, by the adoption of such common-sense methods as that of collecting the grubs and beetles, &c.

During the year 1904 the pest received a setback, owing to the rainfall for June to October of the preceding season having been 6.52 inches less than the average for these five months, while the total annual precipitation for 1904 dropped to 62.61 inches.

In 1905, however, grubs were said to be troublesome in our Northern canefields, and two years later (1907-1908) were reported by the State Entomologist to have caused great damage in the Cairns district.

This was to be expected, since it appears that no climatic check of any importance has been experienced between 1905 and 1907. During this outbreak of the pest no less than 22 tons of these beetles were collected from feeding-trees, and other control methods resorted to (1909-1911), with the result that in 1912 the activities of this insect were very noticeably checked.

At Mackay also during this same period (1909-1911) cane beetles were very much in evidence, and the growers expended a sum of £1,256 in capturing them. It will be of interest to mention that the enormous numerical increase of this cockchafer in the Cairns district throughout 1909 to 1911 was due to the phenomenal downpour experienced, the records for these three consecutive years being 105.63, 114.77, and 158.64 inches respectively, as against our annual average rainfall of 91 inches. It is worth noting, too, that in 1909 to 1910 the precipitation during the most critical period in the life-cycle stages of this cane pest—viz., June to October—happened to be 13.19 inches, as against 3.37 inches, the recognised average for these three months in the Cairns district. Moreover, the occurrence of such eminently favourable weather during its pupal state was followed two months later by a further generous fall of 161.17 inches in the five months of December 1909 to April 1910; so that ideal conditions were also present for development of the egg and larval stages of this beetle.



E. Jarvis Del (original).

PLATE 18

Diagram showing varying degrees of Grub-infestation experienced in the Cairns district during the past twenty-three years. The dotted lines represent amounts of annual rainfalls received.

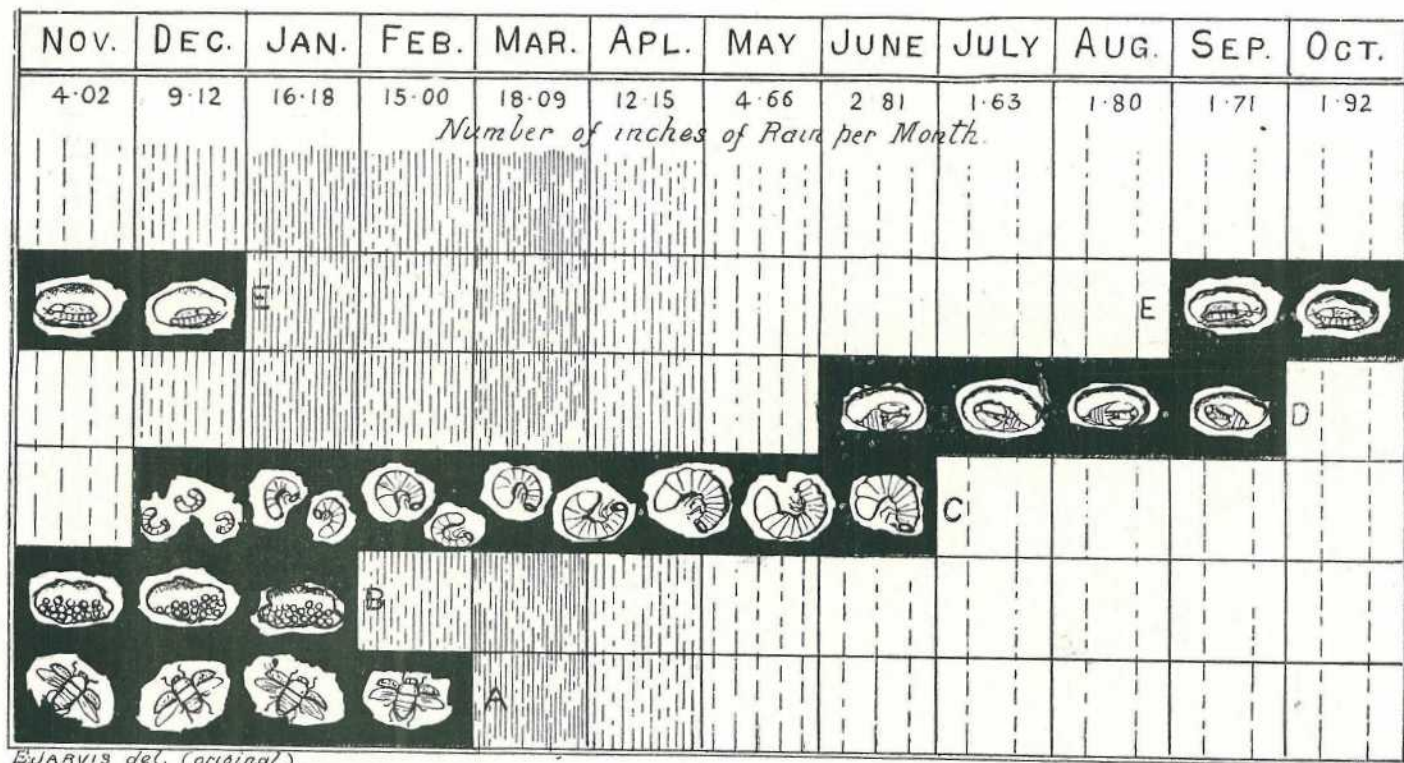


PLATE 19.—LIFE-CYCLE STAGES of the "GREYBACK" COCKCHAFER (*Lepidoderma albobirtum* Waterh.).

Diagrammatic view of the average annual rainfall, together with position during each month of Egg, Grub, Pupa, and Beetle condition.

A. Period of serial activity of the beetles

C. Seven months occupied by first, second, and third larval instars.

B. Period during Egg stage, passed in subterranean chambers.

D. Duration of the Pupal Condition.

E. Months in which beetles are liable to imprisonment, owing to drought conditions prevailing from September to December.

Appointment of an Entomologist for the Sugar Industry.

Growers having at last become seriously alarmed, an entomologist procured from America was attached to the Bureau of Sugar Experiment Stations, with instructions to devote his attention exclusively to the study of the cane grub problem, and, later, additional entomologists were appointed.

Although the weather in 1910 had proved so favourable to development of the pupae of this beetle it encountered a severe climatological check the following season (1911), when the rainfall for the period June to October chanced to be only 4.13 inches, considerably less than half the average amount for that period. This circumstance, coupled with an abnormally low annual rainfall during 1912—viz., 55.26 inches—accounted for the comparative freedom that year from serious damage to the cane.

Prevalence of Grubs During Recent Years.

The next three years (1913 to 1915) saw a run of good seasons, which enabled this formidable insect to regain its normal activity, with the result that in 1916 further heavy losses were sustained by our cane farmers.

Its appearance again in alarming numbers during the 1920 to 1921 season doubtless resulted from a record rainfall of 19.01 inches registered in the district of Cairns during June to October of the latter year (1921).

The following season was marked by a decided decrease in the number of beetles, which, having since that date encountered drought conditions lasting from 1923 to 1926, have been unable to increase to a dangerous degree. During 1923, however, the pest managed to rally slightly (see accompanying diagrammatic sketch), but since that date has given little or no trouble in the Cairns district. Readers are advised to refer to my November report, in which the climatological control of this cane beetle during the period of 1921 to 1925 is more fully described (see "Queensland Agricultural Journal," vol. xxvi., pp. 478, 489).

It appears, from available data extending over the past twenty-four years, that heavy annual rainfalls are not, as some growers imagine, invariably followed by serious grub infestation; such outbreaks of this pest being usually determined (as already pointed out) by the quantity of rain chancing to fall during the period occupied by its pupal and beetle conditions.

For instance, little difference occurred between the rainfalls for 1912 and 1915 (55.26 and 44.97 inches respectively), and yet, as will be noticed by referring to the accompanying diagram, grubs were far more numerous during the latter year.

Comparing the infestation in 1917 with that of 1918, we find that, although the rainfall in the latter year was heavier (69.18 inches), the pest was far more in evidence during the preceding season (1917), in which the annual precipitation was 66.41 inches.

Similarly, in 1923 the rainfall was 52.55 inches, as against 64.70 inches received during 1922; it will be seen, however, that the grubs gave more trouble in the former season (1923).

Grub Infestation for the Season 1926-1927.

Unfortunately we have experienced favourable climatic conditions for the increase of cane beetles during the past twelve months, with the result that the pest has been able to multiply in sufficient numbers to cause more injury this year than was possible last season. Reports have reached this office to the effect that grubs are at present causing noticeable damage on cane farms situated in various portions of the Cairns district, the general impression being that such injury is more widely spread than was the case last season.

This increased activity of the pest has been induced chiefly by the occurrence of unusually wet weather throughout its egg and early larval stages (November, 1926 to May 1927); during which period 82.37 inches of rain fell in the Cairns district—65 points in excess of the average precipitation for these six months.

Again, although adverse climatic influences occurred during its pupal state in 1926 (June to October), these were not severe enough to materially check the increase of cane beetles.

Possible Cane Grub Infestation during 1927-1928.

I regret to state that up to the present the season has proved very favourable to the development of our grub pest; and, in the event of normal or average rainfalls being registered during the coming months of July to December 1927, we may look forward to an outbreak of this pest of much the same magnitude as that which occurred in the year 1916.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

Combating Wireworms.

The larvæ, or so-called "wireworms," of some of our Elaterid beetles (known commonly as "skip-jack" or "click beetles") cause considerable injury at times to newly planted cane sets by eating out the eyes or sprouting buds, or killing the succulent young shoots by boring into same below ground level.

The pest in question is a pale-yellow, shining, firm-bodied larva, reddish yellow at each end, and about three-quarters of an inch long by one-sixteenth inch in thickness. When handled it wriggles and slips easily from between one's fingers. The beetle, which is of a dull slaty-brown colour, and about half an inch long by one-eighth inch greatest width, sometimes flies into houses on dark nights, attracted by lamplight, and if laid on its back on a hard smooth surface quickly jerks itself with a distinct click into the air, usually contriving to come down on its legs.

Some of the following methods of combating the larval form of this pest will doubtless interest Queensland cane-farmers, and should be well worth a trial in badly infested canefields:—

- (1) See that the land be thoroughly worked and well drained.
- (2) Plough deeply, and at the same time collect as many wireworms as possible by hand before planting the crop.
- (3) Use organic manures; increase the humus content of infested soils by the use of green manures, &c.
- (4) Fumigate the land with calcium cyanide granules or with benzine. The best procedure in such cases is to prebait the soil with seeds of cowpeas or Mauritius bean sown in drills about 3 feet apart, and before the weather becomes too warm for wireworms to thrive in the upper layer of soil. The object of these baits is to induce the larvæ to congregate amongst the germinating seeds, the tender sprouts and shoots of which are very attractive to them. A few weeks later, when the majority of the worms have found the bait, the drills should be treated with the fumigants above mentioned. The calcium cyanide is applied at the rate of about 100 lb. per acre, while about 22 gallons of benzine would be required to treat a similar area.
- (5) Strew poison-baits along the bottom of furrows ploughed at regular intervals; a good formula is:—Bran, 25 lb.; paris green, 1 lb.; nitro-benzene, $\frac{1}{2}$ oz.

Other baits or trap-plants used are sliced carrot, rice-bran roasted dry and moistened with water, and potatoes cut on one surface and set in the soil a few inches deep and 10 feet apart; a piece of stiff wire piercing the tuber and showing above ground serves to indicate position of the bait. Remove the potatoes a week or ten days later, dip in a bucket of boiling water, and replace in the soil.

- (6) Intensive cultivation of affected land is highly recommended as a controlling agent against this pest; stir the soil as often as possible.

Grasshoppers on the Warpath.

As foretold in "Hints" for last month (May) grasshoppers bid fair to be troublesome during the present month, owing to favourable conditions having obtained during the egg and early larval stages of growth.

For approved methods of controlling this insect the reader is referred to the "Australian Sugar Journal" and "Queensland Agricultural Journal" for last month.

Caterpillars in Evidence.

The present season is proving very favourable to the development of "army worms," "grass caterpillars," and the larvæ of "cane skippers." In the March issue of the "Australian Sugar Journal," vol. xviii., p. 741, and "Queensland Agricultural Journal," vol. xxvii., pp. 275-276, recommendations are given for fighting such lepidopterous larvæ. It is interesting to note that caterpillars of the butterflies *Melanitis leda* and *Padraona marnas* appear to be slightly on the increase, and during the last two seasons have been responsible for noticeable although not serious damage to young cane-leaves.

Parasitic Fungus of Cane Grubs.

During this month growers will probably notice cane grubs killed by the so-called green muscardine fungus—(*Metarrhizium anisopliae*). When attacked by this vegetable parasite the body of the grub, instead of decomposing, retains its original shape, and after hardening turns at first white and then an olive-green colour, the latter condition being the fruiting stage of this fungus and consisting of a thin crust formed of chains of spores. Weather conditions up to the present, however, have not been favourable to the development of this useful fungus parasite.

Tachinid Parasites now Ready.

Specimens of this parasite of the cane borer are now ready for distribution. Growers requiring same are asked to apply to the Entomologist at Meringa for consignments of these tachinids, which will be released free of cost by the Sugar Bureau on areas affected by the weevil borer.

RED ROT DISEASE.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (5th July, 1927) from the Assistant Pathologist, Mr. E. J. F. Wood, relative to Red Rot disease in cane in the Sarina district, near Mackay.

During the last few years the disease known as Red Rot has sprung into prevalence in the Sarina area, and has caused damage as great as that caused by such serious diseases as gum, so that we must cease to consider it as a disease of minor importance in this State. The evidence of the farmers goes to show that it has been in the district for years past, but was disregarded, as it was considered of little importance. During the last three years the disease has increased both in extent and virulence, and has caused grave losses to both the farmer and the miller by lowering the density by as much as eight units, and also by loss of crop.

The disease shows up only towards the crushing, and at present only isolated cases could be found. This prevents the damage from being estimated till about crushing time, but then the disease suddenly becomes virulent, and the cane goes off before the farmer realises it or has time to get it cut and sent to the mill. If the mill were able to estimate the affected areas, some provision might be made to get this part of the crop in at the beginning of the season, and thus minimise the loss.

Symptoms.

When the insidious fungus at first attacks the cane, the stool appears normal, and you may chance to find an affected stick by breaking at random through the field. The chances are small. This stick will, on slicing it lengthways, show a reddish discoloration with white pithy spots. These are the definite symptoms of the disease as seen in the field. Later on, the cane will die wilting and rotting, but it is usually cut at a slightly earlier stage. The cane comes to the mill with the butt-end and a good part of the rest of the stick in a half-fermented condition, and is almost useless for milling.

Cause.

The cause of the disease is a fungus, *Colletotrichum falcatum*, which is what is known as a facultative parasite. This means that it lives on the trash and old cane stools, but given the right conditions it can attack the cane when it is living and lives on the juices thereof. The spores or fruits can be carried on the trash and the fungus itself can be transmitted in the cuttings. There may be, also, other forms of transmission which could be proved by experiment. Horses and implements infected with the spores would be able to carry the infection from field to field. Whether this is important is yet to be proved in this district.

We have then the important facts:—

- (1) Cuttings carry the disease.
- (2) Any trash, leaves, or old stools carry the disease.
- (3) The disease arises from some weakening of the cane plant due to external causes, before the fungus is able to enter its host.

A conspicuous example of this was seen by me in Clark's Seedling at Sarina, where the Red Rot symptoms were showing just below the longitudinal cracks in the rind, which are so often present in this variety; the cane was lying over, and no disease was to be seen in the standing cane. It is this fact that gives rise to the opinion that the disease often appears in the plant cane, and not at all, or to a lesser extent, in the ratoons.

The control of the disease naturally falls into two divisions:—

Firstly, with regard to the cane itself. This means attention to the plants. Never plant from any field which has suffered from Red Rot, and never allow anyone else to plant from your infected field. It is useless to plant in a field which has been infected unless precautions have been taken to get rid of the infection. You may find that the field is healthy, but it is a matter of luck.

Secondly, with regard to the field. This is most important. Many farmers are of the opinion that with the return of good seasons the trouble will disappear, but though it may be lessened for a time there is no surety that it will not return. The presence of the disease so early shows that there is still a good chance of its recurring even this year. The only sure way to get entirely rid of it is to cope with the field. I should, therefore, suggest tentatively a programme somewhat after the following:—

- (1) All trash and rubbish should be burnt, and the stools broken up.
- (2) The addition of lime to the soil, preferably burnt lime, in order that the soil reaction may be upset with the hope that the fungus will be inhibited.
- (3) The draining of the low-lying pockets.
- (4) The planting of green manure crops in order to add nitrogen and other elements to the soil, to smother weeds, and to assist the degradation of the old stools.
- (5) The analysis of soil in order to find out what is lacking, and the restoration of the deficient elements to the soil in the shape of a correct fertilizer.
- (6) The interval before replanting a diseased field should be as long as possible. If you have enough ground it will be well to let an infected field go out for some years. Plant your clean field with clean seed or you might as well leave it alone.

Much research remains to be done in connection with this disease before all the means of transmission are known, but the above recommendations are intended as a practical and payable method of alleviating the trouble, and should, in fact, absolutely control it if adhered to.

THE JOURNAL A VALUABLE GUIDE.

An Oxley farmer writes (15th June, 1927):—"When first I subscribed to your Journal in 1914, at Raglan, Rockhampton, I was what you term a 'greenhorn farmer,' although a Queensland native. I look forward each month for my copy of the Journal, as it is a valuable guide to me, and I could not carry on without it now, as it guides me from month to month what and how to sow and plant; also how to use fertilizers, all of which one can gather from the Journal or a leaflet on fertilizers.

"I have not had a failure yet by following the instructions. I have already planted out 2,000 cabbage plants, and land and plants are ready now for 5,000 more, and thanks for the Journal and information, I am making a speciality of cabbages alone, and have just had erected an irrigation plant to cope with the watering of these plants in the summer time. I have the latest spray—just like rain. I intend going in for 5 acres of cabbages as I keep getting the land ready, and many thanks to your Journal again."

FIELD REPORTS.

The Northern Field Assistant, Mr. A. P. Gibson, reports (12th July, 1927):—

HERBERT RIVER.

The Herbert River sugar land is alluvial and different from the more northerly areas; it extends many miles along both banks of the river and is wondrously fertile in parts.

At the beginning of the month the weather included days of sparkling sunshine followed by rain; such conditions frequently occur in the Northern winter.

Rainfall—	Ingham. Inches.	Halifax. Inches.
January	31.11	31.77
February	36.28	40.14
March	8.59	7.53
April	5.55	2.50
May	1.58	0.80
June (to 15th)	3.91	(to 11th) 2.57
Total	87.02	85.31

Particulars of past season's crop are interesting and are as follows:—

Macknade Mill—

Season commenced, 22nd June; finished, 11th December.

Crushed 158,477 tons for 21,414 tons sugar.

Average tons cane crushed weekly, 6,468.

Average price per ton cane paid, 47s. 4-8d.

Average price per ton cane paid to cutters, 8s. 7d.

Victoria Mill—

Season commenced, 12th June; finished, 4th January.

Crushed 167,040 tons for 21,578 tons sugar.

Average tons cane crushed weekly, 5,377.

Average price per ton cane paid, 42s. 5-1d.

Average price per ton cane paid to cutters, 8s. 9-3d.

Total tons cane, 325,517 tons for 42,992 tons sugar.

Varieties.

Many varieties were noted. Below is given a complete list, coupled with the percentage of each grown in the two mill areas.

Variety.	Percentage Grown at Macknade.	Percentage Grown at Victoria.
N.G. 15 (Badila)	38.7	46.2
H.Q. 409	35.4	28.0
Goru Family	4.6	12.2
Korpi	10.9	2.0
Q. 813	3.7	5.2
H.Q. 426	0.4	2.0
Orambo	0.9	1.5
M. 189 (Black Innis)	0.9	1.3
Nanemo	1.2	0.8
7 R. 428 (Pompey)	0.4	0.8
M. 1900	0.3	—
Mixed	2.6	—

Flood Damage.

Lack of rain during the growing period and unusual frosts severely affected last year's crop. Those, however, whose memories encompass fifty years cannot recall anything to equal the rain which took place in February of this year, followed by a disastrous flood which occasioned great all-round district losses. Some farms were very badly washed, holed, or heavily sanded, and parts temporarily or permanently ruined in so far as cane culture is concerned. Other farms benefited by the enormous quantity of valuable silt deposited upon them. Nut grass was transported by water to new areas; this is a source of annoyance in germinating cane paddocks, but may be regarded as a blessing in disguise for it makes farmers cultivate. Crops had badly shot or perished where they were long and deeply submerged, since most of this had been ploughed and re-planted. Tractors have taken the place of lost horses on many farms. The farm and crop damage, although severe in isolated parts, is now generally determined to be considerably less than was first reported. Had this crop reduction not occurred it is questionable whether the two local mills could have fully milled the seasonal output. The increased number of bridges spanning the many waterways became fouled by the enormous quantity of débris, and in conjunction with railroad embankments prevented the flood water getting away quickly. Enormous river bank erosion has taken place, and everything possible should be done to stay this; the encouragement of river bank plant life would help.

The Crop.

Perfect weather conditions have prevailed from a cane planter's point of view since the February floods. In consequence, the cane has made a wonderful recovery, and a good crop is now assured. At the present moment this is forecasted to yield 320,000 tons—5,000 tons less than 1926. The area has been well soaked by recent rains, therefore the continuance of good growth seems assured for some time to come.

Harvesting.

There is generally a distinct dry period extending from June to December, when harvesting and planting operations are safely accomplished. Victoria commenced crushing on 3rd June, and Macknade on the 15th. From the outset, field and mill work appeared to proceed smoothly. A big percentage of the crop had fallen, but was said to be weighing well. Soiled cane (the effects of flood) yields a muddy juice, and of course, requires more filtering. Satisfactory crops of most varieties grown were noted throughout the big area. Here it is common to cut from the plant and two ratoons.

Labour.

This is plentiful for all requirements. Seventy-three gangs were operating, comprising some 620 harvesters (all foreigners).

Soils.

These differ much in colour, texture, and quality, according to deposition at time of the many past inundations. Lime, more surface draining, and the restoration of lost vegetable matter would improve the texture and subsequent crops.

Planting.

This season was perfect for planting, consequently a satisfactory germination of the early planted crop is seen over the greater portion of the No. 1 division. Cane rows are commonly made by a big drill plough, being 10 to 12 inches deep, with interspaces varying from 4 feet 6 inches to 5 feet. The seed is very thickly deposited, soil covered by scarifier, and frequently followed by different kinds of home-made soil packers. The plant cutting waste should be removed from the fields. The popular varieties being planted are N.G. 15 (Badila), Korpi, Orambo, Q. 813, and H.Q. 409.

Diseases and Pests.

This area appeared the least diseased in the whole of the No. 1 division. The judicious elimination of the one-time popular but severely gummed H.Q. 426 variety, coupled with improved plant selection methods, has in no small degree been responsible for its now almost gum-free condition. What has been achieved here can be accomplished elsewhere by more careful plant selection and greater co-operation between farmer and the mill field men. Planters here have been well schooled; they realise the value and benefit of expert advice.

Shoot killers, wireworms, *Pentodon Australis* (black beetles), and innumerable black ground crickets were present. The latter attack the plant ends and the growing point of primary plant shoots. A great many brown and green medium-sized frogs were observed amongst the cane foliage. Scanty fungus abundantly seen. Weevil borers not plentiful.

Railroads.

Where the traffic is heavy 45-lb. rails are replacing lighter ones. About a mile of new line (45-lb. rails) is being constructed, and when completed will permit cane trains going direct to the factories instead of passing through the main thoroughfare of Ingham.

Long Pocket and Elphinstone Pocket have suffered severely from the flood. The river bank soil of these places is dark, fertile, rather wavy scrub land; back from this is found a medium quality cohesive to sandy forest soil. Much of it is still densely covered by bloodwood, broad-leaved wattle, Moreton Bay, pandanus, and supple jack. This land would cost some £40 per acre to put under cane. Most of the tilled soil had been washed out in parts; in one instance the plough or hard pan soil had been worked up and planted; the seed had germinated favourably. It will be interesting to watch this field's progress. Prior to the memorable February flood it was computed that the nine farmers in this fertile Elphinstone Pocket would cut 14,000 tons, but it is now forecasted to yield only 1,600 tons of cane. Poor, half dead flooded cane was being unwisely planted in this area.

TULLY.

It may be said that Tully is the newest and most progressive sugar area in the North, in so far as the progress of the town and district is concerned. Those responsible are deserving of much credit. There remains much to be done to make the surrounding roads passable at all times; the cost of this valuable work is greatly increased by adverse weather conditions.

Rainfall.

147.78 inches of rain had fallen up to the 23rd June, as follows:—January, 34.58 inches; February, 65.65; March, 14.40; April, 22.67; May, 4.12; and June (to 23rd), 6.36.

The Crop.

The crop in general had improved wonderfully since my last inspection. It possessed a particularly fine, healthy colour and was growing with amazing speed. Ninety-eight per cent. or more of the crop is N.G. 15 (Badila). This is one of our finest harvesting canes, the foliage although plentiful offering little resistance, therefore it is expected that the loaded cane trucks would be dispatched to the factory reasonably clean. Unfortunately, this is not the case. Prolific crops somewhat recumbent and low in quality are being harvested, 30 to 40-ton crops are common, and 65 or more tons per acre at present are being harvested. This high tonnage speaks for the fertility of some of the Tully cane soils. As time goes on the soil fertility will be reduced when smaller but richer crops will be produced.

Milling.

The big factory is now doing the daily work expected. The cane supply is improving. This has been inadequate to keep the big plant fully operating; 60 tons per hour are sometimes milled. One week 6,787 tons were treated, and something like 25,000 tons were treated by the 26th June. This is quite a satisfactory beginning. Permission has not been given to burn much cane so far. A large quantity of trash is coming forward with the harvested cane. Anything that reduces efficiency and raises the cost of production should be avoided. Trash is a high moisture absorbent material; when compressed it yields its water into the expressed juice, thus lowering the quality besides increasing the bulk to be treated by the factory. The mill estimate stands at 180,000 for the present. Much of the cane harvested after Christmas is naturally backward, and, of course, may not be cut. However, should the cane continue to grow throughout the winter as at present, the given estimate may easily be eclipsed.

Pests and Diseases.

Grubs have been operating on several Lower Tully River farms; they have gone down into the soil to hibernate. Fresh roots and shoots were again forming in the less affected stools. Weevil borers noted, being more numerous in the big traffic

cane. Leaf hoppers and midrib borers were abundantly seen. Rat destruction observed. The interested growers should at once co-operate and endeavour to stay the progress of this most destructive pest. This area contains many heavily grassed water-ways which are excellent breeding grounds and jumping-off places for this undesirable pest. Leaf Scald, Spindle Top, also a little brown rot noted.

INNISFAIL.

Rain and the almost impassable nature of the district roads prevented me inspecting much of the district.

Rainfall.

June, 10.96 inches; total for the year 117.15 inches. Continuous wet weather is having an ill-effect on field work in general. This in its turn is seriously reducing the factories' cane supply brought about by the great difficulty experienced in hauling out the loaded trucks from fields to permanent way. Light crops of rather low quality seemed to be a common complaint. This may be attributed to wind and water damage, and now overmuch rain. Naturally the damaged cane is being harvested first. A very long stretch of sunny weather at an early date is required to bring about an all-round improvement. The crop seen has a good colour, but has not made the progress expected. Spindle Top or Needle Top is widespread, and in no small degree reduces the quality and retards growth. This condition is caused by a fungus which binds the sheath to stem, and causes more destruction during the wetter seasons. Weevil borers are working strongly on cane trashed along No. 6 branch, South Johnstone, for fire break.

The Southern Field Officer, Mr. J. C. Murray, reports for the period 15th May to 15th June:—

BEENLEIGH.

In the course of the month, work has been carried out in the Beenleigh and Bundaberg areas. It is very satisfactory to note that the canegrowers are taking, year by year, a greater interest in the work of the field staff and the Bureau generally, and realise that the field officers can be of real and tangible benefit to them, and that they have a more important function than merely writing reports. The following details summarise conditions:—

There are several very fine blocks of cane in this district, mostly Q. 813 and H. Q. 285. The growers are advised to plant these varieties entirely because they show, so far, a greater degree of resistance to Fiji disease than the other canes. Quite apart from disease, however, these two canes are well suited for the Beenleigh district. The writer does not intend to discuss Fiji disease in this report, as the Pathological staff are working on this cane malady and the attention of canegrowers is directed to the work of these gentlemen on the subject, some account of which is published in this issue of the Journal.

Farmers in this district are recommended to do more green manuring and liming experiments than they are at present doing. They are also recommended to try and carry out local experiment in relation to the value of fertilizers. It is to be borne in mind, however, that commercial fertilizers have little value for restoring a worn-out soil if, as is very often the case, the texture of the soil and not the chemical content is at fault. They are of far greater value after the soil has been put into good condition by green manuring or the addition of animal manures. However, the local experiment plot is the factor that will conclusively determine manurial values. It can be carried out in the following way:—Let a grower take an acre of soil and divide it into ten blocks. That will mean that each block is 2 rods wide and 16 rods long. On No. 1 block he can try 16 lb. of nitrate of soda, on No. 2 16 lb. of sulphate of ammonia, on No. 3 32 lb. of superphosphate, on No. 4 16 lb. of sulphate of potash, on No. 5 16 lb. of nitrate of soda and 16 lb. of sulphate of potash, on No. 6 16 lb. nitrate of soda, 16 lb. of sulphate of potash, and 32 lb. of bonedust; on No. 7 stable manure; on No. 8 nothing; on No. 9 2 cwt. of crushed limestone; and on No. 10 16 lb. of sulphate of ammonia, 16 lb. of sulphate of potash, and 32 lb. of meatworks.

He can then compare his unmanured block with his manured ones and obtain the value of his fertilizer results (if any) by the following calculation:—Subtract the unmanured tonnage from the manured, multiply result by net price of cane at the mill, and subtract from that cost of fertilizer and labour.

BUNDABERG.

In the Bundaberg district the cane generally has made good growth. Since Christmas the appearance of the cane has undergone a complete metamorphosis and now the growers can, almost without exception, point to a good crop. It is seldom that a finer exhibit of cane comes to the local agricultural show than did this year.

Slight frosts have been experienced during the past month, but no harm has been done to the crops. Some farms show considerable crop reduction through root rot. There is no evidence at present that gumming disease is going to cause appreciable losses in this district. Badila cane that was badly affected last year in some parts of the district is, so far, showing nothing (not even where the cane was very bad) of the disease this year.

More fertilizing is being done in this district than has been carried out previously. Complete manures, with the principal part sulphate of potash, are being more used than any other. For the canegrowers' information it can be pointed out that there are two classes of manures, "complete" and "incomplete." A complete fertilizer contains all three of the essential plant foods, while an incomplete fertilizer contains but one or two. It can be easily observed that local experiment on lines laid down earlier in this report is all-important if the grower of cane wishes to obtain accurate data.

There is another matter about which farmers require to be careful, and that is the haphazard introduction of varieties. Now, while it is an excellent plan to experiment with canes, there should always be a special plot kept for this purpose at least three chains away from the principal crop. Say, for instance, a farmer introduced a cane with a disease, and planted it with his staple crop, it does not require much imagination to work out the damage he would be doing. The writer would suggest that each grower of, say, 25 acres should set aside 2 acres, one for fertilizer experiment and one for varieties. A cane requires about six years' trial before grower and miller are clear on the following points:—

- (1) Striking properties.
- (2) Early growth properties.
- (3) Maturing periods.
- (4) Standover properties.
- (5) C.C.S. value.
- (6) Milling qualities.
- (7) Cutting and handling qualities.
- (8) Disease-resistant qualities to major diseases:—
 - (a) Mosaic, (b) gumming, (c) root rot, (d) leaf-attacking fungi.
- (9) Root system. (Upon the root development of the cane depend the methods of fertilizing.)
- (10) Resistance to grubs and earth parasites.
- (11) Resistance to drought.
- (12) Resistance to frost.
- (13) Class of soil variety likes.

The last and the third points are of great importance, as very often through insufficient knowledge of these a valuable cane is discarded.

The Central Field Assistant, Mr. E. H. Osborn, reports for the period 14th May to 13th June:—

MACKAY.

Up to time of writing (22nd June, 1927) the following figures represent the local rainfall:—January, 11.00 inches; February, 8.47; March, 18.44; April, 2.07; May, .54; June (to 13th), 2.79. Total, 43.31 inches. A glance at these figures shows that up to the end of May the fine aggregate of 40.52 inches had been registered, and the further bountiful fall of 2.79 inches early in this month is just what the district needed to ensure the success of the present season's crop, and also to give a great impetus to the late planted cane.

Mirani to Mia Mia.

Six farms were visited, the soil in most places being a very medium greyish forest loam, formerly carrying poplar gum, &c. On these soils, where they had been well ploughed and not merely scratched, liming and fertilising had improved

the stand of cane marvellously; one 8-acre paddock of Q. 813, which had been so treated, was noticed to be carrying a beautifully even crop which will probably cut some 30 tons per acre.

The only disease noticed among these farms was Mosaic to a heavy extent in some plant Innis (M. 189) and grown from seed obtained from the Finch Hutton district. The owner is, however, ploughing it out after harvesting.

Mia Mia.

Some really good country was seen on both sides of the river, which runs roughly in a northerly direction. On both sides of the river, but seemingly to a larger extent on the western bank, are some exceedingly rich deep alluvial flats capable of growing splendid crops of cane. Varieties noticed to be growing most vigorously—Q. 813, M. 1900, N.G. 15, H.Q. 426, Gingor, Malagache, D. 1135, 7 R. 428 (Pompey), and E.K. 28.

As usual the favourite canes are Q. 813, H.Q. 426 (Clark's Seedling), and M. 1900, for a grower can usually be assured of good average density returns from these varieties when cut at the right times.

Some fine crops of Gingor were also seen both on the alluvial land and upon the poorer forest soils. As for E.K. 28 several fine crops were noticed; one October planting upon alluvial soil would probably give a 40-ton crop now, but it is probable that on such good soil the density would be inferior to the same cane on a poorer class of land.

Grubs.—Several farms adjacent to the river were infested with this pest. On one property a block of D. 1135 was planted alongside some N.G. 15 (Badila) with a block of M. 1900 just over the headland. The D. 1135 was growing most luxuriously, being absolutely green and healthy looking, while the N.G. 15 and M. 1900 were both heavily infested and were lying down in most places.

Diseasc.—On a farm on the eastern side of the river, Mosaic was very bad in a small block of first ratoon Malagache, but this will be ploughed out after harvesting. Nearby, a few stools of D. 1135 first ratoon were affected, but this is also to be ploughed out.

Near Mirani the only disease observed was Mosaic in some luxuriantly growing second ratoon Black Innis (M. 189), and in a few odd stools of first ratoon M. 1900. The Innis is to be ploughed out after harvesting. The M. 1900, however, is planted adjoining another farm which is carrying a heavily infected crop of H.Q. 426 plant cane. Adjoining this latter crop is a paddock of young plant H.Q. 426, which now shows Mosaic marking much more freely than it did a week or two earlier.

Cane-killing Weed.—A solitary specimen of this weed was found on the roadway near Mia Mia, and led to inquiries from farmers thereabouts, who formerly suffered cane losses, whether it was now doing any damage to the crops, but they all replied in the negative.

Farleigh (Adjacent to River).

A few days were spent in this vicinity, principally on the lookout for Mosaic, and of ten farms inspected the disease was found as follows:—

Number Farms.	Variety.	Degree of Infection.
1 farm	Plant H.Q. 426	Slight
1 farm	1st Ratoon M. 1900	Slight
1 farm	1st Ratoon M. 1900	Very slight
1 farm	1st Ratoon M. 1900	Bad
1 farm	Plant M. 1900	Very slight
1 farm	2nd Ratoon Inn's	Slight
	Plant Cheribon	Very heavy
	Ratoon Cheribon	Very heavy
1 farm*	Plant M. 1900	Very heavy
	Plant D. 1135	Slight
	Plant E.K. 28	Slight

* As will be seen above, this farm is heavily diseased, but seemingly has a clean crop of young M. 1900 plant, and also in another part of his farm a block of H.Q. 426 looked very fair so far.

Between Eimeo road and Mielere eight farms were inspected, and Mosaic noticed as follows:—

Number Farms.	Variety.	Degree of Infection.
1 farm	Plant Cheribon	Slight
1 farm	Plant H.Q. 426	Very slight
1 farm	Plant Innis (M. 189)	Slight
1 farm	1st Ratoon Malagache	Heavy

In two farms adjacent to the Hills, grubs were showing up slightly.

Diseases.—Red Rot in E.K. 28 plant was noticed upon two Eimeo road farms to an appreciable extent, and in each case upon the poorer portions of the paddock.

When the first ratoons from which these plants had been obtained were inspected, the disease was noticed to be much in evidence.

Control measures were outlined to the growers, including ploughing out after harvesting, liming, and green manuring, and then planting another variety (say Q. 813) in this particular paddock, afterwards returning to E.K. 28 if so desired, and Q. 813, which has not shown Red Rot symptoms.

Liming and green manuring are advocated, as experience indicates that the fungus does not damage in acid soils deficient in humus.

The Central Field Officer, Mr. E. H. Osborn, reports for the period 14th June to 13th July:—

Excellent weather conditions prevailed, for the splendid June rains were followed by over an inch early in July. A cold snap followed which should do much to improve c.c.s. values. Crops are looking splendid. There is, also, grass and water in abundance.

Very large areas are being planted throughout the district, the ground in most cases being in very good order. Present indications are that this year's bountiful crop will be followed by another very heavy crop in 1928.

In most cases some really fine sets were being planted, but odd growers still persist in using very inferior plants, obtained from either poorly developed stalks, plants likely to be borer affected, or others that are likely to be diseased. Over and over again the folly of such careless plant selection is pointed out, and it is gratifying to know that in many cases extra supervision now seems to be exercised.

The writer spent a couple of very interesting days inspecting the large crops under the control of the Palms Estate management, and was struck by the well grown crops of plant, and more especially ratoon cane looking vigorous and healthy. Only the very slightest signs of disease could be found in an odd stool, thus speaking much for the care that had been used in plant selection.

In contrast to this, in another instance, a grower was noticed using some beautifully grown H.Q. 426 (Clark's Seedling) for plants, and amongst a dozen or so turned over casually was one noticed with a reddish end which, on being opened, was found very badly bored with the grub in full operation. This grower will probably blame any loss (through faulty strike, &c.) to everything but his own carelessness.

Nearby, notice was taken of a big heap of Q. 813 sets, which showed a far larger percentage of bored plants than even the above grower had.

Varieties.

Q. 813, H.Q. 426, and M. 1900 are easily the most popular in the recently visited areas, and are certainly suited to Mackay conditions, the former especially being planted in larger quantities every year, for it is a cane that nearly always has a very fair density and continues to keep same up when other canes are steadily falling away.

H.Q. 426 is also a wonderfully good cane in the early part of the season, and some nice crops were to be seen. M. 1900, for late cutting, is here very highly thought of, for its tonnage and density are then very fair.

E.K. 28 is also increasing in favour, and will get a good testing this year for it has been planted in many classes of soils, and also at different planting periods.

Some good crops of D. 1135 were also noticed upon the Palms Estate, and upon some of the oldest Racecourse lands. On one of such farms a 35-ton crop was much admired, the owner of same claiming very good c.e.s. values from this variety upon his land, plant cane giving over 16 c.e.s. frequently.

Badila (N.G. 15).—Some extremely fine crops of this cane were noticed growing upon the alluvial flats adjacent to the river, well stooled out cane with good length and thickness of stick. As practically most of this class of land has been under cane for some forty to fifty years without fertilizing, and still yields such good crops, its quality can easily be gauged.

Fertilizing.

The principal manure used certainly seems to be B_2 , and growers in most cases claimed good results from it. In connection with either fertilizing or liming it cannot be too much pointed out that where the drainage is deficient neither of these agents can do their best, for good drainage is absolutely essential for satisfactory returns.

Where the grower is doubtful as to his soil requirements he can always obtain an analysis (free of charge) by applying to the Bureau of Sugar Experiment Stations, Brisbane, through their Field Officers, or direct.

In speaking of drainage as referring to Mackay, mention must be made of the seemingly very successful system of two-row 9 feet 6 inch beds as carried out in the Homebush area. During the very wet days in January last the writer visited several of these farms and saw plenty of water in the headland drains, and in some cases in the water furrow, but the cane itself looked beautifully green and healthy, and carrying none of the yellow leaves so often seen in larger row beds, especially upon the outer rows.

Quite a number of growers upon low-lying and heavy soils are now giving lime a trial, and in several cases the limed portions show a wonderful improvement upon the unlimed parts and the texture of the soil much improved.

Diseases.

Mosaic to a very slight extent was found on four farms visited—i.e., one farm, in H.Q. 426 plant, one farm, in H.Q. 426 ratoons, one farm, in 7 R. 428 (Pompey) ratoons, whilst another alluvial farm had it in H.Q. 426 ratoons, M. 1900 ratoons, and N.G. 15 plant.

Red Rot was noticed very slightly in E.K. 28 plant, H.Q. 426 plant and ratoon.

"A MOST PROFITABLE INVESTMENT."

Thus a Norfolk Island subscriber (27th June, 1927):—"I herewith enclose the amount of 5s. in postal note, being my subscription to the Journal for five years—a most profitable investment."

AN INFORMATIVE JOURNAL.

A Bowen farmer writes (29th June, 1927):—"Please find cheque for 5s. 6d. enclosed, being five years' subscription (plus exchange) to the 'Queensland Agricultural Journal.' . . . Without doubt the Journal contains a lot of valuable information which could not be obtained elsewhere."

REPORT ON THE FIJI DISEASE SITUATION IN QUEENSLAND.

PARTS I. AND II. BY W. COTTRELL-DORMER.

PART III. BY E. J. FERGUSON WOOD, B.Sc.

PART I.**GENERAL DISCUSSION OF FIJI DISEASE, WITH SPECIAL REFERENCE TO ITS OCCURRENCE IN QUEENSLAND.**

Fiji disease was first reported as being established in Queensland in 1926, when it was found to be present in the Beenleigh district, some 25 miles south of Brisbane, by Mr. J. C. Murray, the Southern Field Assistant to the Bureau of Sugar Experiment Stations. Later in the same year the disease was recognised by Mr. N. L. Kelly, Assistant Plant Pathologist, in the Maryborough district, which lies 167 miles from Brisbane, on the North Coast Railway.

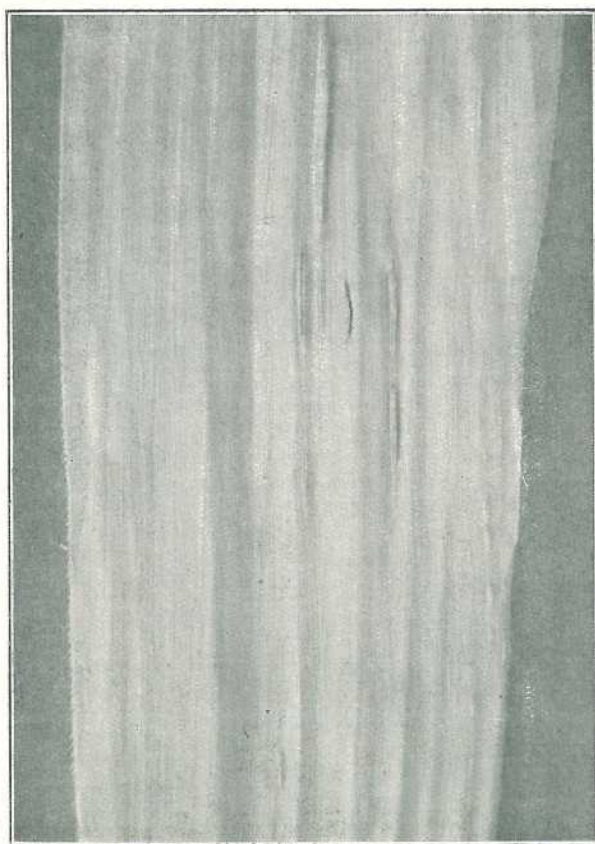


PLATE 20 (Fig. 1).—PORTION OF LEAF OF D. 1135, SHOWING FIJI DISEASE GALLS ($\times 2$).

This report is the outcome of investigations carried out by the writer, with the assistance of Mr. E. J. Ferguson Wood, B.Sc., during the month of January of this year. Unfortunately, heavy rains fell during a great part of the time set aside for the work, and it was only with great difficulty that the districts infected could be inspected; in fact, some farms were quite inaccessible owing to flood water. However, sufficient information was gathered to indicate definite lines of attack in each district.

During the month of May a further week was spent in the Beenleigh area in completing the inspection, and in re-examining certain farms with a view to confirming previous observations.



PLATE 21 (Fig 2)—A STEM OF E.K. 1, SHOWING TYPICAL SYMPTOMS OF FIJI DISEASE.



PLATE 22 (Fig. 3).—SHOWING ADVANCED STAGE OF DISEASE IN D. 1135.

Origin of Fiji Disease in Queensland.

How or whence Fiji disease came into Queensland remains an open question. The lack of records by farmers of introduction of canes into the Beenleigh and Maryborough districts makes it exceedingly difficult to obtain any information in this regard.

As a result of conversations with many of the growers, we think that it is more than probable that the presence of the disease dates back some ten years. It is only because the districts had not been visited earlier by a pathologist that its presence remained unknown to the Bureau for so long.

The History of Fiji Disease.

Fiji disease owes its name to the fact that Fiji is the country in which it was first responsible for severe damage to commercially grown sugar-cane.

The first serious work executed on the subject was due to D. S. North, Pathologist to the Colonial Sugar Refining Company, about the year 1909. At that time the disease was proving a very severe menace to the sugar industry in Fiji, and North carried out very extensive field investigations and soon succeeded in evolving reliable methods of quickly diagnosing the disease in the field. He then found that certain varieties, especially Badila (N.G. 15), were more resistant to infection than others, and that hillside cane gave cleaner seed than lowland crops. With this knowledge he worked out a control scheme which, carried out by the company's field men under his supervision, proved in a few years an unqualified success, and re-established the industry in Fiji. The disease was also present in Australia at this time.

The first published account of Fiji disease came from the pen of Dr. H. L. Lyon (1), of Hawaii, in 1910 as a result of work done in conjunction with North.

In 1914 the disease was discovered in many localities in Papua, by A. M. Carne (1), who was collecting sugar-cane varieties during that year for the Colonial Sugar Refining Company. Since it is quite improbable that the disease had previously been introduced from Fiji or Australia into New Guinea, this has been considered sufficient evidence that the disease was originally introduced from New Guinea to these countries with variety collection.

In 1920 the disease was discovered in the Philippines, where it is still doing damage. Fiji disease is not known to occur in countries other than New Guinea, Fiji, Australia, and the Philippines.

Symptoms of Fiji Disease.

Once the symptoms are known, Fiji disease is probably the easiest of sugar-cane diseases to recognise; no special skill or training is required, and even colour blindness is no drawback in its detection.

This is because Fiji disease has, as was pointed out by North in Fiji when the disease was first studied, one quite remarkable characteristic which is never found in other cane diseases—viz., the presence of galls or lumps on the leaves of affected stalks.

These lumps or galls are longer than broad and are really swellings of the veins or vascular bundles of the leaf. They occur on the under side of the blade and midrib of the leaf, measure from about $\frac{1}{32}$ to $\frac{1}{16}$ inch in width by $\frac{1}{8}$ to 2 inches in length; and are light green, yellow, or brown in colour (see Fig. 1).

The leaves showing these galls are invariably more or less distorted according to the degree of infection. If the infection is recent the leaf will show but one or two galls, will be somewhat shorter than normal, but will not otherwise differ much from other cane leaves.

As the infection becomes older, however (see Fig. 2), it will be seen that the younger leaves are assuming a darker green colour than usual, while galls are more plentiful. The leaf will attain only about half the length of a healthy leaf, though the width will not be altered. The tips of the leaves will be blunt and much curled, and the heart of the stem will be somewhat twisted.

The next stage (Fig. 3) is a very serious distortion of the whole top. Leaves forming now never become anything but dark-green stumps with curled tips, and bear many galls, generally running in lines along what remains of the leaf blade. The heart is very stunted, twisted, and split. A strong tendency for promiscuous shooting of lower buds is also often to be observed.

Frequently a stem will persist in the last stage described until the next crushing season, when it may be cut down; on the other hand, it often happens that the stem dies out altogether (Fig. 4). Whatever occurs, the stem is of little or no commercial value as it is usually very thin and dry.



PLATE 23 (Fig. 4).—A STEM OF D. 1135 KILLED BY FIJI DISEASE.
Note promiscuous shooting of eyes.

If the infection has been a secondary one, i.e., if a stool becomes infected after planting, only one or two stems may be badly affected. However, if this stool be ratooned it will usually happen that every stem of the ratoon stool will show infection (Fig. 5). Similarly, if stems be taken from the secondarily infected stool and used for plant cuttings, the stools arising from these cuttings will show serious infection.



PLATE 24 (Fig. 5).—SHOWING STUNTED, PRIMARILY INFECTED
STOOLS OF D. 1135.

This infection of the ratoon and plant stools is termed primary infection—i.e., coming from an infected parent. Primary infection is invariably far more serious than secondary infection. The galls are to be found on the youngest leaves as these come out of the ground, and stools so infected never become of any real commercial value. The advanced symptoms of the disease are shown by the young stalks as quickly as these stalks develop, and the stool seldom forms sticks more than 2 feet in length. Frequently a height of 9 inches is the greatest attained (see Fig. 5).

The Cause of Fiji Disease.

In spite of considerable study, very little progress has been made to date towards discovering the cause of Fiji disease.

The fact that the disease is always accompanied by the presence of galls on the leaves and in the stems of infected cane would suggest that if any causal organism is to be found it might well be looked for in the galls.

Microscopical studies of Fiji disease galls have shown that the galls are due to excessive development of the phloem tissue of the vascular bundles in those parts where galls are found (see Fig. 6). The cells of this excessively developed phloem tissue are found to contain small rounded "intracellular bodies" which, it would appear, are capable of dividing when nuclear division takes place. Studies of these "intracellular bodies" by North, Lyon (1), and Künkel (2) failed to reveal their true nature. Lyon considered them to be some stage in the life history of a parasitic organism for which he proposed the name of *Northiella sacchari*.

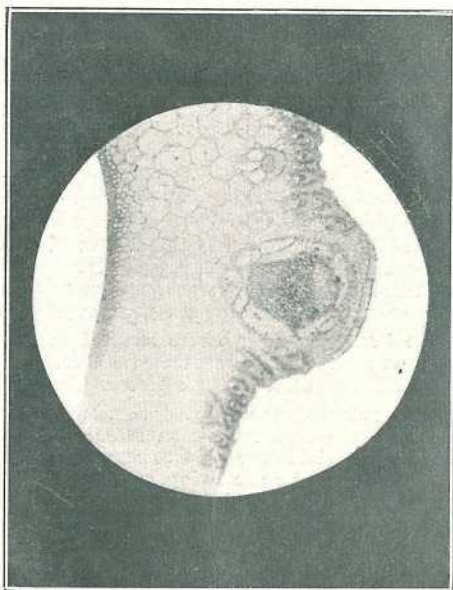


PLATE 25 (Fig. 6).—PHOTOMICROGRAPH OF THIN SECTION THROUGH A YOUNG GALL.

Note unhealthy growth of phloem tissue.

Later, in 1922, F. P. McWhorter (3), of the Philippines, published the result of his investigations into the nature of these "bodies," writing:—

"Finally, after numerous unsuccessful attempts, I have been able to culture the organism and thereby prove that it is a distinct being, and not some morbid cytoplasmic structure developed by unseen causes."

He claimed that the "intracellular bodies" are cysts, and that by watching very thin freehand sections of galls in hanging drop cultures, using cane juice as medium, he observed these "cysts" germinate into amoebæ. However, he found great difficulty in obtaining cultures, and succeeded in getting only two really good ones out of 100 trials. He named the amoeboid organism which he saw *Phytamæba sacchari*, but did not actually claim that this organism was the cause of Fiji disease, and wrote:—

"That Fiji disease is actually caused by *Phytamæba sacchari* cannot be considered demonstrated until pure cultures of the organism injected into healthy cane produce the disease under controlled conditions."

As far as is known to the writer, McWhorter's work has not been confirmed. Thus it may be said that the cause of Fiji disease remains unknown.

Transmission of Fiji Disease.

Every grower now knows that Fiji disease is transmitted by cuttings from visibly infected stalks, but it is apparently not known to all that a stalk of sugar-cane may be infected and capable of carrying disease without being sufficiently

affected actually to show symptoms. In fact, it has been observed by North that the disease may remain in an apparently latent state for many months before appearing in the stool grown from a lightly infected, though apparently healthy, cutting.

This fact constitutes a serious difficulty in the selection of healthy seed, and accounts, to a large extent, for the failure of even the more careful growers to obtain an entirely healthy plant crop from apparently healthy cane selected from lightly infected fields.

The transmission of the disease by means of infected cuttings is quite possibly the chief factor in the spread of the disease through a district, but it does not explain the rapid rate of infection which takes place in a field of a susceptible variety during the course of its growth in both plant and ratoon stages.

Again, it is often found that the disease can suddenly appear in a locality situated several miles from the nearest infected field, although no record can be found of the movement of plants from an already infected area into this new locality. In a communication to the writer, Mr. Ferguson Wood cites such a case as observed by him in the Maryborough district:—

“From Mungar and Welcome Creek to the nearest farm in the main area infected with Fiji disease is well over 7 miles, and intervening farms are often separated or broken by patches of standing timber. The river would seem to have been the course of the infection, and the transmitter must have travelled up the river some 8 miles.

“In the case at Mungar only one infected stool was noticed, and this appeared to be secondary infection in ratoon standover cane. The grower denied having obtained plants from Maryborough at any time. Farms situated between his and the main infected area are unaffected.

“The Welcome Creek infection occurs about 1 mile down the river, and on the opposite bank to the farm mentioned above, and the same remarks apply, only one stool being found visibly affected.”

It will have been noticed that the word “transmitter” has been used by Mr. Wood. While Johnson's (4) recent work on Mosaic diseases shows that such a thing as the development of Fiji disease *de novo* may be considered possible until such time as it has been proved that some living organism is the causal agent, yet such evidence as given above, supported by the observation of workers in other parts where Fiji disease is known to occur, does, we think, definitely point to the existence of one or more natural transmitters of the disease. Such vectors, it is reasonable to suppose, will prove to be sap-sucking insects. As, to our knowledge, no definite experimental work has been carried out in this connection, further discussion of the matter can only lead to idle speculations, so we may pass on to other aspects of the question of transmission.

It has been shown by McWhorter that galls are present in the roots of infected stools. This suggests that the disease might possibly be carried by means of soil. However, experiments have been carried out in Fiji (by North and his assistants) and in the Philippines, in which healthy cane plants were grown in soil taken from around badly diseased stools, and in sterilised soil containing crushed-up diseased leaves, both types of experiments being, of course, checked by controls. In no case did Fiji disease show up in the resulting cane.

This shows that at least the soil cannot be held responsible for the spread of Fiji disease. However, the presence of galls in the roots of diseased stools makes it possible that the disease may be carried from a diseased stool to its healthy neighbour by some soil-inhabiting vector, but experimental evidence is entirely lacking on this point.

Another mode of transmission common to these diseases attacking plants which are propagated by means of cuttings is through the medium of the knife employed for preparing those cuttings. Conclusive experiments have been carried out by North on this phase of the question, and, as is the case with Mosaic disease, it was found that in no instance could the disease be transmitted by cutting healthy sticks with a knife which had immediately before been used for cutting diseased stems.

Thus, at present, we are only sure of one method of transmission of the disease in the field—namely, by means of infected cuttings—but the mass of field evidence shows that, in some varieties at least, some other very important mode of transmission exists. It is our intention to carry out experiments during the course of the year, aiming at finding out the part played, if any, by insects in the transmission of Fiji disease.

Varietal Resistance.

Although a certain amount of evidence on resistance and susceptibility to Fiji disease has been accumulated in Fiji, the Northern Rivers of New South Wales, and in the Philippines, we have relied rather on our own observations for information, as it is well known that resistance, like other characteristics of a variety, may often vary with changes in the conditions under which it is grown.

We have based our conclusions on resistance on what we have actually seen in the field—i.e., on the behaviour of certain standard varieties actually grown for some years in the infected localities. In this way we have been able to make recommendations, which will be detailed later, after only a comparatively short



PLATE 26 (Fig. 7).—SHOWING STEM OF UBA, SECONDARILY INFECTED BY FIJI DISEASE.

investigation, whereas, had we at once set out to carry out resistance trials with a number of varieties, our recommendations would necessarily have been delayed until evidence was accruing from such trials. This might have taken another three years or more.

However, arrangements have been made with a very progressive and interested grower on a badly infected though isolated farm in the Eagleby area, near Beenleigh, for fairly extensive resistance trials with promising varieties to be carried out under our supervision; so that we can hope to have experimental evidence to submit during the course of the next few years if Fiji disease still resists our efforts in controlling it.

No variety of cane has yet proved to be immune to Fiji disease—even Uba, which is considered immune to Mosaic and very resistant to most diseases, being infected in the Beenleigh district (see Fig. 7). However, some canes have certainly proved to be far more susceptible to the disease than others. Thus D.1135 and M.1900 Seedling are well known to be very subject to infection, while Badila (N.G. 15) and N.G. 16 are considered fairly resistant.

Our investigations, which will be given in detail later in this paper, have brought out what we consider to be definite indication of resistance to Fiji disease in Q. 813 and H.Q. 285 in the Beenleigh district.

Control.

The very effective control of Fiji disease by the Colonial Sugar Refining Company in Fiji has been largely based on the fact that cane grown on the less fertile clayey soils of hillsides invariably gives far cleaner and healthier seed, in so far as Fiji disease is concerned, than cane obtained from good free alluvial lands.

Varietal resistance was also taken into account, and Badila (N.G. 15) proved to be more or less resistant and thus suitable for cultivation in the infected regions.

Probably the most important feature of the campaign against the disease in Fiji was careful seed selection—as is stressed in a letter written by C. E. Pemberton while in Fiji in 1920 and quoted by Dr. Lyon (1):—

“The selection of seed for planting, free from outward evidences of Fiji diseases, goes on as vigorously now as ever, though it is usually difficult to find stools affected by it. Specially experienced men pass along the rows and cut seed only from stools which show absolutely no sign of the disease. It is a matter of stool selection, rather than a selection of good sticks. Sometimes a vigorous stool will show one stick affected. The entire stool is left standing and goes to the mill to be ground, or, as on some estates, it is dug up and burned. This simple selection of seed from only healthy stools seems to have resulted in a complete control of the disease. I have been told by some of the independent planters that a brief laxity in such selection for a few seasons results in a quick ascendant return of the disease in all of the newly planted fields.”

So far we have not been able to improve on these simple and common-sense methods of control. We have little or no hillside cane in the infected districts, so our control measures will consist simply of planting more resistant varieties—namely, Q. 813 and H.Q. 285—and in exercising careful selection from the poorer or heavier soils where practicable, reguig where advisable, and ploughing out of the worst fields after harvesting.

Legislative Measures.

In addition to these local control measures which strictly benefit the affected districts only, two proclamations (Nos. 11 and 12) have been recently issued by His Excellency the Lieutenant-Governor, which aim at protecting the State from wholesale infection, and eventually at eradicating Fiji disease in Queensland if possible.

These proclamations may be referred to in full on page 1816 of the “Queensland Government Gazette,” published 23rd October, 1926, but for the sake of simplicity, and for the information of growers, will be interpreted here.

Proclamation No. 11 absolutely prohibits the introduction into Queensland of any portion or whole of a sugar-cane plant from New South Wales, on account of the presence of Fiji disease in that State, without the written permission of an inspector.

Proclamation No. 12 absolutely prohibits the removal of any portion or whole of a sugar-cane plant from any farm or other place situated within the counties of Ward, Stanley, Canning, or March, when such portion, or whole, of plant is to be used for purposes of planting, unless permission in writing has been obtained from an inspector.

The word “inspector” means an inspector appointed under “*The Diseases in Plants Acts, 1916 to 1924.*” An inspector is vested with all powers necessary for the enforcement or carrying out of any reasonable measures for the control and eradication of Fiji disease. He may, for example, compel any farmer to destroy diseased plants, and may, “without notice, and with or without such assistants as he may think fit, enter at all reasonable times, upon any land, premises, or place” in order to examine any cane likely to be infected with Fiji disease.

From our experience with Queensland sugar-cane growers we feel that such a thing as *enforcement* of any measure will seldom be necessary, as every grower naturally realises that, especially in districts where cane is sent to small mills, the price obtained for cane depends largely on the efficiency of the mill, which again depends on the value of the cane sent in by the grower; he, furthermore, realises that it would mean a very severe setback to the sugar industry of Queensland if Fiji disease were allowed to be distributed promiscuously throughout our great sugar-cane tract.

Having now completed a general discussion of Fiji disease, we will go on with a more detailed account of its occurrence and control in the Beenleigh district.

ACKNOWLEDGMENT.

To Mr. D. S. North we tender our earnest thanks for his kindly advice, and for making available to us his many invaluable, though, unfortunately for science, unpublished manuscripts. We also wish to thank the farmers in the districts visited for their goodwill, keen interest, and ready assistance during our investigations.

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PART II.

Investigations in Beenleigh District.

The arable lands of this district consist chiefly of heavy to sandy alluvial loams, which, generally speaking, show improvement on the application of lime. Drainage is on the whole fairly good. Most of the farms are situated on the banks or near the mouth of the Logan River and along the banks of the Albert River, in country which is very flat and only a few feet above sea-level. Though bananas, pineapples, grapes, and many other crops are grown on neighbouring hills, such as Mount Yellowwood, sugar-cane cultivation is practically entirely restricted to the low-level country, with the exception of a few hundred tons grown in parts of Eagleby, Carbrook, and on a small red-soil hillock at Agaston.

In some parts of the district sugar-cane has found a keen rival in arrowroot, which also does well on the dark soils.

Extent of Infected Area.

This can be stated in few words. It was found that the disease had spread to every portion of the cane-growing areas drained by the Logan and Albert Rivers or their tributaries.

It need scarcely be said that this is a serious state of affairs, and will make the task of controlling Fiji disease in the Beenleigh district a difficult one.

The infection has taken place quite regardless of soil or locality, though these factors have certainly affected its intensity, it being found that infected cane suffered most heavily on the rich soils lying near the river banks.

During the course of inspection, 127 farms were visited, and out of these 80—i.e., about 62 per cent.—were found to be infected with Fiji disease.

Varieties Grown, and Their Degree of Infection.

Many varieties are grown in the Beenleigh district, but only the more important ones and those of special interest need be mentioned.

Green Goru (N.G. 24) is grown in small patches on a few farms. In some cases it has done fairly well. However, it is very subject to gumming disease

(*Bacterium vascularum*), which is present practically all over the district. Much of this variety here is infected with Mosaic disease. A few stools were found showing Fiji disease.

Baruma (N.G. 48), or Green New Guinea as it is called in this district, was found infected in only one field, although small areas of it are found on many farms. However, it is not a desirable cane, as it stands at present in these parts, being from 50 per cent. to 100 per cent. infected with Mosaic disease; and being of rank growth with strong tendency to lodge. It shows marked stunting when infected with Mosaic.



PLATE 27 (Fig. 8).—GOOD STANDOVER Q. 813 ON MR. J. M. STOLLZNOW'S FARM AT PIMPAMA ISLAND.

Purple Top (N.G. 64) is grown on a few farms. It is more susceptible to Fiji disease than *Baruma*, but is not yet seriously affected. However, it is very subject to gumming, one field visited showing 100 per cent. infection in young plant and ratoon cane.

E.K. 28 and *E.K. 1* were found growing on only one farm. Both plant and ratoon of each variety were infected to the extent of 14 per cent. to 15 per cent.

Uba was seen on only one small field in which three stools were infected with Fiji disease (see Fig. 7). It is grown for fodder only in this district.

Kikarua (or Striped New Guinea) is grown on a few farms. In two fields one or two infected stools were found. This cane sometimes does well, but is an uncertain ratooner and hence is not popular.

Meerah was seen growing on two farms, where it showed about a 5 per cent. infection with Fiji disease.

M. 1900 Seedling.—This cane was found on eight farms. On six of these farms it was infected with Fiji disease. It is very susceptible indeed. It is also very subject to root diseases of various forms and to gumming disease.

H. 227.—A few rows of this variety are grown on one farm amongst other infected canes. The original plant cane, now first ratoon, is free from infection, but this year's plant cane, grown from the above, is 6 per cent. infected.

Q. 855.—A few rows of this cane are grown on the same farm as *H. 227*. The variety is now 7 per cent. to 8 per cent. infected.

D. 1135.—This cane forms the staple variety on 102 of the 127 farms visited, 76 per cent. being more or less heavily infected with Fiji disease. This variety is probably the most susceptible to the disease, and the fact that it has been in the district for some twenty years, and is so widely grown, probably accounts for the widespread distribution of the disease. This variety is considered one of the most susceptible on the Northern Rivers of New South Wales also.

When it is realised that very few infected stools are of any commercial value, excepting when infected shortly before the crushing season, it is fairly easy to estimate the dead loss due to Fiji disease in an infected field. In this area such losses generally range as follows:—Plant cane about 5 per cent., in first ratoons about 13 per cent., and in second and third ratoons about 20 per cent.

These figures are based on counts made with tallimeters along several average rows in different fields, and take into consideration only the loss directly due to the disease; they do not make any allowance for losses due to weed infestation, with its consequent need of extra labour.

Losses can sometimes be much greater, especially on rich sandy alluvial soils near the river banks. In one such farm two counts were made, one in January and another in May, in a field of young first ratoon *D. 1135*. In January it was found that 42 per cent. of the young stools were diseased and stunted, while in May the figure had risen to 53 per cent., many of the stools having died out altogether. The field was so badly affected as to hardly pay for cultivation and harvesting. When first inspected the disease may have been latent in some stools. This would account for the large rise in the figures.

It is the general opinion of the growers in this district that Fiji disease is causing greater damage and loss each year; in fact, it is only recently that the damage has been brought well home to them. They are well aware that most of this loss occurs in *D. 1135* and are on the lookout for some cane to replace it.

Q. 813.—This variety is at present grown on 56—i.e., 44 per cent.—of the farms visited. It has proved very successful indeed from the cultural point of view, giving excellent plant crops, if not cut too early, and usually very good ratoons, except on the more sandy soils. It also has the advantage of being quite a good standover cane (see Fig. 8). Furthermore, it usually tops the score in c.e.s. tests in this district. It is a cane which strikes well and quickly, matures in about eleven months, and should be harvested from August onwards. It has proved very resistant to gumming and Mosaic in all Queensland districts to date.

Q. 813 was introduced into the Beenleigh district in 1919, and is rapidly gaining the confidence of the growers. It was found infected with Fiji disease on six farms, although in most cases it is growing next to fairly badly infected *D. 1135*. The highest percentage of infection found was 7 per cent. In this case a single short row of nearly 100 stools had been growing for three years in a field of *D. 1135*, which is now showing about a 20 per cent. infection. The field had been cut once last year. Two other small fields of *Q. 813* showed a 3 per cent. infection, and it was found that they had been planted from material taken from another lightly infected field, which indicates that the infection in these two fields was primary. This leaves us with three more infected fields to account for. These were small fields of from 2,000 to 4,000 plant stools growing next to infected *D. 1135*, and the infection in the *Q. 813*, probably of secondary nature, was restricted to from one to four stools.

From these facts we are naturally led to the conclusion that with a little care on the part of the growers concerned most of this *Q. 813* could have been kept clean—i.e., all of it with the exception of the single row of first ratoon which showed 7 per cent. infection, and which should be ploughed out after harvesting. It would seem, also, that the rate of spread of Fiji disease infection in *Q. 813* is very slow as a rule, especially when it is considered that we were unable to find infected stools on fifty of the farms growing the variety.

Summarising, it may be said that, generally speaking, Q. 813 is a better cane for the district than D. 1135, and is considerably more resistant to Fiji disease than the latter.

H.Q. 285.—This cane is known to some growers as Milton, Nerang, or Hambleton Seedling. It was introduced into the Beenleigh district about 1914, but is only lately coming into favour. It is a good early maturing cane, gives good ratoons on most soils, and can be harvested with safety at the beginning of the crushing season. It cannot always be relied upon for a standover crop, being somewhat susceptible to fungous diseases of the stem when mature, and should thus be cut in preference to Q. 813 where there is a likelihood of its being necessary to let some of the crop stand over.

It is also a fairly high density cane and thus has many points in its favour from the commercial and cultural aspects alone. The illustration (Fig. 9) shows what can be expected of this cane in the Beenleigh district.

Although at present growing on fifteen farms in the midst of infected D. 1135 fields, we have, so far, only been able to find one single stool showing Fiji disease. This single stool was situated in a field of about 5 per cent. infected standover D. 1135, where it had probably been planted accidentally with D. 1135 sets. Thus, as in the case of Q. 813, it may be assumed that H.Q. 285 is considerably more resistant to Fiji disease than D. 1135.

Control Measures.

The position in the Beenleigh areas, in so far as Fiji disease is concerned, is a very dark one, but is far from being hopelessly so.

It is true that the staple cane of the district is severely infected, but it should be remembered that this cane—viz., D. 1135—has been grown from cuttings in this small district for twenty years or more with few or no changes of soil, which are said to be beneficial in keeping up the vigour of a variety, and little or no attention to the disease question.

Until quite lately the growers did not realise that Fiji disease was actually a serious infectious disease, but merely took it to be a mysterious stunting, perhaps due to insect attack or to some inauspicious soil condition; and so they planted on merrily, avoiding only sticks so diseased as to be quite worthless as seed.

And, now, something of the order of 8 per cent. of the cane grown is a dead loss. This position has arisen during the course of about ten years, and there is no evidence to indicate that the annual toll of stunted and useless plants has reached a standstill as some farmers seem to believe. If damage can increase from 0 per cent. to 8 per cent. in ten years, it is obviously unwise to allow matters to go on in the old slipshod fashion and chance what may happen during the next ten years.

Furthermore, at present, but a very small area, comparatively speaking, is infected in Queensland, and every effort must therefore be made to prevent further contagion and eventually State-wide ravages.

The control measures which we propose are as follows:—

(a) *The Use of More Resistant Varieties.*—From our observations in the field, we have come to the conclusion that Q. 813 and H.Q. 285, besides being suitable canes for the district, show a certain amount of resistance to Fiji disease. How great this resistance will yet prove we cannot tell, but certain it is that these canes give the growers ample supply of clean material from which to commence planting operations next August and September.

After much careful consideration of every aspect of the question, we feel justified in recommending that, as far as possible, Q. 813 and H.Q. 285 be planted in future to replace D. 1135, M. 1900 Seedling, Purple Top (N.G. 64), and those other varieties which, for reasons already given, we do not consider it advisable to plant further for some time to come at least. If, after a few seasons more have passed, we find that Fiji disease is quite under control, or possibly eradicated, consideration might be given to a reintroduction of some of these canes if such reintroduction did not threaten to re-establish the disease.

Planting of H.Q. 285 should be restricted to a quarter or a fifth of the area planted by each farmer and used mainly as an early maturing cane to be cut early in the crushing season.

(b) *Seed Selection.*—Since a little of the Q. 813 in the district is already slightly infected, and since some fields of Q. 813 and H.Q. 285, owing to situation in very close proximity to other badly infected varieties, cannot be regarded as being safe for use as seed, it is obvious that indiscriminate planting of even these two varieties should be avoided. Growers should be careful in the selection

of the material they propose using for plants. Seed selection, to be properly carried out, is a task which requires a certain amount of experience which many growers do not possess, and so every assistance is being rendered by the Bureau in this matter.

During the month of January certain fields were noted as being suitable sources of plants owing to their possessing such desirable features as freedom from disease, thrifty growth, suitable age of cane, &c. A second careful inspection of these fields was made in May. The owners were then consulted, and they agreed to sell cane from these fields for plants next September at the price per ton being then paid at the mills supplied by them, provided the buyer cuts and transports his plants himself. The following is the list of growers who have agreed to sell



PLATE 28 (Fig. 9).—EIGHT-MONTHS-OLD PLANT, H.Q. 285, ON
MR. J. M. STOLLZNOW'S FARM, AT PIMPAMA ISLAND.

cane which we have inspected and declared suitable for planting purposes, together with their postal addresses:—

Q. 813—

Latimer, J. W., Norwell road, *viâ* Yatala.
Stollznow, J. M., Pimpama Island road, *viâ* Yatala.
Haack, F. W., Pimpama Island road, *viâ* Yatala.
Encklemann, M., Agaston, Alberton.
Encklemann, J. T., Pimpama Island.
Stollznow, W., Eagleby.
Stern, A., Carbrook.

H.Q. 285—

Latimer, J. W., Norwell road, *viâ* Yatala.
Stollznow, J. M., Pimpama Island road, *viâ* Yatala.

Since, under the Diseases in Plants Acts (Proclamation No. 12), it is not permissible for anyone to remove or have removed from a farm any cane destined for use as plants, without the written permission of an inspector, the above listed growers have been issued with the necessary permit, thus enabling them to sell cane from specified fields for plants, and enabling the buyers to take these plants to his own farm. However, it must be borne in mind by growers obtaining plants from farms other than their own and those listed above, without the written permission of an inspector, that by doing so they render themselves liable to a heavy fine.

In order to simplify matters as far as possible for the growers, a brief circular will be posted to each one, explaining what action he must take if he desires to obtain plants from some farm not listed above, and enclosing a simple form which he should fill in, stating what variety of cane he desires, and from which farm he proposes obtaining it. These forms should be posted to the Director, Bureau of Sugar Experiment Stations, Brisbane, before the end of August. In most cases we will be able to decide whether the issuing of a permit is or is not advisable by consulting our field books. However, to facilitate matters further, arrangements will be made for an officer of the Bureau to spend a fortnight or more in the district in September, during which time he will select seed for the growers, and, where necessary, issue permits to plant. An announcement will appear in the public Press notifying the district of the date of his arrival and his address in the district.

Beyond the steps outlined above there is little else which the Bureau can do at present, and the successful control of Fiji disease rests largely with the goodwill of the growers themselves. We are willing to help the growers as far as lies in our power, but the man who will not help himself is not deserving of any help from us. If he will not do his bit towards checking the disease in his fields he is a menace to his neighbours, and cannot in any way claim to be a good farmer.

(c) *Destruction of Diseased Stools.*—Since neither Q. 813 nor H.Q. 285 is immune to Fiji disease, it will be found that, however careful the grower may be, a little of the disease will creep into the Q. 813, and possibly the H.Q. 285, in certain cases. However, if all diseased stools be dug out immediately they are noticed it will be possible to keep the disease in check, and with care to eradicate it from such lightly infected fields. Badly infected ratoon fields of D. 1135 and other susceptible varieties should be ploughed out after harvesting, as they are a constant source of infection to healthy fields.

This concludes the writer's report on the Beenleigh investigations, but to make this paper more complete Mr. E. J. Ferguson Wood has kindly agreed to submit a few notes on the Maryborough district, where Fiji disease was studied by him. An earlier report by him on this district has already been published in the "Queensland Agricultural Journal" for May, 1927.

PART III.

Investigations in the Maryborough District—Extent of Infection.

In the Maryborough district the Fiji disease infection, principally in D. 1135, extends along both banks of Tinana Creek, from Bullwell School to the Mary River and down the Mary River to below Point Lookout and up to a point 3 miles above the Lamington Bridge.

Isolated cases have occurred at Walker's Point, Welcome Creek, and Mungar; along the Mary River and on the Gympie road. In both these districts the only case of occurrence away from river flats is the one at Melrose. This is on red ironstone forest soil and about 2 miles from the river on a low hillside.

Control.

The control measures recommended at Maryborough are simpler than those for Beenleigh, as stocks of clean seed can be obtained from Pialba and within the Maryborough area. Arrangements will be made for an officer of the Bureau to visit the infected areas during August or September to assist farmers with the selection of cane for plants.

Roguing of fields less than 5 per cent. infected, ploughing out after harvesting of badly infected crops over 10 per cent., and the trial of Q. 813, H.Q. 285, and Petite Senneville as comparatively resistant varieties, have been advised.

In Maryborough Q. 813 does not seem to be so resistant, but this may be only apparent. Fairly heavy infection has been observed at Granville, where diseased sets have been planted. It may well be that a few original stools became infected and that these served to propagate the disease widely over a larger area, or another factor may come into play.

It has been observed in connection with Fiji disease and Mosaic that varietal resistance seems to vary in different localities. Field evidence makes it necessary to lay stress on this apparent variation, which may be due to the following causes:—

- (1) Variation in susceptibility of the cane, owing to different soil and climatic conditions.
- (2) Presence or absence of a given insect vector, or the modification of its habits due to (a) its relations with the surrounding flora, (b) the attraction or repulsion of the insect from different varieties of cane, modified by variations in cell sap content due to edaphic and climatic factors as stated in (1).

LIVE STOCK AND MEAT INDUSTRY EXHIBIT—ROYAL NATIONAL SHOW.

The Council of the Royal National Association has undertaken a big task which shows every evidence of being thoroughly done, in the staging of a live stock and meat industry exhibit as a special feature of this year's show.

Mr. W. J. Affleck, chairman of the council, has undertaken the work of council steward. Mr. E. J. Sunners will act as hon. council steward, and a committee, each of whom will have some direct sectional interest, is being formed.

It is quite possible that the elaborate staging of this exhibit and the emphasising of its strong educational features by the adoption of special display methods will cost the association well over £2,000.

It is recognised, however, that at this particular time the meat industry is in need of greater lessons pointing the way to greater economic utilisation of the by-products of the industry, as well as to those lessons which point to the great savings effected in a public abattoir system.

A special building is being designed, and every correlated secondary industry will be featured in interesting educative fashion.

The Minister for Agriculture has expressed his keen interest in the whole programme, and has already granted a subsidy towards this work, and promised to make available the services of departmental specialists in certain sections.

The complete details are not yet available, but it is sufficient to say that this exhibit will excel, in many respects, any previously staged by the association, and will be of wonderful interest to cattle-grower, pastoralist, meat trader, and householder alike.

“ONE OF THE BEST.”

A Marburg farmer writes (11th June, 1927):—“Only just recently have I discovered an old ‘Queensland Agricultural Journal,’ and as I read it I formed an opinion that it is one of the best journals circulating among the farmers, because it is full of advice and guidance for the men on the land. I am forwarding my subscription herewith.”

CANE-GROWING AND ITS PROBLEMS.

FIELD DAY AT MACKAY.

PRIMARY PRODUCTION AND SCIENTIFIC RESEARCH.

The Annual Field Day under the auspices of the Bureau of Sugar Experiment Stations was held at the Mackay Station on 17th June.

The attendance numbered over 600 and included not only farmers, but representatives of the Scientific, Manufacturing, and Commercial sides of the industry. Subjoined is an abridged report of the proceedings.

THE Annual Field Day for the Mackay district was conducted on 17th June. The attendance numbered some 600, including not only farmers, but also mill managers, chemists, and business men. As is customary on these occasions, the visitors, in two parties, were conducted over the experiment plots, and the nature of the work in connection with each plot was explained either by Mr. H. T. Easterby, Director, or by the chemist in charge, Mr. F. Keogh. A preliminary address was given by Mr. Easterby, who apologised for the absence of the Minister for Agriculture (Mr. W. Forgan Smith), who had hoped to be with them, but in his capacity of Acting Premier had been called away to Melbourne. He welcomed the presence of Professor Goddard, Dean of the Faculty of Agriculture in the Queensland University, referring to the valuable work that gentleman has performed in connection with disease investigation for the benefit of banana growers, and particularly to the assistance afforded to the work of the Bureau of Sugar Experiment Stations in the training of pathologists and entomologists. As a result of this training they now had a number of men in the field rendering scientific assistance to the canegrower. He mentioned also that the students who had been abroad benefiting from the travelling scholarships, would shortly return to Queensland; and he was hopeful that by next year the bureau would have a scientific staff as efficient as could be found in any part of the world.

The excellent condition of the cane in all the experiment plots was the subject of favourable comment, though the area under crop was smaller than in 1926, a certain proportion of the land being in fallow.

THE ADDRESSES.

SCIENTIFIC RESEARCH AND THE SUGAR INDUSTRY.

Under the chairmanship of Mr. Easterby, short addresses were delivered in the lunch hour.

Professor E. J. Goddard, B.A., D.Sc., Dean of the Faculty of Agriculture, gave a most informative discourse on the measures at present being adopted by the Commonwealth and State Governments, and by the Queensland University, to promote the interests of agriculture generally, and particularly those of the sugar industry.

In the course of his address, as reported in the "Mackay Mercury" of 18th June, Professor Goddard said that he had remarked during the few years of his association with the biological problems in relation to agriculture in Queensland, the desire of the Director of the Bureau of Sugar Experiment Stations to co-operate with every scientific effort to solve the problems connected with the industry. Mr. Easterby's efforts to secure the efficient training of cadets in plant pathology and entomology had counted for much in the fight to secure a Faculty of Agriculture. Now that this had been brought about there was a great desire on the part of the University to afford thorough training to young men and cadets for every type of specialisation required in dealing with the problems of tropical agriculture. Many of those problems were of an economic nature; but it might readily be that scientific research shall lead to a solution of many of the difficulties included in this complex. At all events, that was the interpretation which he was personally inclined to place on modern scientific effort, and that was the outlook which the Faculty of Agriculture was

desirous of implanting in the agricultural students during their training. Professor Goddard emphasised the importance of science to agriculture, and appealed to the farmers for their sympathetic co-operation with the efforts of the Bureau, and with the scientific officers associated therewith.

National Problems.

The problems of the sugar and other tropical industries are matters of concern to the Commonwealth and Queensland, he said. The Commonwealth Government has recently replaced the Bureau of Science and Industry by the Council for Scientific and Industrial Research, a body which has already during its brief period of existence set to work to tackle our problems in dead earnest. Men are being sent to various parts of the world to receive specialised training in many and varied aspects of agricultural industry, and there can be little doubt that within a few years all branches of agriculture which afford problems of a national nature will be equipped with fully-trained men. The Empire Marketing Board has recently offered to assist in the foundation of a Tropical Agricultural Research Station in Queensland. This offer means that, provided the Commonwealth Government contributes on a £1 for £1 basis, the Marketing Board will make available a capital grant of £25,000 and contribute an amount of £5,000 per annum for five years for the upkeep of such an institution. The idea is to add another station to the circle of stations now constituted by that at Trinidad and that at Kenya for the investigation of tropical products within the Empire. We have every hope that this arrangement will be finalised by the Commonwealth Government. We are now concerned in locating a suitable area for such a station, and then will be in a position to draw up concrete plans which will enable us to outline a scheme of attack on tropical agricultural problems of concern to Queensland and the mandated territories.

How the Queensland Government Assists.

The State Government of Queensland is doing everything possible in so far as your industry is concerned to furnish you with a full complement of scientific officers. Three such excellent officers are receiving abroad special training in sugar problems and are completing such by actually visiting all the sugar-producing countries of the world. A number of young men have been trained or are at present being trained at the University. The University is carrying out investigation into your problems, and has recently erected special laboratories, part of the responsibilities of which embrace your problems.

Necessity for Scientific Guidance.

Why all this effort? Because those who share the responsibilities of the sugar industry appreciate the fact that here, as in all agriculture, there is necessity for scientific guidance, and that without such there can be nothing but chaos, both in the productive and economic spheres. Here, as in all other agricultural industries, however, the efforts of scientific and technical advisers will be futile unless there is the utmost co-operation on the part of the grower. It is the duty of every individual grower to recognise his responsibilities to the industry and his duty to urge all other growers to carry through efficiently all recommendations made. Every day we are learning that various diseases of plants are playing a bigger part in plant destruction and ruin of industries.

100 Per Cent. Co-operation and Efficiency Required.

These insidious diseases are due to ultra-microscopic germs which are distributed in two ways—namely, by diseased stock and by sucking insects, such as aphides and hoppers. The only way of fighting such diseases is by placing an embargo on distribution of stocks by growers, immediate notification of the disease, immediate destruction of affected material, careful inspection of fields by the owner, &c. I have had much experience in this connection with bunchy top disease in bananas. It has been preached continuously for the past two years that once the disease has made its appearance in a plant nothing on earth can cure that disease—immediate destruction is necessary. Arbitrary shifting of suckers will spread the disease from locality to locality, and in any new locality the banana aphide will carry the disease from diseased to healthy plants. If every banana grower would do his bit, we could stamp out that disease completely and restore that important industry in all affected areas to a level far higher than previously existed. You have similar problems, such as Fiji disease, and the same advice applies. Every country deserves the pests it has—the control is in the hands of the community. But we must have 100 per cent. co-operation and efficiency on the part of the producer. I would make bold to say that, generally speaking, pests as such do not baulk the scientific adviser, but humanity constitutes the problem.

Biological Control of Insect Pests.

It is the aim of the scientist dealing with pests to elaborate means of dealing with such in a way that will be easiest and most practicable for the producer. The ideal would be to find a natural or introduced enemy of a pest and combat it in that way. This is the method of biological control, and much remains to be done in that connection. Much can be done along the lines of biological control and we are now endeavouring to concentrate researches along those lines.

Yet all problems do not lend themselves to such treatment. There will always remain problems in which success depends on the efforts of the producer. Many problems lend themselves to mechanical control only, and the recommendations made, say, in respect of certain insect pests of cane, by your technical advisers depend for their success on you. Fruit fly is an excellent example. You must not expect that the scientist should wave a magic wand to eradicate your troubles. Effort on your part is the factor for success. Serious care and responsibility are the duty of the scientist, and, equally of the grower. It has been the habit too much in the past to focus attention on pests when they have assumed the status of epidemics. Yet there are many pests constantly doing damage to the extent of 10 or more per cent. which should have been tackled as soon as they appeared. I suppose if we could measure the damage done we would find that no crop produced in Australia suffers less than 15 per cent. loss due to pests and ineffective production. We must imitate the Americans in thoroughness. There are problems of transport also, and these are receiving attention from a committee of experts now visiting the North.

Hold on to What We Have!

While these are matters of deep concern, it is essential that we hold on to what we already have, and assist those whose responsibilities are to guard existing assets. Your industry is probably the best organised in Australia. I appreciate the co-operative spirit among you, but I would advise greater co-operation in so far as individuals are concerned. A great responsibility rests on you. The North is destined to attract more and more serious attention—it now has the interest and consideration of all who think on natural lines. I am pleased to have the opportunity of meeting you and voicing the interest of the University in your problems and those of the tropical North.

CANE PESTS AND DISEASES.

Mr. E. J. Ferguson Woods spoke on the symptoms of the three major diseases of the sugar cane—namely, Mosaic, Leaf Stripe, and gumming, illustrating his remarks by showing specimens of sugar-cane affected. He spoke also of a number of the minor diseases, such as red rot, and certain root diseases. He mentioned as an evidence of the usefulness of the experiment station that it was at the request of the farmers themselves that specimens illustrative of the various diseases had been brought for their inspection on this occasion.

Mr. R. W. Montgomery, assistant entomologist, gave an address on the various species of grub working mischief in the canefield. Different varieties needed different control measures, as, for example, those grubs whose beetles, like the greyback, feed on the foliage of figs and eucalypts; the beetles may be got rid of by cutting down their feeding trees, and in consequence grubs will disappear in the following seasons. In the case of other beetles which do not feed, or which feed only to a limited extent, such a procedure is useless. Where the destruction of feeding trees is not possible or when dealing with grubs of the latter class of beetles, recourse must then be made to the use of fumigants placed in the soil in proximity to where the grubs are feeding. Fumigants, such as carbon bisulphide, or paradichlorobenzene, injected into the soil in doses of $\frac{1}{2}$ oz. 15 inches apart near the cane stools, and at a depth of about 3 inches, have been the most successful that have yet been evolved in combating these pests.

"THE BIGGEST SHILLING'S WORTH."

A North Coast farmer writes (13th June, 1927):—"Am sorry I am so late with my renewal as I do not like being without the Journal. I think it the biggest shilling's worth in the way of a farm journal. Would it be possible to start my renewal with the June number?"

SOME HAWAIIAN EXPERIMENTS IN THE BIOLOGICAL CONTROL OF INSECT PESTS.

By ROBERT VEITCH, B.Sc., Chief Entomologist.

Biological control is the term generally employed to denote the part played by natural enemies introduced for the specific purpose of checking the increase of an insect pest of an economic plant. It is a term that is also applicable to such undertakings as the present campaign for the control of various species of prickly-pear by the introduction from America of certain of their insect enemies.

A survey of agricultural conditions reveals the fact that among the worst pests with which the producer has to contend are many accidentally introduced insects. In the early days of the modern world-wide migration of the white race, economic plants were transported from one country to another on quite an extensive scale, and not unnaturally some of the destructive insects associated with these economic plants were unintentionally transported with them. In many of these cases the accidentally introduced insect pests were unaccompanied by the insect and other enemies that kept them more or less under control in their original homes. Under such circumstances many introduced insects, that were only relatively unimportant pests in their native lands, became responsible for extremely serious losses in the countries to which they unfortunately gained access.

Objective in Biological Control.

The objective in the biological control method of fighting introduced insect pests is to readjust the balance by bringing in and establishing the natural enemies that were left behind when the destructive insects migrated. If success is achieved in the introduction of these enemies then the normal balance of nature will be more or less restored, and the numbers of the destructive insects will be so greatly reduced that the pests dealt with in this manner will cease to be of outstanding importance.

Natural Enemies of Destructive Insects.

The chief enemies of destructive insects are other insects which, instead of attacking plant life, habitually feed on insect life, either as internal or external parasites, or as predators that simply seize and destroy their prey. Mention may also be made of the valuable control factors represented by introduced insectivorous birds. Other small animals, such as the mongoose, have also been used as introduced natural control factors, but the case in their favour has not been clearly demonstrated. The utilisation of fungus and bacterial diseases of insects has also been discussed, but, speaking generally, comparatively little progress has so far been made along this line of attack.

Hawaiian Experiments in Biological Control.

The biological control method of fighting destructive insects has been given particular prominence in connection with sugar-cane pests, and it seems well worth while to direct attention to some of the results achieved in the application of biological control to that branch of economic entomology. Sugar-cane entomology affords excellent examples of the success of the method, where conditions are favourable, and hence the

three instances of biological control quoted in the following paragraphs are all associated with sugar-cane, and, further, all were carried out in the same country—namely, the Hawaiian Islands.

The Sugar-cane Leafhopper.

The first illustration of biological control is one that should be of particular interest to Queenslanders, because the insect fought in this case is one that has intimate associations with Australia—in fact, Queensland is its native home. Here reference is made to the sugar-cane leafhopper which was accidentally introduced from Australia to Hawaii shortly before 1900. The insect in question is regarded as a minor pest in Australia, but on its introduction to Hawaii it spread and multiplied with astonishing rapidity, and by 1902 the position had become so serious that the insect was estimated to be responsible for a loss of £500,000 annually. The Hawaiian Sugar Planters Association accordingly organised an Entomological Branch, and the investigation of the problem was commenced.

It was evident that the insect was a recent importation, and it was equally clear that it was not subject to the attacks of many enemies, although a few relatively unimportant native Hawaiian insects have turned their attention to this newcomer from Queensland. Eventually it was demonstrated that its native home was Australia, and an investigation of the sugar-cane districts of this State revealed the presence of a number of enemies that were keeping it in check.

It was found that three extremely small wasps were breeding in the eggs of the leafhopper, and as a consequence the attacked eggs were destroyed. These wasps were introduced into Hawaii, and certain other enemies were obtained elsewhere. These importations produced a marked improvement in the situation, and a visit to Hawaii in 1914 afforded convincing proof of the fact that on the majority of the sugar-cane plantations appreciable losses had been practically eliminated.

The entomologists, however, were not fully satisfied with the position, because, on a few plantations where climatic or other conditions were abnormal, serious losses were still being experienced, and on one plantation on the Island of Hawaii the position was far from satisfactory.

This led to a renewed search for further enemies, and Queensland again supplied requirements in the shape of a very small bug that lives by extracting the leafhopper egg contents through punctures made by its sharp beak. The relationship of this bug to the sugar-cane plant was not clearly understood in the earlier investigations, but, in 1919, it was fully demonstrated that it was not a sugar-cane pest, but was actually a very valuable enemy of the leafhopper.

It was accordingly introduced to Hawaii, and the remaining leafhopper infestations were brought under control. The financial result of the application of the biological control method in this particular case is that an annual loss of £500,000 has been virtually eliminated.

The Sugar-cane Beetle Borer.

A second serious pest in the Hawaiian Islands was the sugar-cane beetle borer, the original home of which is believed to have been New Guinea. The annual loss in this case was regarded as being in the vicinity of £250,000.

Being an introduced pest the biological control method was again employed, and a fly parasite was eventually discovered in the Dutch East Indies. After encountering many difficulties this parasite was successfully transported to Hawaii in 1910, and during a visit paid to that group in 1914 it was observed breeding freely on the great majority of the plantations, and it has obviously succeeded in very materially improving the situation.

The Anomala Grub.

The third Hawaiian success to which attention might be directed is the control of the *Anomala* grub. The white grubs of this beetle, which were probably introduced from the Far East, first caused noticeable injury in the year 1912. On a visit being paid to Hawaii in 1914, it was observed in enormous numbers in the magnificent rich, red soil on two of the largest plantations on the Island of Oahu, the infestation extending over several miles. Fortunately, its rate of spread was slow, and the entomological staff decided to endeavour to nip in the bud an infestation which, although restricted to a relatively small area, was nevertheless responsible for an annual loss of £20,000. Further, it was bound to spread throughout the whole of the group if left uncontrolled, and hence it constituted a very serious menace to the whole of the plantations of Hawaii.

Again a search for parasites was commenced, and in 1916 a wasp parasite was introduced from the Philippine Islands and was eventually permanently established. On a return visit to Hawaii, in 1917, the parasite was seen breeding in very large numbers, and here again a marked measure of success was obtained, and it is now possible to say that the *Anomala* grub menace to the uninfested plantations no longer exists.

The particularly interesting point about this case is the fact that biological control was established before the pest had become distributed throughout the length and breadth of the Hawaiian Islands. In the case of the leafhopper and beetle borer, the whole of the plantations were more or less infested, and enormous losses had been sustained before biological control was attempted.

Success Achieved in Hawaii.

Such is the record of three very fine instances of entomological work in the Hawaiian Islands. Although many of the parasites experimented with were failures, success was eventually achieved in each of the three major problems attacked by the staff. The balance-sheet on the whole is a very favourable one, and the expenditure involved in the investigations has been returned a hundredfold.

One cannot but admire the splendid faith displayed by both the Hawaiian Sugar Planters' Association and its entomologists in carrying out the work, for it must be remembered that frequently years of arduous, discouraging, and even dangerous work had to be undertaken before success was finally achieved.

It is but right to draw attention to the fact that the conditions in Hawaii are particularly favourable for this type of entomological control work. Success has, however, been achieved elsewhere in eliminating certain difficult problems, and there are doubtless many others that can be satisfactorily handled in this manner. Biological

control is, however, generally applicable only to introduced insects, and it is usually, but not invariably, of little assistance in the campaign against native pests.

Queensland Experiments in Biological Control.

Mention may be made of the fact that the biological control method has also been extensively employed in the United States, Fiji, Mauritius, South Africa, New Zealand, and Australia, as well as in several other countries. In Queensland very considerable success has been achieved in controlling woolly aphis of apples by means of a small wasp parasite, while colonies of a predaceous beetle have been introduced from Java in an attempt to minimise the losses caused by the banana weevil borer. While it should be clearly understood that, as a rule, success is possible only in the case of its application to introduced insect pests, there is, nevertheless, a large and promising field for this type of work wherever immigrant entomological problems are a serious factor in determining the degree of success likely to be achieved in agricultural or pastoral pursuits.

THE QUEENSLAND AGRICULTURAL BANK.

MR. A. P. DESHON APPOINTED MANAGER.

The original Agricultural Bank Act was passed in 1901, and the recently appointed manager of the Bank, Mr. A. P. Deshon, joined the institution at the time of its actual inception the following year. At that time the staff consisted of the then manager and Mr. Deshon. In the meantime he has been closely associated with every section of the bank's many activities.

The institution has grown rapidly having a present staff of 100. It has branches in the principal country centres, and makes advances averaging well over £1,000 per day, and is undoubtedly one of the most important factors at the present time for the advancement of Queensland agriculture.

Mr. Deshon, who is a Queensland native, was educated at the Brisbane Grammar School, and prior to joining the Agricultural Bank was engaged in mercantile pursuits. In addition to his long experience of finance and business, Mr. Deshon has personally a first class knowledge of rural pursuits and land economy.

His father was the late Mr. Edward Deshon, C.M.G., a former Auditor-General of Queensland. The latter gentleman fought in the English Army in the Crimean War, and forty-five years later his son was a member of the Queensland Mounted Infantry in the South African War. Included in the actions in which he participated were the Relief of Mafeking and Siege of Eland's River, and is the holder of the South African Medal and five clasps. After the conclusion of hostilities and his return to Queensland, Mr. Deshon was one of a picked body of Australian troops specially selected to visit England on behalf of the Commonwealth Government to take part in the celebrations at the coronation of King Edward VII.

NOTHING LEFT TO GUESS WORK.

Writing (4th July, 1927) from Oakey to renew his subscription a farmer reader says:—"The Journal is worth having as the work and doings of the experts of the Department are printed in the book, and as they leave nothing to guess work and chance it should be instructive to anyone on the land."



PLATE 29.—MR. A. P. DESHON,
Manager of the Queensland Agricultural Bank.

THE BRENNAN BUTTER BOX.

The butter trade of Australia to-day stands as an important and growing feature in our commercial life. With the grazing potentialities of this country, Australian butter should, in the near future, attain a foremost place in the world's market. This development will, of course, demand unremitting attention to ensure a high-grade article which is the first essential to establishing a reputation. The great distance to be covered and the time taken in shipping overseas is, of course, a handicap. This factor necessitates careful packing and the highest efficiency in refrigeration during transport.

In this respect the Brennan butter box is worthy of consideration, possessing as it does several advantages over the ordinary box. The new box is an invention of Mr. Joe Brennan, a railway employee stationed at Roma Street. For many years Mr. Brennan's duties have been supervising at the railway wharves the loading of butter consigned overseas. Long contact with butter in bulk stimulated his inventive faculties, and the result is the Brennan butter box which has been patented in the Commonwealth and elsewhere.

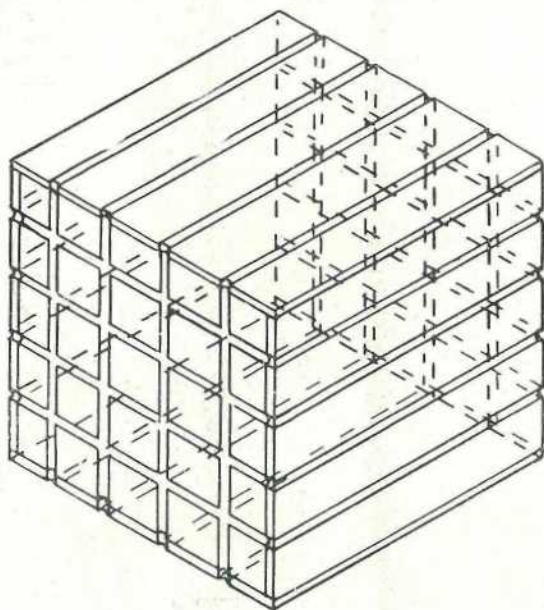


PLATE 30.—BRENNAN'S PATENT BUTTER BOX.

The new box is fitted with grooves running around the outside which constitute air channels, thus ensuring a regular current of chilled air while being refrigerated. The advantage is that the boxes can be stacked solidly in ship's holds. With the ordinary box, butter must be stacked in tiers with laths between to allow free circulation. This means using extra space which sends up the cost of freight. The new box saves space amounting to 800 boxes in every 20,000 shipped, the saving in freight works out about 3d. per box. The cost of laths and working time of laying same, and the expense of clearing the debris when unloading, is also eradicated. It is claimed further that the regular system of air channels insures the maintenance of an even temperature with less refrigeration. Breakages are claimed to be less, the grooved sides furnishing a safer hold when handling than the ordinary smooth-sided box. The butter is landed in better condition which effects the sale price and stabilises a reputation.

A test shipment of butter in the Brennan boxes was forwarded per s.s. "Woodarra" to London under the auspices of the Kingston Butter Factory. Test temperatures taken when shipped and after landing, and the condition of the butter, showed to the advantage of the new box. The consignment was landed 100 per cent. intact, which is a record.

For some time arrangements have been in preparation for the wholesale manufacture of the patent boxes. The matter is now finalised, and an unlimited supply is available on demand. Orders are being executed for several of the leading factories in this State. The Brennan Company is optimistic regarding the future of the boxes, and believes the coming season will see it used almost exclusively by the butter producers of Queensland. Southern interest is marked by inquiries from factories in New South Wales, where the new box is under consideration.

FARM TRACTORS AND THEIR MANAGEMENT.

THE FORCE OF EXPLOSIONS IN THE CYLINDERS.

By E. T. BROWN.*

The arguments that have taken place in the past between advocates of horse-power farming and motor-power farming have never as yet got any "forarder," as it is a trait of human nature to stick to one's opinion through thick and thin. But the day was bound to come when definite statistics would be forthcoming relative to the difference in cost between horse and motor farm work, and for this day many of us have been waiting for some time. I do not expect that those who still believe that horses are better than tractors for farm work will accept the proof of the latter's superiority without question, but the figures that I give below are certain to make them sit up and think. The following figures may be taken as authentic and reliable, as they were published by the British Ministry of Agriculture.

Comparative Costs.

The tests that were carried out dealt with harvest work and the results are those of work actually done with the harvesting of 10 acres of oats. Four devices were employed in the test—namely, (1) a horse-drawn binder, (2) a tractor-drawn binder, (3) a tractor-drawn two-binder, and (4) a tractor-drawn binder and stooker. The last-mentioned device—namely, the stooker—is of American origin and its performance is sensational. It is a rather unwieldy looking machine, but it can be manipulated with rapidity, and that it does remarkably good work was admitted by everyone that saw it at work. Without going into too many details as regards time occupied by the different devices when cutting and binding the 10 acres set for the test, the following particulars will give all the information that is necessary. The horse-drawn binder required five men for cutting and stooking, the cost of cutting being 30s. 4d. and for stooking 14s. 1d., making a total of 44s. 5d. The tractor-drawn binder required eight men for the dual work, the cost being 18s. 4d. and 16s. 9d. respectively, making a total of 35s. 1d. The tractor-drawn two-binders required seven men, costing 12s. 8d. and 14s. 4d. respectively with a total of 27s. The tractor-drawn binder and stooker required only two men throughout the whole work, the time occupied being six and three-quarter hours at a total cost of 13s. 7d.

The Need for Good Materials.

Many prospective tractor buyers cannot for the life of them make out why a farm tractor should cost such a lot of money in the first place, and why the price of important spare parts is so considerable; but when one begins to learn something as regards what goes on the moment an explosion occurs in the cylinder, it is realised at once that the reason for the supposed high cost is that only the very finest materials can be used successfully for the various working parts. I think, however, by giving you a few figures I will be able to prove to you that the cost is justified. Let us take the case of a 20-horse power engine, having two cylinders—6.5-in. by 8-in.—with a normal speed of 500 revolutions a minute. The head of the piston in this case is 33.2 square inch, and the average explosion pressure is somewhere in the neighbourhood of 250 lb. to the square inch. In many instances the explosion pressure is considerably more than that given, but the 250 lb. will answer my purpose of explanation. From these figures it will be seen that whenever an explosion occurs the piston head in question receives a blow of close on 4 tons. But in a two-cylinder engine, with a normal speed of 500 revolutions, the two piston heads between them experience 500 such blows each minute. This will give some indication as to the strength of the parts if they are to encounter 250 such blows, or nearly 1,000 tons a minute.

* In "The Farmer and Settler."

All Parts Concerned.

It is true that the piston head received this blow in the first place, but all other working parts of the engine are affected thereby. From the piston the blow is passed on through the connecting rod, with the big and little end bearings, to the crankshaft. Each time that the blow is passed on it loses some of its intensity, but for all this the strain that is imposed on the crankshaft has to withstand 500 such blows a minute. Is it any wonder, therefore, that every part of the engine must be constructed of those metals that are able to bear the strain?

How Pressure is Determined.

It has been stated that the explosion pressure is generally about 250 lb. to the square inch. Some of you may wonder how it is possible to determine this when an engine is at work. It is, of course, a job for the engineer in his shop, and it is not one that can be carried out by everybody. To obtain the pressure a special device is employed which is attached to the cylinder. The indicator, as it is called, draws on a card by means of pencil lines, and this indicates exactly what is happening inside the cylinder. The pressure inside the cylinder moves the pencil up and down against a spring, so that when the pressure is high the pencil moves in the same direction. The movement of the piston up and down causes the paper on the drum to move backwards and forwards, and in this way four lines are drawn to correspond with the four movements of the piston. When the pressure has been determined it is only a matter of arithmetic to work out the temperature within. It is a known fact that the temperature rises in a definite relationship to the increase in pressure and, therefore, the calculation is not a difficult one.

CITRUS CULTURE—SUCCESSFUL EXPERIMENTS.

Thus a recent Press message from Nambour:—About twelve months ago the Department of Agriculture undertook experiments on the orchard of Mr. J. T. Tennant, at Mapleton, in the revitalising of orange trees which showed loss of vigour after having been in bearing for some years. The entire work was done by departmental officials, from the pruning, spraying, and treatment to the first application of the fertilizers. Fifty trees in one portion of the orchard were selected, after close inspection of the root systems. This work occupied some weeks, when Mr. Tennant continued with the fertilizers, which were selected according to the nature of the soils. There is now seen on those trees one of the finest crops of oranges along the Blackall Range. The navel variety has especially responded to the treatment. The cost has worked out at 8s. per tree for the twelve months. Mr. Tennant states that before any orchardist attempted to carry out similar work it would be necessary to closely examine the root system of each tree, for there would only be waste of time and money on trees where the roots had lost vitality. The intention is to treat other portions of the orchard in a similar manner. Orange trees which were not showing live root action have been uprooted, and are being replaced with young trees. For the time being those portions are also being planted with pineapples.

Commenting on this the Acting Director of Fruit Culture, Mr. Geo. Williams, remarked that a rather high percentage of orange trees in the Mapleton district have in recent years shown indications of stagnation and more or less decay. Measures calculated to effect improvement have from time to time been recommended, but not received in the way that the general condition of the trees warranted. It was consequently decided that the fact of the application of the treatment advised be demonstrated and a small portion of Mr. Tennant's orchard selected for the purpose. The trees in this plot, estimated to be about fourteen years planted, were of very indifferent appearance and carrying many decaying and dead branches, poor, yellow foliage, and were practically unproductive. In addition to severe pruning in the first instance and subsequently thinning out young growth, the following soil treatment was applied:—Pulverised lime stone at the rate of 2 tons per acre and Nauru phosphate at the rate of 16 cwt. per acre, broadcasted and worked into the soil, followed by an application to each tree of 5 lb. sulphate of potash and 5 lb. sulphate of ammonia (25th June); a subsequent application (25th December) 4 lb. each of potash and sulphate of ammonia; third application (26th July) 3 lb. superphosphate, 2 lb. sulphate of ammonia, 1½ lb. potash. It is considered advisable that applications after the first liberal dressing be made twice annually.

POULTRY RAISING.

By P. RUMBALL, Poultry Expert.

Poultry farming on a commercial scale is an active, healthy, open-air life, calling for intelligence and application to detail rather than muscular effort. On a small scale it readily fits in with the general operations of the mixed farmer, the dairyman, and the orchardist, proving at times one of the main sources of revenue. In this article Mr. Rumball makes a general survey of the development and progress of the industry.—Ed.

Not the least important rural industry in Queensland is that of poultry raising. Its true value is estimated at considerably over £1,000,000 annually, but there is still room for further development, and persons desirous of taking up any rural industry should give serious consideration to the claims of poultry farming.

It is an occupation that is suited either to men or women. Though the latter are at a disadvantage with respect to the general building up of a plant, it often happens that by closer attention to details they may be more successful than men. It is, however, not an occupation that can be entered into as a sole means of support, as many think, with little capital. Certainly many of our foremost breeders commenced operations with little or no capital, but they passed through many of the struggles of the pioneer, and often had to seek outside work. It is not the writer's intention to encourage those lacking in finance, knowledge, or an aptitude for detail to embark into extensive operation, but rather to start in a small way, extending operations as they gain knowledge, experience, and finance, or in other words start right by making your fowls pay their way and build up the farm.

The poultry industry throughout the world has taken many years to grow to what it is to-day, and it also has passed through many trying stages. Possibly one of the earliest purposes for which poultry were especially bred was that of cock-fighting. Then we may say the next phase was that of exhibition. For many years now the breeding of poultry as a hobby and for exhibition purposes has been and still is extensively practised. The breeding of poultry for purely show purposes was not found to be a method which led to the extensive development of the industry, as the stock were principally selected for type and feather and little thought given to the commercial feature of egg production. This phase of the industry's development was, however, responsible for many benefits. Fanciers had to learn to breed for type and feather markings, &c. They had to be observant, and the self-training they received well fitted them for the rather difficult question of selection and breeding for egg production, and many of our foremost breeders have come from the ranks of the fancier. Again, the fancier is largely responsible for the maintenance of the type of various breeds. It was also the fancier's paying undue attention to certain features for show purposes and not enough to the commercial side of poultry keeping, the production of eggs, that was largely responsible for the establishment of egg-laying competitions.

Egg-laying competitions were commenced many years ago in practically all the States. Some were conducted by the various State Governments, and others by poultry clubs formed for the purpose of promoting the development of the industry. This may be termed the third stage through which the industry has passed. This State is well provided with egg-laying tests—one being conducted by the Department of Public Lands at Mount Gravatt, one by the National Utility Poultry Breeders' Association at Nundah, one by the Darling Downs Poultry Club, one by the Gympie Poultry Club, and one by the Bundaberg Poultry Club.

These tests have greatly stimulated the breeding and selection of stock for egg production, and it is largely due to these tests that the Commonwealth now has a poultry industry which is worth over £10,000,000 annually, and capable of exporting £250,000 worth of eggs. The tests have also been a wonderful advertisement to Australia, as the records created have attracted the attention of breeders throughout



PLATE 31.—MOUNT GRAVATT EGG-LAYING COMPETITION PENS.

The venue of a Competition conducted by the Department of Public Lands in connection with their Soldier Settlement operations.

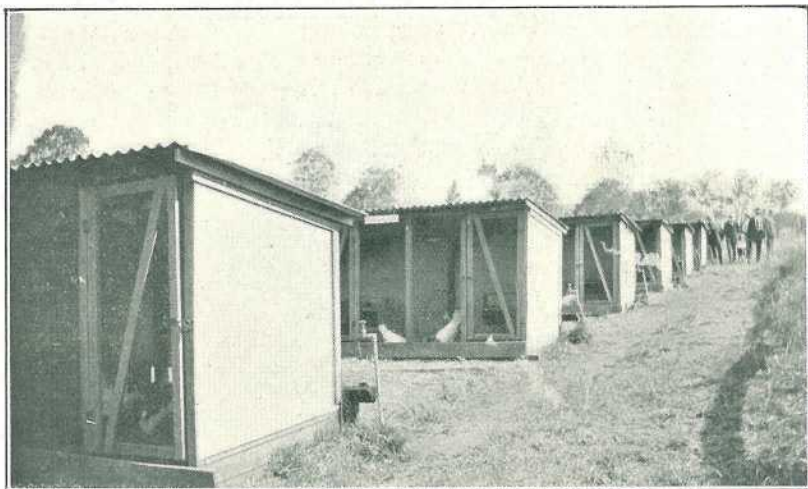


PLATE 32.—COMPETITION PENS OF THE QUEENSLAND BRANCH OF THE NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION AT NUNDAH.

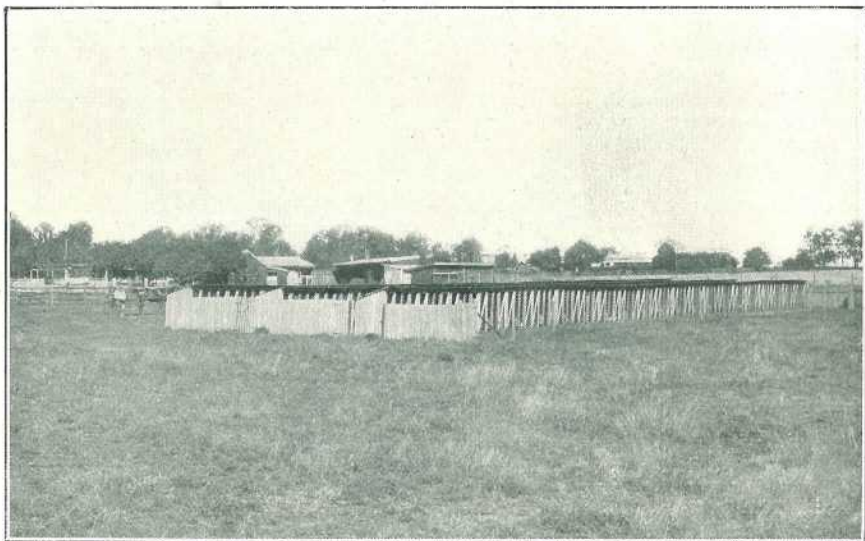


PLATE 33.—COMPETITION PENS OF DARLING DOWNS' SINGLE TEST EGG-LAYING COMPETITION.

It was here that the Queensland Record for Egg Production was obtained when a Black Orpington Hen laid 354 Eggs in twelve months.

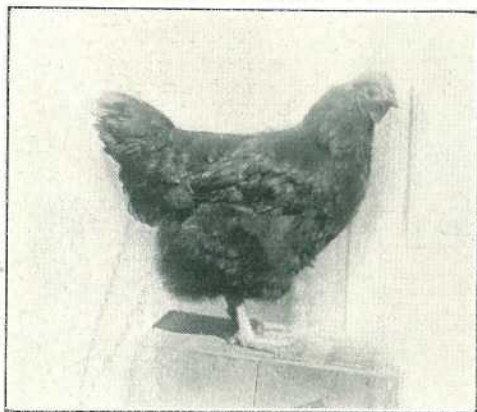


PLATE 34.—R. BURN'S "WARWICK WONDER" BLACK ORPINGTON.
Laid 354 2½-oz. Eggs in 365 days in Darling Downs Egg-laying
Competition, 1926-27.

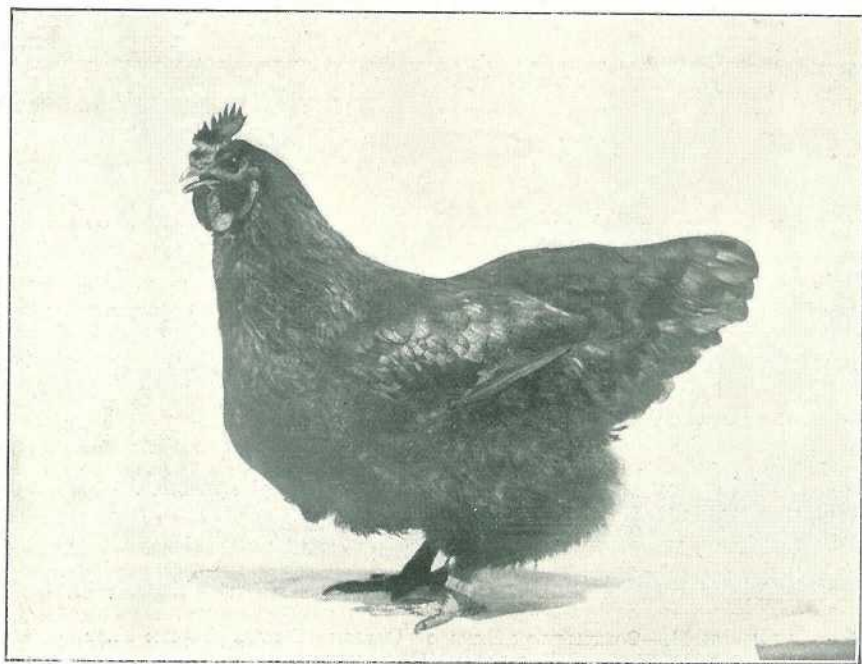


PLATE 35.—BLACK ORPINGTON WHICH LAID 274 EGGS AT THE 1926-27
COMPETITION AT MOUNT GRAVATT.

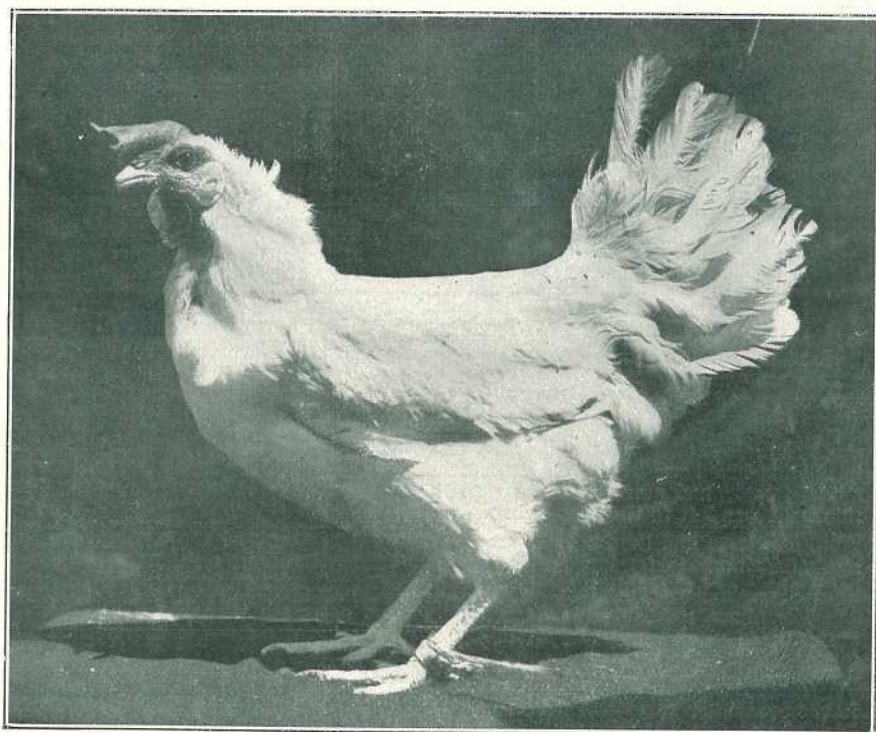


PLATE 36.—TWO WHITE LEGHORNS WHICH COMPETED IN THE MOUNT GRAVATT TEST, 1926-1927.

Both hens laid 278 Eggs, and carry splendid type.

the world, and it is probable that the exports of stud poultry rates second only to that of our sheep. To breeders in Australia they indicate a reliable source of obtaining stock, the progeny of which carries the feature of high egg production. Although the distribution of stock from this source has been carried on now for many years, there has been practically a constant improvement in the quality of the birds, and careful breeders still make a practice of selecting stock from breeders who indicate the quality of their birds by public competition.

The published returns of egg yields, egg values, cost of feeding and profit over cost of feeding, has also provided interesting reading, and undoubtedly induced many farmers to consider the results they obtain from their own stock and make purchases of birds of better breeding. The methods of feeding to obtain these results have also undoubtedly demonstrated to the farmer the necessity of giving this question greater consideration, and not to treat his birds as merely scavengers of the farm and expect results.

Even with the improvement that has taken place with the breeding, feeding, and distribution of stock the reproduction of the better class of bird was not as

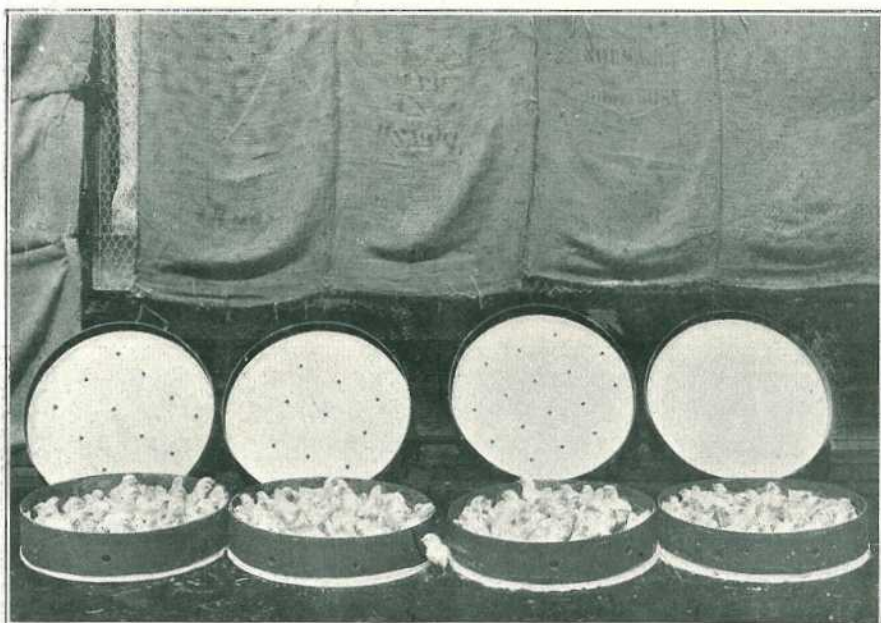


PLATE 37.—THE FRUITS OF INCUBATION.

Four hundred chickens opened up on a farm in the Cleveland District. All but sixteen were reared to maturity. Chickens packed similarly to these will travel well and experience no ill result. Two days' journey should, however, be the limit.

rapid as desired owing to the difficulty of obtaining broody hens. Certainly artificial incubation had been in use on commercial poultry farms for many years, but the mixed farmer had quite sufficient worries without adding incubators to them, and this work was left to the broody hen.

Broodiness had been a trait largely bred out of many of the best varieties of stock, and it was increasingly difficult for the farmer to obtain a sufficient number of broody hens and to obtain them during the period most suitable for breeding purposes.

The above condition now has largely been overcome with the advent of the mammoth incubators and the possibility of purchasing day-old chickens, and may be termed the fourth stage.

These large hatcheries or incubators make it practical for breeders to specialise in the production of chickens for sale as day-old chickens, it being merely necessary for them to retain sufficient chicks for the replenishment of their studs. One man alone operating a large incubator can turn out 50,000 or more chickens according to the facilities provided. Many poultry farmers commence by purchasing 1,000 or more chickens from these large plants, while others again never bother to put in incubators, being satisfied to purchase chickens every year. To the agriculturist or

general mixed farmer, large concerns similar to that illustrated are of considerable advantage as they enable him to obtain a given number of chickens on a certain date and therefore are to him what the small incubators are to the poultry farmer. This means of reproduction and distribution of stock has undoubtedly hastened the development of the industry in Queensland, and will ultimately if kept on a sound basis bring poultry raising into the foremost ranks of our rural industries.

The expanse and development of the industry as stated has naturally meant that production has increased by leaps and bounds. In the first place birds that



PLATE 38.—ONE OF THE LARGEST HATCHERIES IN QUEENSLAND.

There are three incubators here capable of holding 18,000 eggs. The total number of chickens hatched annually exceeds 40,000. These machines are heated by a coke fire and the eggs automatically turned. The room where these machines are operated is 60 ft. long and 20 ft. wide, and no space wasted.

possibly laid only about 100 eggs yearly have been replaced with those that are capable of producing 200 or more. Methods of feeding, which (say) were only 50 per cent. efficient, have been increased (say) 90 per cent., while it cannot be denied that the poultry population has also increased. Although eggs are produced throughout the whole of the year, production is stimulated during the spring and warmer months. This production has become in many countries so heavy that various organisations have had to be set up with the object of stabilising the industry, and Queensland has been faced with a similar condition. In this State the position has largely been overcome by the creation of an Egg Pool and consequently by the

co-ordination of the efforts of merchants and producers. An illustration of the fruits of organised marketing is given, and from this producers should realise the magnitude of the task of egg marketing.

From the foregoing an idea can be gathered of the developing of the industry in Queensland, and of the energy and knowledge that must have been applied to build it to what it is to-day. Although the building process has necessitated the passing through various phases it is not conceded that any can be dispensed with, but rather that efforts displayed by various clubs, breeders, &c., be conducted with the object of improving or at least maintaining what we already have.

The fancier or showman still needs his show, but certain features in his stock should not be encouraged. He should strive to introduce utility into the various varieties of poultry kept by him.

The management of the various egg-laying competitions should take greater note of type, be more severe, if possible, in the question of size of egg, and endeavour to make more use of tested hens by a better distribution of their male progeny.

Large hatcheries must not content themselves with just selling chickens. The chickens should be the progeny of hens laying standard-sized eggs, true to type, and if not the first descendants at least the second of tested parents. No finer



PLATE 39.

The illustration depicts the loading on board ship of portion of a consignment of 50 tons of eggs shipped per s.s. Jervis Bay to London during the early part of 1927. It represents, together with previous shipments, the results of the initial organisation of the export of poultry products to overseas markets.

opportunity exists for the distribution of stock of the best quality than is offered by these large hatcheries, but at the same time without constant care and attention on the part of the breeder the chickens sold could easily be worthless.

The question of marketing is every producer's business. To sell our produce we must retain the consumer's confidence. Quality of the internal content, size, and cleanliness of the egg, are of primary importance in obtaining and retaining this confidence, and every producer's attention is directed to this feature.

The Department of Agriculture and Stock is at all times prepared to give the poultry breeder every assistance possible, and with the object of assisting in the direction illustrated articles have been prepared upon the following subjects and may be had free upon application:—

Poultry Housing; Utility Poultry Standard; Poultry Feeding; Fattening Poultry; Rearing and Feeding Chickens; Handling and Marketing of Eggs; Storage of Eggs; Distended Abdomen in Poultry; Marketing Table Poultry; Incubation; Caponizing; Poultry for the Fruitgrower; Parasitic Worms; Poultry Tick; Chicken Pox; Roup or Contagious Catarrh; Post-mortem of Poultry; and Anomalies in Egg Production.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JUNE IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING JUNE, 1927 AND 1926, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	June.	No. of Years' Records.	June, 1927.	June, 1926.		June.	No. of Years' Records.	June, 1927.	June, 1926.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
Atherton ...	In. 1.58	26	In. 4.07	In. 1.55	Nambour ...	In. 3.67	31	In. 3.37	In. 5.33
Cairns ...	2.86	45	1.84	1.15	Nanango ...	2.04	45	2.94	2.33
Cardwell ...	2.02	55	4.81	0.54	Rockhampton ...	2.17	40	3.97	0.65
Cooktown ...	2.03	51	1.80	3.23	Woodford ...	2.86	40	3.15	5.06
Herberton ...	1.00	40	3.45	0.36					
Ingham ...	2.31	35	4.35	0.52					
Innisfail ...	7.14	46	10.96	4.19					
Mossman ...	2.10	14	2.65	1.00					
Townsville ...	1.27	56	4.17	1.06					
<i>Central Coast.</i>					<i>Darling Downs.</i>				
Ayr ...	1.33	40	5.19	0.13	Dalby ...	1.68	57	3.37	1.54
Bowen ...	1.59	56	4.46	0.32	Emu Vale ...	1.45	31	2.68	1.54
Charters Towers ...	1.27	45	3.45	0.18	Jimbour ...	1.70	39	3.18	2.21
Mackay ...	2.69	56	3.29	1.43	Miles ...	1.87	42	1.68	1.01
Proserpine ...	3.46	24	4.29	1.01	Stanthorpe ...	1.89	54	2.71	1.49
St. Lawrence ...	2.45	56	1.82	1.36	Toowoomba ...	2.42	55	4.12	3.49
					Warwick ...	1.77	62	2.83	1.35
<i>South Coast.</i>					<i>Maranoa.</i>				
Biggenden ...	2.08	28	2.44	2.23	Roma ...	1.67	53	0.93	0.76
Bundaberg ...	2.76	44	3.26	1.17					
Brisbane ...	2.77	76	3.21	5.32					
Caboolture ...	2.64	40	2.75	5.55					
Childers ...	2.40	32	4.01	4.17					
Crohamhurst ...	4.42	35	4.05	6.56					
Esk ...	2.16	40	3.57	3.66					
Gayndah ...	1.85	56	1.82	0.89					
Gympie ...	2.64	57	2.91	3.61					
Kilkivan ...	2.15	48	2.14	2.28					
Maryborough ...	2.94	55	3.96	2.59					
					<i>State Farms, &c.</i>				
					Bungeworogorai ...	1.63	13	0.96	0.94
					Gatton College ...	1.83	27	2.68	2.30
					Gindie ...	1.56	27	0.67	0.15
					Hernitage ...	1.87	20	2.99	1.82
					Kairi ...	1.47	12	2.43	1.68
					Sugar Experiment Station, Mackay	2.42	29	3.08	1.51
					Warren ...	2.29	12	3.14	1.50

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for June, this year, and for the same period of 1926, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,

Divisional Meteorologist.

Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription—one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

ABSTRACTS AND REVIEWS.

All foreign agricultural intelligence in this section, unless otherwise stated, has been taken from the "International Review of the Science and Practice of Agriculture," published at Rome by the International Institute of Agriculture.

What Size of Holding Gives the Best Results?

RUSTON, ARTHUR G.: Small Holdings. "Transactions of the Highland and Agricultural Society of Scotland," Fifth Series, vol. xxxviii. Edinburgh, 1926.

Examining the question "What size of holding is likely to give the best results for the nation as a whole, the community at large, and the individual farmer concerned?" in the light of figures collected in Switzerland by Dr. Laur, in Denmark by Dr. Larsen, and in Yorkshire by the Department of Agriculture of Leeds University, Dr. Arthur Rushton arrives at the following conclusions:—

If the time comes when Great Britain must as far as possible be self-supporting in the matter of food supply, it is undoubtedly the small holding that is wanted. The figures of Dr. Laur show that the gross output per acre of the small holding under 25 acres is nearly double that of the larger farms. The results of Dr. Laur also show that the gross output per acre steadily decreases as the size of the holding increases. The results obtained from the study of a limited number of small holdings in Yorkshire show that the gross output on small holdings of every type is invariably high on the acreage basis, but not necessarily so per man employed. The Danish results show that the output per man employed increases as the size of the holding increases.

The figures of Dr. Larsen show that the small holding employs a larger number of men per hundred acres than the large holding. The Swiss and Yorkshire results confirm those of Dr. Larsen, but indicate that the small holding has the possible economic disadvantage of a high labour bill per acre.

The individual farmer, however, will look at the matter from the personal rather than the impersonal point of view, and the economic rather than the social point of view will appeal to him. Here the Danish figures are instructive as they reveal the fact that the small holding of approximately 20 acres, so common in Denmark, is not the most economic unit. It is handicapped by high capitalisation, particularly in the form of non-productive capital, by high working costs, by the uneconomic employment of labour, both man and horse, to such an extent as more than to over-balance the social advantages it enjoys. When once the land has been acquired, buildings must be erected, and working capital found before that land can be efficiently farmed. In the case of the small holding under 25 acres the total capital to be invested in the farm is approximately three and a-half times the value of the land, but in the case of a holding of 250 acres it is roughly twice the value of the land. The big increase in the capitalisation of the smaller farms is largely in the form of buildings, implements, and what may be looked upon to a certain extent as non-productive capital.

While the data for Yorkshire are somewhat scanty, such as are available show that, as in Denmark and Switzerland, the small holder has to bear the same handicap of high working capitalisation, particularly in the form of implements and dead stock.

From the economic standpoint, it is not so much the gross output that matters as the net. While the output from the small holding is undoubtedly high the production cost of that output is also high. The Danish and Swiss results show this, and the more limited data collected in Yorkshire show results which are strictly in agreement. The high rent and rates which are inseparable from small holdings, their high labour and other costs, add heavily to the cost of production of their home-grown foods, and these high costs of production of crops react upon the cost of upkeep of the stock consuming them.

After allowing for a normal interest on the capital invested in the holding, and charging the labour of the small holder at the normal rate paid to the hired man, the Danish figures show that during the seven years 1917-23, there was an

average yearly deficit of 4s. per acre on the small holding under 26 acres. The efficiency of the holding increased with its size up to a maximum which was reached on farms between 75 and 100 acres in area, on which a surplus of 30s. per acre was obtained, and then fell off steadily as the holding increased, the surplus on farms of over 250 acres being approximately £1 per acre.

In Switzerland the holdings are, on the average, smaller even than in Denmark, and Dr. Laur's results show that in spite of the high gross output from the holdings under 12½ acres, the average net profits obtained on them were less than 3 per cent. on the capital outlay, as compared with more than 5½ per cent. in the case of holdings of more than 75 acres, from which it would appear that the efficiency of the normal holding increases with its size certainly up to 75 acres.

The results obtained from a more detailed study of a smaller number of farms in Yorkshire go to show that maximum efficiency is reached on a holding of between 100 and 150 acres, though the data available are not sufficient for the evidence to that effect to be conclusive. There are indications that the efficiency of holdings falls again as they increase beyond 100 to 150 acres, and then again rises until they are about 350 acres, from which point it appears to fall as the holdings increase in size beyond that limit.

From a study of the variations in the number of holdings of various sizes in England and Wales, it results that the tendency has been in the direction of the gradual elimination of the large holdings and also of those which have been found in practice to be too small for economic working. In spite of the repeated efforts made to encourage the small-holding movement, economic forces have slowly but surely worked in the direction of the medium-sized farm of about 100 acres.

Dr. Rushton also examines the cost to the responsible authorities of creating and maintaining small holdings in England and Wales, and his conclusion is that the present small-holding system has been to a large extent a costly failure, mainly through following too slavishly the methods that have been adopted in other, mostly smaller, countries. He recommends that no man should be placed on a holding of less than 35 acres; that the responsible authorities should hesitate to put any man on a holding of less than 50 acres; that the working of the Small Holdings Act should be extended so as to make it applicable at least to holdings of 75 acres and that, wherever possible, the holdings supplied should be close to that limit; and, lastly, that the men to be placed upon the holdings should be carefully selected.

Farm Costings Investigation in New Zealand.

FAWCETT, E. J.: Farm Economics, Work of New Branch of Fields Division.
"New Zealand Journal of Agriculture," vol. xxxiii., Nos. 2 and 6.
Wellington, 20th August and 20th December, 1926.

A Farm Economics Branch of the Fields Division of the New Zealand Department of Agriculture has recently been established. The programme of work adopted falls under two heads: (1) A farm survey questionnaire is being issued to a large number of farms of every type; (2) a certain number of selected farms in each district are being subjected to a very accurate system of costing, with a view to forming a standard against which the replies to the questionnaire can be checked.

On the basis of the data obtained, it is hoped that at least some of the following problems will prove capable of solution:—

- (1) Some farms of a group controlled by a certain combination of factors show a profit, others of the same group a loss. How far can the management of the low-producing farms be modified so as to improve returns?
- (2) What is the minimum capital essential for undertaking a farm of any given size in any locality?
- (3) Is the crippling factor usually the high price of land, high rates and taxes, over-capitalisation, or faulty management?
- (4) What is the earning value of land under average management skill on different types of soil in different localities under average marketing conditions?

The general conception underlying the projected work of the Farm Economics Branch is that the true economy of the matter is first to rectify farming conditions and only after that has been done to give attention to the other important questions of the relation of producer to the ultimate consumer.

The work is at present confined to (1) a survey of mixed farming in Canterbury; (2) investigations into the cost of producing: (a) wool and meat, taking account also of the relation between the two products; (b) butter-fat. In every case the endeavour is to study the whole farm as a unit, rather than to follow a detailed system of cost accounting.

Studies in Atmospheric Electricity.

C. NEGRO. "Elettricità atmosferica." Milan, 1926. One vol. in 8°, pp. 299, 40 plates. U. Hoepli.

Atmospheric electricity is nowadays once again attracting the attention of physicists, and our present knowledge on the subject is set forth by the author in eight chapters. We have still much to learn, only to mention, for example, the atmospheric disturbances brought about by the transmission of radio.

The chapters are entitled as follows:—The earth electric field; Atmospheric ions; Electricity in precipitations; Radio-activity of precipitations; Storm electric phenomena; Telluric currents and polar auroras; Various hypotheses; Atmospheres in radio-telegraphy.

An appendix contains studies on atmospheric electricity in Italy; there is also an extract of reports on atmospheric electricity arising out of the observations made at the R. Istituto Superiore, Florence.

The volume is of interest not only to theorists but also to practical men on account of the different questions relating to hail, lightning, &c., of which it treats.

ONION GROWING.

In response to numerous requests the following notes on onion growing are reprinted from the Journal of April, 1920:—

There is no reason why onions should be imported in such quantities as we see often arriving by steamer from the Southern States. The climate here is perfectly adapted to them, and, if only planted on suitable soil and given the necessary attention, heavy crops are an almost certain result. At one time it used to be said that onions could not be profitably grown as a field crop in the Blenheim district, near Laidley. To disprove this, the writer determined to experiment on the sandy loam of the scrub land on Sandy Creek. The seed was sown in April; the variety, Brown Spanish. The land to which they were to be transplanted was well worked and then rolled to make a hard, compact bed. Transplanting was carried on throughout July, and the season having proved favourable the result was a heavy crop of magnificent bulbs, which gave a splendid return for the labour expended. Now, if such a result can be obtained by one farmer, it follows that others can do the same. As there are thousands of acres of similar land under cultivation both there and in many other portions of the State, it only requires determination on the part of the farmers to enable them to successfully displace the importations from the South.

On looking over an old diary of farm operations, it appears that the writer's crops averaged 6 tons per acre, and sold at £25 per ton. Are there many crops which will give a like return? The present price of onions in the market is about £17 per ton. Now, suppose a crop to yield 8 tons per acre (and we know that double that return has been made), the cash return for a medium crop will amount to £136. Certainly there is a considerable amount of labour involved in planting out an acre or two of onions, but that labour is amply compensated for by the net returns.

A consideration of the following notes, based on practical experience, may, therefore, be of some service. Let us first consider

The Soil.

The most suitable soil for onions is a rich sandy loam, such as that of the Blenheim scrubs—free, friable, and easy to work, a soil that will not cake, and not lying so low as to retain the superabundant moisture after heavy rains. In such a case the land should be well drained. An eastern or south-eastern aspect has been proved to be better than if the land sloped to the west, as the onion does not require intense heat to bring it to perfection.

Before sowing the seed, it is important that the seed beds should be clear of weeds and of their fallen seeds. By sowing in April or May, there is not much to fear from weeds; still, it is advisable that the land, both of the seed beds and of the area proposed to be planted out, should be turned up and exposed to the weather

for some time previous to sowing. As soon as the weeds appear, give the land a good scuffling, and if this be done two or three times between March and April there will be no trouble afterwards. If the soil be not virgin scrub, or if it has borne crops for many years in succession without manuring, it should be thoroughly well manured with stable dung, ashes, bonedust, &c., as the onion demands plenty and the best of nourishment. New scrub land is rich enough in natural fertilizers not to require any addition of manure.

Preparing the Soil.

In planting out onions a very serious mistake is often made, and that is, the soil is carefully worked, reduced to a fine tilth, and the plants are set out in a soil which is loosened to a depth of perhaps 8 inches. From land prepared in this manner no good results need be expected. The onion requires a firm bed; otherwise the plant, instead of making a large well-shaped bulb, will run to neck, and have more the appearance of a leek than of an onion. Therefore, the land before being planted must be well solidified by rolling.

The Seed Bed.

Onions may be sown broadcast, or they may be drilled in, or they may be sown in a seed bed and afterwards planted out in the same manner as cabbages. The best way is to drill them in. In this case, about 2 lb. of seed per acre will be required. The seeds must be dropped at a distance of about 2 inches apart in the drill, and the drills should be from 12 inches to 15 inches distant from each other. The plants will afterwards require thinning out with the hoe. When sowing in a seed bed, planting out must be resorted to—a tedious process, but one that pays well for doing well.

On rich soil the plants may be 6 inches apart. The drills should be slightly raised, and the roots of the plant firmly embedded in it—allow the bulb to, as it were, squat on, not under the surface. As the plant grows, the soil must be kept perfectly clear of weeds, and, where the working of the ground has thrown the soil against the bulbs, it must be drawn down, so that only the root is in the ground. Where this has not been attended to, the remedy for the resulting want of bulb formation is to wring the necks of the plants, or, at least, to bend them down with a twist. This will have the effect of inducing the formation of bulbs.

When sowing the seed, care should be taken that they are not covered to more than their own depth. If sown deep, many seeds fail to germinate, and most of those that do appear will make an abnormal growth of neck, causing much labour in drawing away the soil from the incipient bulbs. The writer has never sown onions broadcast, and therefore offers no opinion on the value of the method. Of course more seed would be required per acre, and, if weeds are troublesome, a good deal of hand work would be necessary.

Now, about the seed. There are few seeds so annoyingly deceptive as onion seed. So difficult was it to get good seed in the State even at 10s. per lb. in the good old days, that growers imported it from Spain. The largest growers at Oxley, Messrs. Martindale and Nosworthy, were most successful with imported seed, but the writer had a very bad experience in this business. Twenty pounds weight of onion seed was sent from a friend in Germany. Instead of packing it in hermetically sealed bottles, he stowed it in calico bags in the body of an immense wooden Swiss cuckoo clock. When the clock was opened the bags of seed were examined, and looked perfect in colour and shape; but, alas! when subjected to pressure, no oily fatness was perceived; and when at last it was given a chance and sown thickly in drills, five acres returned the magnificent yield of 72 lb., which, at the rate of £28 per ton, amounted to 18s. Certainly, the land, after a week's waiting for the seed to germinate, was utilised otherwise, but not 1 cwt. of onions was harvested.

Make sure, therefore, of the seed. After sowing, it should germinate in less than a week.

In former days large onions were always aimed at, but now the public taste is in favour of medium-sized bulbs, so that closer planting may be adopted.

Onions may be known to be ripe by the drying up of the tops. As soon as this happens, take them up by hand and leave them on the ground between the rows to dry. As soon as they are dry, carry them carefully with as little bruising as possible to the barn.

As before stated, the Brown Spanish has proved most successful in this State, but the gentlemen above mentioned grew what they called the large White Portugal onion. It certainly was a splendid bulb, and fetched very high prices in the markets of Brisbane, Maryborough, and Rockhampton.



Photo. : Department of Agriculture and Stock.]

PLATE 40.—PEANUT INDUSTRY—MR. J. CAVANAGH'S FARM, WOOROOLIN, KINGAROY LINE.

- (1) Ploughing peanuts prior to stacking. (2) Lifting peanut roots for stacking.
(3) Stacking peanuts (Mr. J. Cavanagh, a well-known South Burnett pioneer, in the picture).



Photo. : Department of Agriculture and Stock.]

PLATE 41.—PEANUT INDUSTRY, KINGAROO.

- (1) Field of peanuts stacked for carting to thresher on Mr. B. Young's farm, Memerambi.
- (2) Carting peanuts to thresher on Mr. J. Cavanagh's farm, Wooroolin.



Photo. : Department of Agriculture and Stock, Brisbane.]

PLATE 42.—THRESHING PEANUTS, MEMERAMBI, KINGAROY

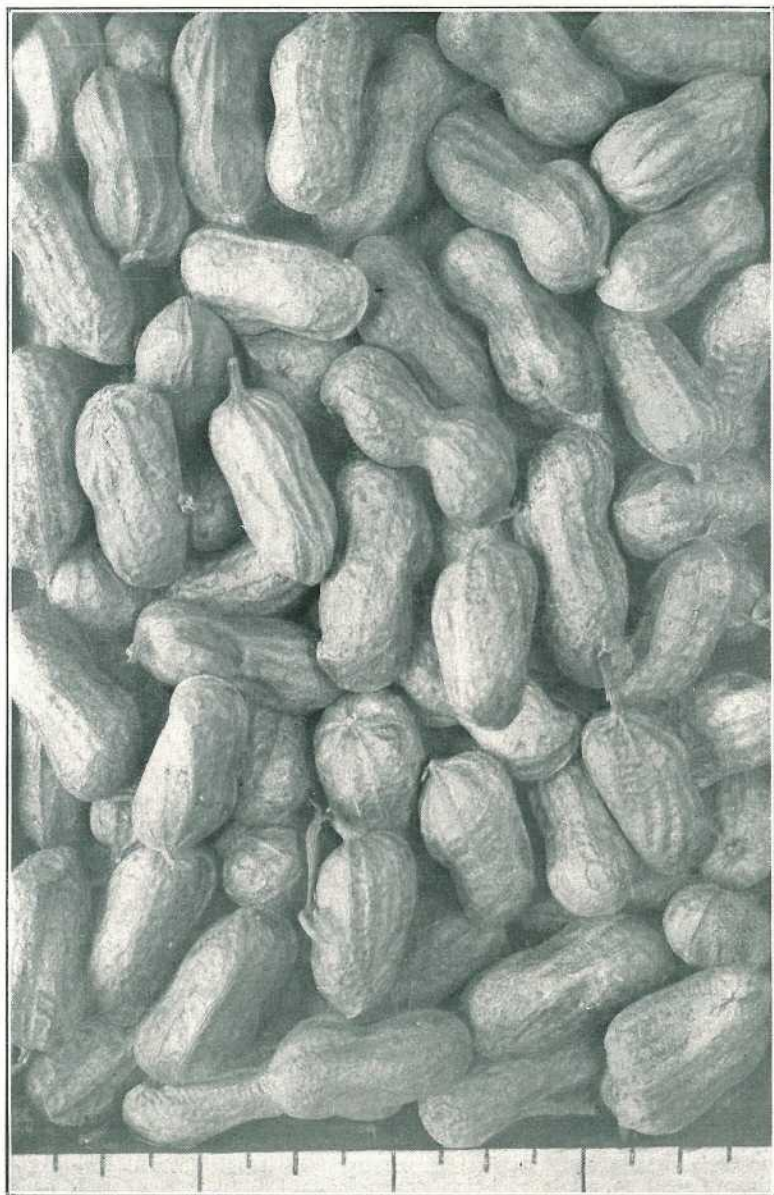


Photo.: Department of Agriculture and Stock.]

PLATE 43.—PEANUTS IN THE SHELL, GRADED FOR SALE.

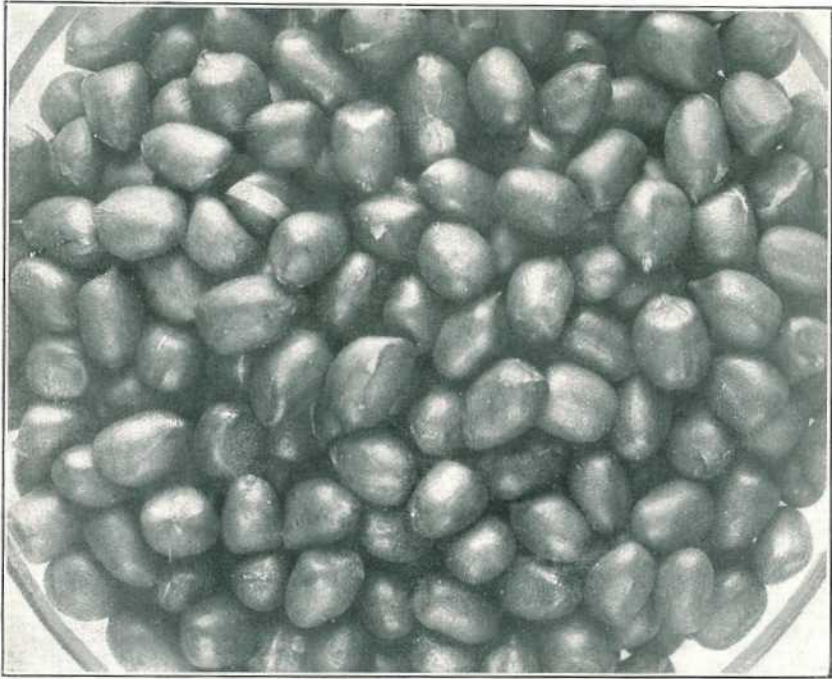


Photo.: Department of Agriculture and Stock, Brisbane.

PLATE 44.—PEANUTS—GRADED KERNELS READY FOR MARKET.

POINTS IN PLANT PROPAGATION.

By GEO. WILLIAMS, Acting Director of Fruit Culture.*

Plants are propagated for new individuals by seeds and for the multiplication of those previously raised so that the exact characteristics may be maintained by cuttings, layers, divisions, suckers, budding, and grafting, &c.

Propagation by seed is the most universal mode and that common to all plants in their natural state, and generally it is the most advantageous method with the average garden plant except where the exact counterpart of the parent is required. For successful propagation by seeds several conditions are essential—briefly that the seeds have perfectly matured, that they have been properly stored until the period of sowing, and that they be sown at the right time in a manner most conducive to germination. Regarding the perfection and maturity of seeds, the microscope in skilful hands will detect imperfections not observable to the naked eye, but a germination test is by far the most reliable. So much variation exists amongst the seeds of different plants that stored conditions which may prove fatal to one may not affect the germination of others. For the ordinary garden varieties, placing when in a reasonably dry state in insect-proof receptacles and storing in a cool place are recognised as being the most efficacious. Some of the larger seeds soon lose their vitality under any conditions, but more particularly dry and various materials are used to retain moisture during distant transit; a mixture of fibre dust and charcoal receives most favour, and though the process of germination is frequently well advanced on opening the container, losses in careful hands are nil.

Seed Sowing.

The theory that the most favourable time for sowing seeds is when they naturally drop from the plants in their country of origin is not applicable in other climates. Favoured by suitable weather, seeds of more tropical plants may vegetate in autumn and grow slowly through the winter, but in many cases they

* From a radio lecture broadcast from 4QG Brisbane.

would perish during the colder months unless special provision be made for their preservation; whereas if the seeds are well kept and sown in the spring the young plants will progress as conditions become more favourable to their growth. In the absence of cultivation, the time when seeds are self-sown may be accepted as the most suitable for perpetuating the species, but the cultivator has other objects which render it necessary to deviate from the natural mode. He has to cultivate not only for reproduction but for use or ornament and to meet demands existing perhaps through the year, under climatic conditions differing materially from those prevailing in the country of origin of the crop. Generally garden seeds require no preparation for sowing, though some like those of the carrot, which adhere to each other, are improved in distribution by being rubbed between the hands along with dry sand. Others which are encased in hard coverings should be steeped in water until their covering is materially softened; and those of an excessively hard nature, instanced in some *Acacias*, are improved by placing in a cup of hot water—up to boiling point—poured on them and allowed to remain immersed therein overnight. The germination of legumes is accelerated by soaking in cool water for about six hours before planting.

Methods of Sowing.

There are two principal modes of sowing—broadcast or in drills or rows. Broadcast, doubtless the most original, is merely scattering the seeds over the surface. The drill system has the advantage of admitting of the ground being more expeditiously cleaned and stirred at intervals, which is very necessary in soils of a close nature, particularly after heavy rains. On the other hand, small plants with spreading roots are probably best disposed promiscuously. Where transplanting is practised the drill method, excepting perhaps where very fine seed is used, is recommended. In their natural state seeds rarely fall upon the bare ground, but amongst the decayed or decaying vegetable matter with which it is covered. In this the seeds vegetate and the young plants are nourished by it until the roots acquire strength to penetrate the loam. Though seeds will vegetate under the influences of heat and moisture a fertile soil is essential for further progress. The constituency of the soil is also a most important feature. Fine light rich soil or a compost containing leaf mould is favourable to the vegetation of most seeds.

Germination.

The term "germination" is applied to the series of phenomena through which a seed passes when, having arrived at a state of maturity and placed in favourable circumstances, it swells, bursts its envelopes, and tends to develop the embryo which it contains. Before a seed can germinate, there must be a concurrence of circumstances favourable and essential to this process. The external agents essential to germination are water, heat, and air. Water is absolutely necessary for producing vegetation and the phenomena of nutrition in plants. In germination it penetrates into the substance of the seed, softens its envelopes, causes the embryo to swell, and produces changes in the nature of the first leaf or leaves which often render them fitted for supplying the young plant with the first material of its nutrition. It contributes to the development of the plant by means of the decomposition which it undergoes. Its disunited elements combine with carbon and give rise to the various principles found in plants. The quantity, however, must not be too great or the seeds would undergo a sort of maurotation and their germinative faculty be destroyed. Heat is no less essential to germination; seeds placed in a temperature below zero exhibit no germinative action. The heat, however, must not exceed certain limits, otherwise instead of favouring the development of the germs it will dry them up and destroy their vital principle.

Air is also indispensable, for were a seed totally withdrawn from its contact it would undergo no process of development. Certain substances have a decided influence in accelerating germination. Humboldt demonstrated that seeds of the cultivated cress when placed in a solution of chlorine germinated in five or six hours, whereas if placed in pure water they occupied thirty-six hours to attain the same state. Certain exotic seed which had resisted every method which had been tried to make them germinate became perfectly developed in a solution of the same substance. He further observed that all substances which readily yield a part of their oxygen to water, such as nitric and sulphuric acids sufficiently diluted, accelerated the evolution of seeds, but at the same time would have the effect of quickly destroying their vitality.

Light, instead of accelerating germination, rather retards it. Seeds germinate more rapidly under shade than when exposed to sunlight. The time occupied before an appreciable extent of germination varies widely, and whilst with some varieties it occupies but two days, others may not be evidenced for two years.

Seed-bed Practice.

The young plants for ordinary garden or nursery work are, with few exceptions, raised in seed-beds specially prepared for the purpose, with such facilities for shading as may be necessary or are available. The necessity for a friable fertile soil has been mentioned. This is not always available, particularly in heavy soils, which are invariably disposed to encrust on the surface, much to the detriment of the young plants. The addition of sufficient leaf-mould or decomposed organic manure and fine sand will effect the necessary alteration, but these are not always convenient in sufficient quantity, when a generous application of freshly slaked lime—up to 4 or 5 lb. per yard—thoroughly incorporated with the surface soil some months before planting, is recommended—a fine tilth and good cultivation are most desirable. Shade is an important consideration in starting fine seeds—particularly when it is desired to raise plants very early in their season or what is considered out of season. The shade should not, however, for garden plants be of a permanent nature, particularly such as would be accorded by opaque fixtures not growing in bushhouses, excepting where free access can be given to light for some time prior to transplanting. Whatever material is used to provide shade it will be found that the closer this is to the ground—allowance must be made for watering—the less watering is required and a more even moisture maintained. This is particularly desirable in the case of small seeds, which are usually evenly distributed on the soil surface, which is then firmly pressed down with the back of a flat spade or substitute, and very fine loam scattered lightly over the surface, water being applied with a fine distributor so that the seeds are not disturbed. In deciding upon the form of shade to be provided, consideration should be given to the possibility of loss or damage through the effect of heavy rains. The effect in respect of excessive moisture is obviated by raised beds and the action of the lime where required upon the soil. On the whole a fabric covering for seed-beds is preferable to brush or small boughs. Following germination it can be removed or rolled up in the afternoon, and the young plants (excepting under likelihood of heavy rain) allowed to remain exposed during early morning, the time of exposure being gradually extended with development until the cover can be completely removed. Following its removal plants should be allowed to remain for a fortnight or longer, according to their stage of development and general conditions, before considering transplanting. It will be recognised that sufficient even moisture must be maintained to assist development, but prior to transplanting the supply should be withheld for two or three days to allow the growth to harden, or liberal application be made before removals, so that the soil will break up readily without taking the roots with its particles.

Except with very fine seeds producing delicate plants, the open ground, if in good form, will be sufficient in cool weather to ensure a fairly good germination, but the seed-bed and transplanting is almost invariably preferable to broadcasting seeds over beds where the plants are to be allowed to remain. Admitted, there are a few but very few which do not readily transplant, and the quantities of these required would be limited, and be accommodated by raising them in the smallest sized flower-pots, filled with suitable soil and plunged to the rim in a part of the seed-bed where one watering will cover the whole supply, and transferred from the pots to their permanent positions without any fear of failures—a feature always present in planting seeds where the plants are to remain.

A MOST VALUED PUBLICATION.

A Chinchilla farmer in renewing his subscription writes (8th July, 1927):—“The little Journal is a most valued and useful publication for the man on the land, so I do not like to miss it.”

“A GREAT HELP.”

Thus an Klimbah farmer (18th July, 1927): “Kindly continue forwarding the ‘Queensland Agricultural Journal.’ It sure has been a great help to me since coming to this land of sunshine and fair play.”

FLUKE IN SHEEP.

Recent investigations have indicated that chemically pure carbon tetrachloride is an efficient drug for use against fluke in sheep. Tests in this State, and in America and England, have proved this new cure to be in every way superior to and cheaper than the male fern extract drench previously advocated.

While this latter drench costs something like 6½d. per sheep, the carbon tetrachloride given in capsule form amounts to one penny, and in drench form (one part carbon tetrachloride to four parts medicinal liquid paraffin) one-third of a penny per sheep treated.

Prevention First.

The use of a highly efficient cure, however, has a certain disadvantage. The more nearly a cure approaches 100 per cent. perfection—and the carbon tetrachloride treatment comes near to that mark—the greater is the risk of sheepmen neglecting the practice of prevention, because of the false sense of security that a “perfect” cure is likely to give.

Preventive measures should always be regarded as the first line of defence against fluke, while the “100 per cent.” cure should be regarded as a very handy reserve force to be drawn upon only when the first line of defence has broken down.

Life History.

Before outlining preventive measures, it might be explained that the fluke commences egg-laying about three weeks after reaching the liver of the sheep. The thousands of eggs produced by each fluke pass out of the sheep in the faeces, and, if deposited in moisture, will eventually develop into embryos, which are free-swimming, and seek certain fresh-water snails, into which they penetrate, and in the body of which they undergo a second process of multiplication, developing into forms known as *rediae*. These, again, undergo a process of division, and from each *redia* are produced several *cercariae*.

It will thus be seen that each egg may develop into a large number of *cercariae*, each of which bores its way out of the snail, and, after swimming about in the water for some time, attaches itself to a blade of grass or some aquatic plant. Here it forms a cyst round itself, and remains quiet until swallowed by some animal. It is therefore, in consuming the herbage of damp pastures that animals become infested. When the attached *cercariae* reach the intestine, they find their way to the liver, and there develop into fluke, and so complete the life cycle.

Preventive Measures.

Preventive measures must aim at destroying the eggs and embryos of the fluke, the snails which act as an intermediary host, and the *cercariae* which infest the sheep. The addition of bluestone (copper sulphate) to standing or running water in the proportion of ½ lb. to 4,000 gallons of water will destroy all snails and *cercariae* in less than forty-eight hours. Infested pastures may be cleaned by spraying with ½ per cent. solution of copper sulphate, but stock should not be allowed to graze until sufficient rain has fallen to clean the grass. Much good may be done by the following:—

- (1) Remove infested sheep to dry pastures; the ova excreted from the sheep will thus be deposited on dry country, and will not develop.
- (2) Drain wet and boggy pastures, or fence off. Draining will lower the number of snails, and will safeguard the sheep from feeding over the class of country most likely to be infested.
- (3) Burn off pastures. This will destroy large numbers of *cercariae*, snails, and ova.
- (4) Water stock from troughs in preference to ponds and dams.
- (5) When possible, dressing the pastures with lime and salt is a very effective measure.

If sheep must be placed on infested pastures, the ill-effects resulting from fluke may be greatly reduced by the following precautions:—

- (1) Avoid overstocking. If sheep are compelled to feed on short grass, there is more likelihood of their picking up vigorous *cercariae*.
- (2) Allow all sheep plenty of lick of salt and sulphate of iron, in the proportion of 40 of salt to 1 of sulphate of iron.

—A. and P. Notes, N.S.W. Dept. Ag.

TRADE CLASSIFICATION OF PIGS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

To secure the maximum profit in the production and marketing of various grades of pigs, it is essential that the farmer should have a detailed knowledge of trade classification, and of the requirements of the buyers representing both proprietary and co-operative bacon factories, the fresh pork trade, shop and retail trade, or the general buyer who attends and operates at store or market pig sales. The requirements of fellow farmers who depend to an extent upon the purchase of store pigs for further fattening are worth careful study; while in the stud pig business one needs quite an expert knowledge of the various breeds and of breeding and feeding, together with an equally extensive knowledge of the exhibition of stud pigs at shows, and of the business side of the trade in so far as it relates to membership in the Stud Pig Breeders' Society, correspondence, recording of pedigrees, advertising, despatch of selected pigs, and so on. These and other interesting points are discussed by Mr. Shelton in the following pages—Ed.

To secure the greatest margin of profit in the actual marketing of the animals it is necessary that they be properly developed and "topped up" on suitable and sufficient foods, this especially so three weeks or more before actual despatch, and that at the time of final preparation for marketing they be correctly classified and graded. The final preparation for market is particularly important, as on this so much depends; nothing is more annoying than to see well bred and well fed pigs offered for sale in a filthy condition, covered with mud (and sometimes with parasites such as hog lice) and confined in pens equally muddy, filthy, or dusty.

It is the right of every producer to see that the goods he has to offer for sale are placed before the buyers in the most attractive manner possible, and that they be delivered with all care and expedition to the buyer at point of local or terminal despatch.

Market Classification.

In the actual sale of pigs by public auction or private treaty, a number of different grades are provided for, each of which has its own particular classification, the pigs being graded according to quality, approximate age, estimated or actual live weight or estimated or actual dressed weight (as the case may be), and approximate value.

The following table, which sets forth the names, ages, approximate weight, and value of market pigs will therefore be found very useful as a guide in the actual preparation of these animals for disposal and despatch. The figures quoted are approximate only, as trade requirements vary from time to time, and in different districts, States, and countries; they are quoted more as a guide than as a price schedule.

The demand for pigs of all ages and grades is being well maintained, and there appears to be no occasion to suggest a weakening of the demand, since as yet our local markets are not continuously fully supplied, and as yet we have no regular export of bacon and ham, or of frozen or chilled pork to markets overseas. Indeed, there has been quite an appreciable import of pig products from New Zealand, and this matter is the cause of some concern both here in the North, and in the Southern States; it was to the markets of the Southern States that this imported meat was consigned, though the import has quite an indirect effect on Queensland markets.

TRADE CLASSIFICATION, QUEENSLAND, AUGUST, 1927.
PIGS.

Name or Grade of Animal.	Approximate Age.	Approximate Weight.	Approximate Value per Pig.
Sucker or Sucking Pig ..	6 weeks ..	15 lb. dressed ..	10s. to 12s. 6d.
Weaner Pig	8 weeks ..	25 to 30 lb. alive ..	15s. to 20s.
Slip Pig	10 weeks ..	30 to 35 lb. alive ..	20s. to 25s.
Store Pig	12 to 14 weeks	45 lb. alive ..	20s. to 35s.
Light Porker	4 months ..	50 lb. dressed ..	40s. to 50s.
Medium Porker	4½ to 5 months	60 to 70 lb. dressed ..	50s. to 60s.
Heavy Porker	5 to 5½ months	80 to 85 lb. dressed ..	55s. to 60s.
Light Baconer	5½ to 6 months	86 to 94 lb. dressed ..	55s. to 65s.
Prime or Medium Baconer	6 months ..	95 to 125 lb. dressed ..	65s. to 78s.
Heavy Baconer	Up to 9 months	{ 1st Grade— 126 to 135 lb. dressed 2nd Grade— 136 to 145 lb. dressed 3rd Grade— 145 to 160 lb. dressed }	from 50s. to 80s.
Backfatter	Up to 4 to 5 years	Up to 4 cwt. dressed ..	£3 to £4
Stag	Up to 6 to 7 years	Up to 4 cwt. dressed ..	£1 to £3
Chopper	Up to 2 years or more	Up to 3 cwt. dressed or over	£2 to £5
Boar	Over, say, 5 to 6 months	Various weights ..	Boars are of little or no value as "meat" pigs

While it will be noted that values fluctuate a good deal, and while pigs of one grade might readily be included in another and perhaps better grade, it can be taken as a general rule that the principal demand is for the medium or prime weight animal, whether marketed as porkers or baconers, or included in other grades. There is with us here, in the North particularly, a very limited demand for very light porkers or very heavy pigs of any grade. The prime pig in good marketable condition with a firm yet mellow flesh and firm white fat is the one most in demand, and is the one that under normal conditions is the most profitable.

GENERAL DESCRIPTION OF MARKET AND STUD PIGS.

Suckers or Sucking Pigs.

This is a trade class, and includes pigs up to six or even eight weeks old, in good marketable condition and fit for immediate slaughter as "sucking pig" for the week-end, Easter, or Christmas menu, &c. The demand for this class varies considerably with seasonal and local conditions, and is not sufficiently constant or lucrative to warrant being specially catered for by the farmer resident outside the metropolitan or city areas. Pig breeders having this class of pig for sale at Christmas (and "sucking pig" is, where finances will allow, almost a national addition to these menus) can usually dispose of them at remunerative prices with but little trouble. The most popular weight is 15 lb. dressed, although some customers ask for lighter or heavier weight carcasses.

Percentage Deduction.

In general the difference between actual live and actual dressed weight—where the animals are weighed, slaughtered, and weighed again within two or three hours—varies from about 18 to 25 per cent. Most factories, however, find it necessary in actual practice and in ordinary routine to deduct much heavier percentages than these, up to 30 per cent. being a common deduction where the time elapsing between weighing alive and weighing when dressed covers twenty-four hours or more, and where there is a good deal of shrinkage in weight, the result of handling, sometimes rough handling, and transport over long distances to destination, and possibly a "rest" period of twenty-four hours more or less between arrival at the factory and actual slaughter.

Further details in regard to this portion of our subject may be had from the pamphlets dealing with "Marketing Pigs," which, together with many other nicely illustrated informative pamphlets on pig raising, are available gratis on application (written or personal) to the Department of Agriculture and Stock, Brisbane, Queensland. The various bacon factories will also be pleased to advise pig raisers in regard to any of these matters, as it is in their interests that their clients should be informed as fully as possible in regard to all matters associated with marketing, &c.

Weaners.

Dealing further with the various grades of pigs, we come to the trade class referred to as weaners. Pigs are usually weaned off the sow at about eight weeks of age. This is the correct age for weaning, though pigs benefit considerably by being allowed to run with the sow until the age of ten weeks. At this age they are sufficiently advanced (or at least they should be) to be able to care for themselves.

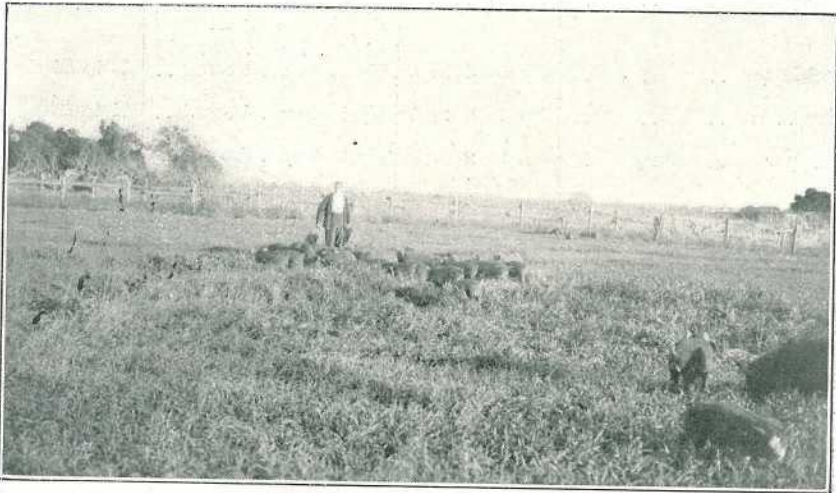


PLATE 45.—ALL AMONG THE PIGS.

A Pig Farm Scene in the South. Mr. A. N. White, of the Blakeney Stud, with a group of Poland-China and Berkshire Pigs, in one of the grazing areas attached to the Stud.

They should, however, have been taught to feed from a trough when four or five weeks old, so that by the time they are ready for weaning they will be quite accustomed to their own food trough and the class of food on which they are to be fed from then onwards.

Weaners are not a "trade" class in saleyards as far as butchers are concerned, but farmers trade a good deal with these young pigs, though even for this purpose slips or stores are a better line. It is not a good thing to wean pigs off their mother hurriedly and rush them off to the saleyards, as they frequently become so checked in growth as a result of the altered conditions that they fail to develop properly and become slow growers or even "stunted" pigs. Many young pigs are rushed off to the saleyards at six weeks old, and change hands at 15s. to 20s. each, a price that is scarcely a payable one to the buyer, unless he knows how to handle these pigs to prevent a check in their growth. It is but natural for a very young pig to fret for its mother at this age, and this fretting and fuming (crying as it were) all day long soon upsets the animal's nervous and digestive system with ill results. It is preferable to hold young pigs at this age for at least two weeks more before selling, as this enables them to become accustomed to the new conditions and the absence of the sow's milk from the daily menu. Pigs vary a good deal in weight at this age, some exceptionally well grown animals weighing as much as 40 lb. or more alive. However, the general average would be about 25 to 30 lb.

Slips.

After passing through the weaner stage and having been definitely separated from the mother, the young pig next becomes entitled to the trade term of a "slip." This is purely a stock salesman's or stockyard term, indicating that the pig is midway between the weaner and store stage. Many farmers prefer buying slips or stores, and growing and fattening them for market in preference to breeding them. Thus it is that there is usually a fairly keen demand for slips and stores, and thus also it often happens that they realise more in comparison than pigs that have already been fattened as light porkers. A "slip" is not a butcher's pig, and butchers do not handle them, except for fattening purposes. Most country butchers run their own piggeries, and they frequently have pigs of this description for sale. The value varies with the demand, but well developed slips should be worth from 20s. to 25s. or more, if they have been well cared for from birth and are well bred. A little extra care in their preparation for sale and a little advertising as to their breeding, &c., helps considerably.

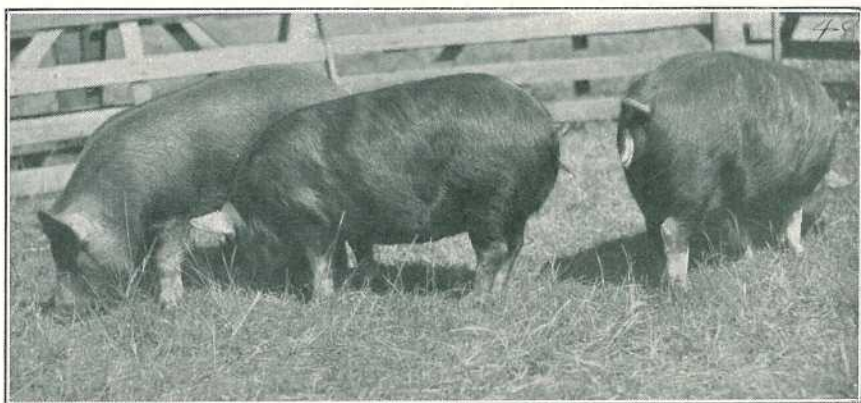


PLATE 46.—AN ATTRACTIVE TRIO OF BERKSHIRE-TAMWORTH CROSS BACONERS,
PRIZE WINNERS OF THE BEST QUALITY.

The Property of Mr. P. Fett, of Westbrook Crossing, Queensland. These would be classed as Prime Baconers in the markets of the North, and as Light to Medium Baconers in the markets of the South.

Stores.

Passing through the weaner and slip stages, the young pig next becomes a "store pig," a stockyard term indicating, as it does in most other classes of live stock, that the pig is at an age when the owner must determine the animal's future, whether he or she is to be kept for breeding purposes, to be fattened as a porker, to be still further grown and fattened as a baconer, or to go into the heavier grades, or whether the pigs will be held for a week or two and be resold in the same grade to some other person or firm. The demand for store pigs for fattening purposes continues to increase annually, hence, provided that store pigs are in good, healthy, growing condition and show some breeding and quality, they can usually be disposed of to advantage by public auction at pig saleyards or by private contract, at prices varying from 20s. to 30s., or even 35s. to 40s. each. Store pigs to realise maximum values must be perfectly healthy, show good breeding and type, and be in clean, attractive condition ready for further development and fattening. Any "weedy" sorts or any pigs that have been injured in any way, or are smaller than the others in the same pen should not be offered for sale in the same pen, as they will always affect the value of the other pigs offered, or of the better class pigs available. Suburban and metropolitan pig farmers, proprietors of "buttermilk" or "whey" piggeries (i.e., piggeries where buttermilk or whey are the principal items of purchased food) are constantly on the look-out for good lines of store pigs. They usually have no objection to the size or age of the pigs, except that they will not handle weaners or slips if larger pigs are available. The stores they like most are those from five to six months old that have had good opportunity of growth, but

that have had little or no fattening food—pigs that with three or four weeks' good "solid" food will "make up" into first-class baconers. For these latter sorts they will frequently pay more in comparison than the farmer can realise for porkers.

It is good business growing store pigs in quantity for sale as such, but one needs to be watchful of the seasons and food supply, otherwise one might be caught with a heavy supply of pigs on hand and little or no (or very expensive) food available. The ideal condition would be growing store pigs on the cheaper country over the ranges, and fattening them on the more expensive country capable of growing corn and other cereals, and root crops, &c., &c., on the coastal areas.

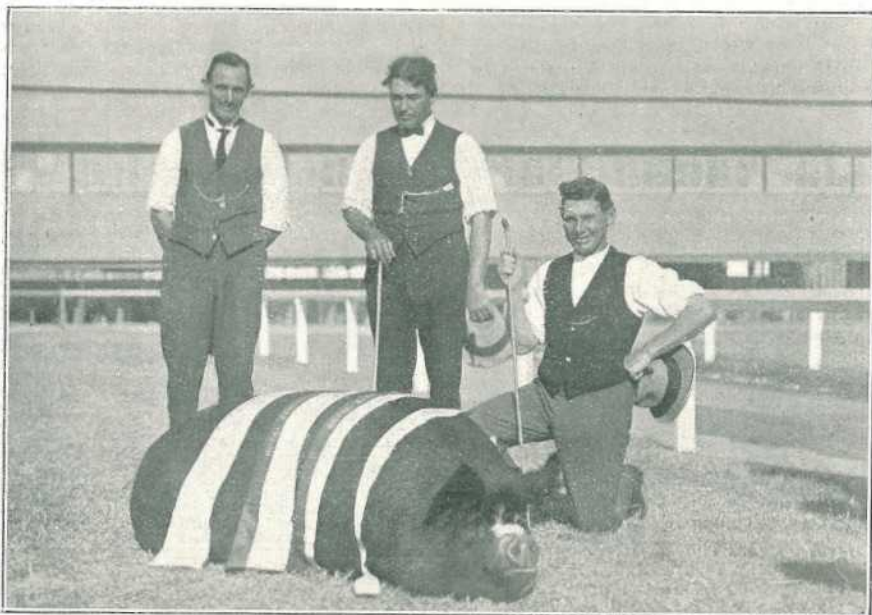


PLATE 47.—THE CHAMPION OF CHAMPIONS.

A unique photograph of that famous Sow "Brentwood Dorothy," now deceased, which sold at public auction, at the Sydney Show Stud Pig Sales, six years ago, at 130 guineas. This sow was a profit-maker of the highest order and was just as good as she looks. The purchasers, Messrs. McPhee Bros., to the right of the picture, are shown in company with Mr. H. J. J. Honey, another Richmond River enthusiast.

Light Porkers.

Good quality well-developed pigs from four to five months old are usually classed as porkers, and they are graded according to weight, quality, and condition into three groups—light, medium (or prime), and heavy.

In the past in Queensland there has not been a sufficiently constant demand for porkers to have warranted farmers catering specially for these grades, but conditions are rapidly changing, and nowadays when the export of frozen pork is being given so much publicity, fresh buyers are offering, and a certain amount of frozen pork has already been shipped from Queensland to ports outside of our own borders and to overseas markets. One firm alone, during 1926, exported 2,800 porkers, purchased here at between 7d. and 7½d. per lb. dressed weight, at weights between 60 and 110 lb. dressed. The pigs arrived at destination in a satisfactory condition, and created a demand for further and almost unlimited supplies. It will be seen, therefore, that the porker grade is becoming an important one. There is, of course, always a certain quantity of fresh pork on the retail markets of this State, especially in the metropolitan area.

It is a mistake for farmers to send porkers to the bacon factory and expect the factory manager to grade them as bacon pigs and pay for them accordingly—that is, unless they are sent in by arrangement with the factories—for even bacon

factories have a certain demand for pork, and in the far North the Northern Pig Board handle porkers as well as baconers through the North Queensland Co-operative Bacon Factory. If there is a demand for them at a payable price, porkers, if properly handled, should be more profitable than bacon pigs, as they are ready for market much earlier, and consequently can be produced at a lower price and with less risk. The lighter grades of porkers—say, those dressing about 50 lb. weight—are not as profitable as the prime weight porkers (70 lb. dressed), except to the suburban farmer, who can deliver them to the saleyards or to retailers or consumers in a fresh, clean, prime condition. Porkers cannot stand knocking about to the same extent as pigs carrying more age and weight. To the farmer having porkers for sale the best advice would be to spend some time moving about among pork butchers, stock agents, hotel and cafe proprietors, suburban pig farmers, &c., ascertaining the exact position regarding the market outlet for these animals. See table for ages, weights, and values.

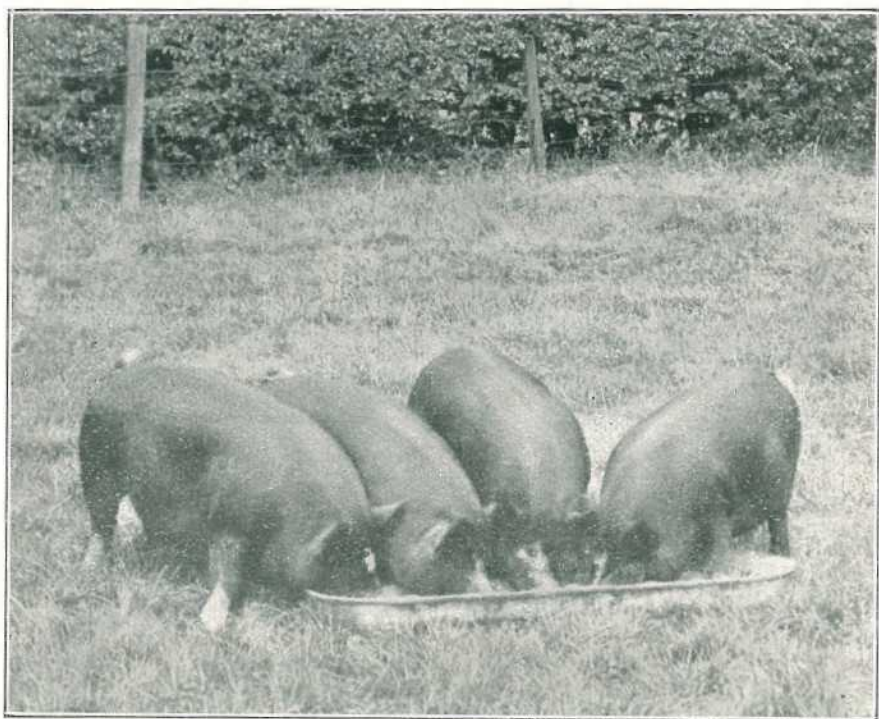


PLATE 48.—AN EXCELLENT QUARTETTE OF BERKSHIRE PORKERS IN PRIME CONDITION. Note the clean healthy skin and hair, the fine quality and even development of each animal, and the clean comfortable quarters under which they have their abode.

Medium Weight Porkers.

For pigs of 65 to 70 lb. dressed weight there is, especially during the cooler months of the year, a good local demand. They are more profitable than either the lighter or heavier grades, and provided they are in good, healthy condition, will always realise top prices. Butchers prefer porkers weighing 65 lb. dressed if they can secure them regularly, because they are of a convenient and handy "shop" size, and can be cut up to more advantage than other grades. Porkers are, of course, used in the fresh meat business, being retailed in the form of small joints of fresh pork, pork chops, roast pork, and other forms. Many farmers believe that the baconers can handle porkers to cut up for the sausage trade, but this is not the case, except as referred to above, as factory reports will bear out. In the Southern markets there is a heavy demand all the year round for porkers of good quality and of convenient "shop" weights.

Heavy Porkers.

For these the demand is not so keen or constant, nor are prices as satisfactory. Altogether they are not as good for marketing purposes as are the medium weights or the better grades of light bacon pigs. There are times, of course, especially in the South, when heavy porkers sell well, particularly if one or more of the carcass butchers have heavy export orders for carcass pork for the Navy or for pickled pork for the "Island" trade. In general, however, it can be said that the heavy porker is not in demand; he had better be fed for a fortnight or a month longer and be marketed as a baconer, in which class he will realise a price that should more than pay for his keep for this extra period. This is a point far too many farmers fail to realise; the general complaint amongst bacon-curers to-day is that farmers are rushing their pigs into market before they are heavy enough or carry sufficient condition for curing, this especially so in the Southern States, where there is a general "scare" owing to numerous outbreaks of disease among pigs, particularly in the metropolitan areas of Sydney and Melbourne.

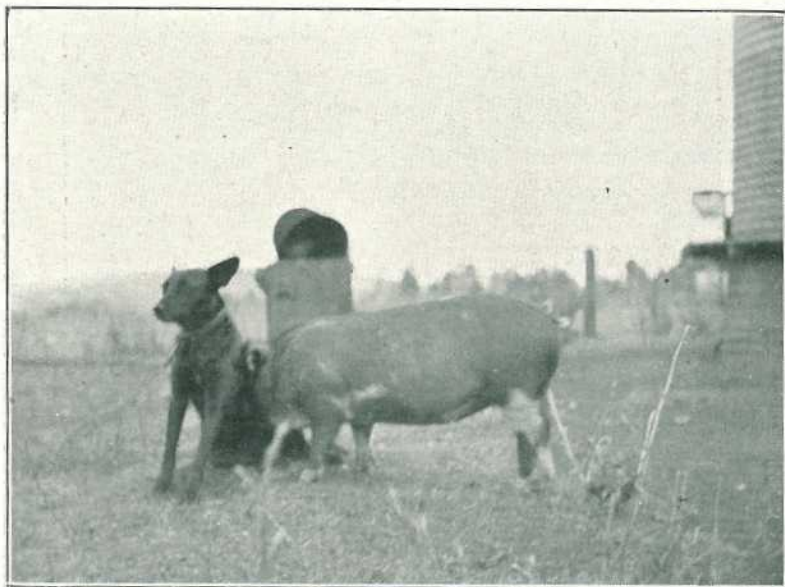


PLATE 49.—A KELPIE-REARED POLAND-CHINA SOW.

This photograph is of a Poland-China Sow, suckled and reared by a Kelpie bitch, the property of Mr. A. J. Little, of Coolabunia, Queensland. The dam of this young sow died shortly after giving birth to her litter. The Kelpie had a litter of pups about the same time, but as they were "not wanted" they were destroyed. The bitch soon developed a heavy flow of milk and it was at this stage that the sow shown here discovered this new source of food supply. The bitch and the sow became firm friends, and as will be noted, both were doing well at the time the photograph was taken, by which time the sow was approaching marketable age as a light baconer. The photograph is certainly a unique one.

Bacon Pigs—Light, Prime (or Medium), and Heavy.

As with porkers, the demand for bacon pigs centres more upon the medium and prime weight pigs than upon the lighter or heavier, overfat grades. In fact the very light bacon pig, like the overweight porker, is not desired. He shrinks heavily in weight while in transit, and loses condition very much more as a result of handling. A pig that is too heavy for the pork butcher, yet not heavy enough for the bacon-curer, is in a class that is likely to suffer more on a falling market than any other grade, therefore breeders who desire to secure bacon pig prices should aim at placing their baconers on the market when they are five and a-half to six or

even seven months old at about 120 to 125 lb. dressed weight (on approximately 170 to 179 lb. live weight). The bacon-curer prefers a pig this size, because the carcass can be retailed more profitably in the form of ham, shoulders, flitches, middles or sides. The heavy bacon pig is a better market animal than the heavy porker, because the former carries a more weighty ham, but he is not as profitable "all round" as the pig of medium weight, and should not be kept so long in the fattening yard or pen. It must always be remembered that the pig is a greedy feeder, and so long as he is feeding he is either doing so at a profit or at a loss to his owner. It pays handsomely to watch the markets carefully and to place before buyers the class of stock most in demand. The demand for bacon pigs is very keen, so much so that bacon curers have buyers or agents operating in practically every district throughout the State; the competition is so keen that the farmer need have no fear that his stock will not realise market values. Good pigs always realise good current values; whether these values are profitable to the farmer or not is, of course, another question, and one that bears a direct ratio to cost of production and handling. See table for ages, weights, and approximate values.

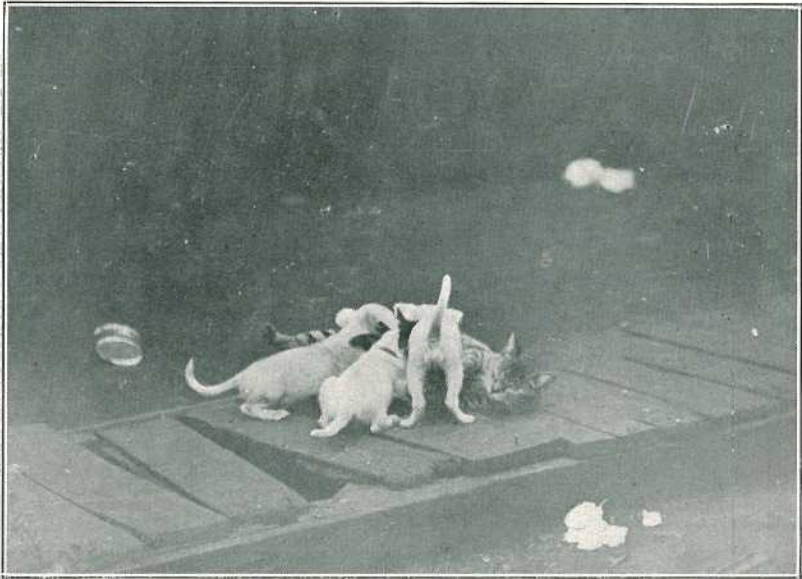


PLATE 50.—ANOTHER ANIMAL STUDY.

In this case "Pussy" came to the rescue, and is shown with her family of puppies. The photograph is an original one from Tolga, on the Atherton Tableland, Queensland.

Backfatters.

The term "backfatter" is used by pig buyers to indicate that the pig has passed the stage at which he can profitably be handled as a bacon pig, and that having passed that stage his carcass must be "cut up" into smaller pieces and be used in the manufacture of the variety of small goods for which the carcass of the pig is justly famous. The term "backfatter" also indicates that the pig is a very heavy one, and that he carries the greater portion of his fat on his back or on the upper portions of his body. Backfatters fluctuate in value more than any other grade of pig, and as a class they can fairly be considered as unprofitable; still the class embraces a variety of heavy pigs, old fat sows, barrows, and very heavy bacon pigs that for various reasons might not have been marketed earlier. It would not pay under ordinary circumstances to breed pigs for sale as backfatters, but it certainly pays to fatten up brood sows that have become unprofitable, either on account of age or because they are unsatisfactory as breeders; it pays to cull and fatten up any sow that fails to produce a satisfactory litter twice a year, therefore the backfatter class provides a suitable market outlet for old heavy pigs or for fat pigs over the ordinary market weights. The price varies considerably according to supply and demand and the quality and condition. During the war phenomenal

prices ruled for very heavy fat pigs, as much as £22 15s. having been paid at the Abattoir Saleyards, Homebush Bay, New South Wales, for a very heavy fat sow. Prices ranging from £12 to £20 were quite common, but during normal periods these prices are not heard of, though in the markets of the South (Sydney and Melbourne particularly) from £4 to £10 are quite common figures for prime quality backfatters. In Queensland, however, and in Northern New South Wales, these cannot be obtained, hence we have stated the value of backfatters as £3 to £4, a value within the reach of the farmer if his pigs are of sufficiently good quality.

Stags.

Old sows are usually graded as backfatters, whilst old boars that have been castrated and fattened up are classed as "stags," and for them the demand is very

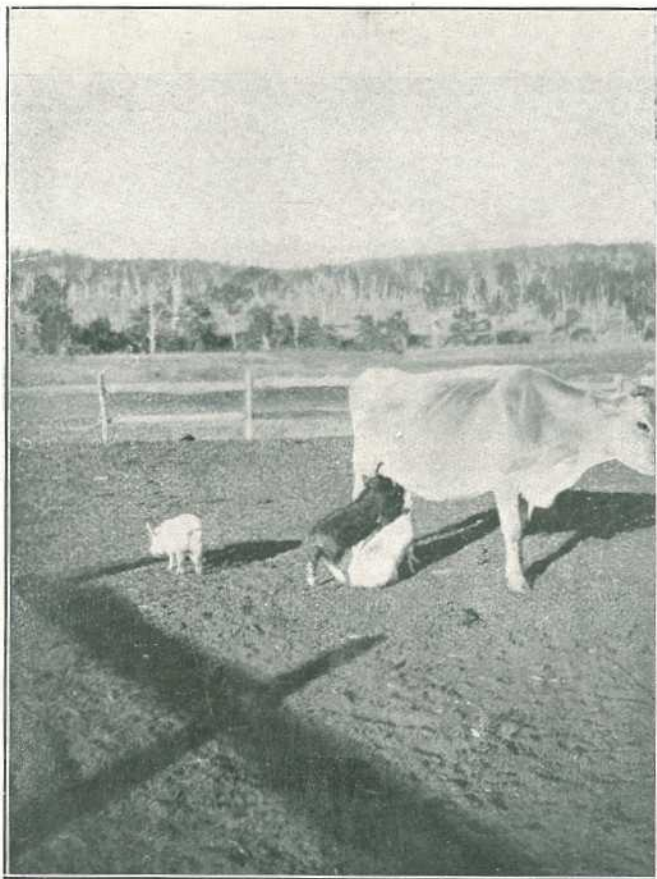


PLATE 51.—A PHOTOGRAPH FROM THE CROW'S NEST DISTRICT, QUEENSLAND.

Here again the cow seems to be quite content to nourish these weaners, while they in turn (except the little fellow) appear to be on a good wicket. Another indication of the wisdom of the pig.

limited. Stags are purchased for rendering down mostly, the fat goes into the manufacture of lard, the lean meat goes to the sausage tub, and most of the heavy gristly skin (the shield and wrinkly skin along the neck and sides) is cut away by the Meat Inspector and is condemned as unfit for human consumption. "Aged" stags rarely pay for the feed they consume.

Boars.

It does not pay to market boars unless one has an abundant supply of very cheap food; they rarely realise more than from £1 to £2, and they will only realise

these prices if they are comparatively prime and in good condition. Whether it would pay to castrate them and fatten and market as stags is a very debatable point, and one that can only be answered by the owner. It would not pay to fatten them upon purchased foods unless the food was very cheap and the market rates of pigs reasonably high.

Bacon factory buyers nowadays will not accept boars at all, and all "stags" are accepted only on condition that they have been "emasculated" (castrated) three months beforehand.

Choppers.

Pigs that are marketed in a half-fat condition and that are unsuited to the requirements of the pork butcher, or the bacon curer, or for use as backfatters, are usually classed as "choppers"; the term indicating that they are purchased for chopping purposes—that is, the carcass is chopped up into a variety of pieces and is used either for export as salt pork or pickled pork, or is used in the manufacture of small goods. Choppers vary in price according to their weight, condition, and quality. The class provides a very useful market outlet for a variety of pigs that could not be marketed profitably in the classes for which they might otherwise be suited.

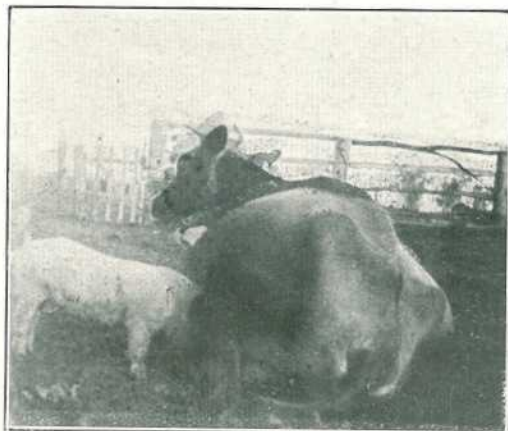


PLATE 52.—AN UNEXPECTED SOURCE OF "PIGGY'S" FOOD SUPPLY.

An incident on the farm of Mr. J. Stinger, of Speedwell, Preston Line. It was because the cow was giving so little milk at the bucket, while still being well fed and cared for, that a watch was set and above photograph secured. It is evident the pig has a well-developed, keen sense of business. The cow appears to be content.

OTHER STOCK TERMS REFERRING TO PIGS.

Apart from the general classification of pigs for trade and market purposes, there is a breeding classification in which other terms are used to describe the pigs at different stages of growth.

Commencing at birth the young pig is variously known as a sucker, a pigling, a bonham, a piglet; or, in a group, he is part of a farrow or litter.

The Yelt.

Having passed the sucker stage the young female pig is called a "yelt" or "gilt" until she has produced her first litter. This term "gilt" is quite a common one among farmers from England, Scotland, Ireland, and Wales, but is not a common term in Australia.

The Brood Sow.

Having produced a litter, the yelt now becomes one of the matrons of the herd, and is henceforth known as a brood sow or as a breeder or breeding sow.

The Male Pig.

The boar usually retains his title throughout life. The male is often termed the "hog," but in America all pigs are called "hogs" (i.e., the hog industry); in fact, the Americans rarely use the term "pig" at all, and when they do use it, it is to describe suckers or very young stock. The boar does not actually begin his stud duties until he is ten to twelve months old, the sow also should be at this age before being mated.

The term "pig" is now, however, being generally accepted as the correct one for males and females of the "porcine" species, the term "swine" is gradually being dropped, and the term "hog" used to designate the male pig.

The Barrow Pig.

A male pig castrated whilst young is styled a "barrow." In American literature again both boars, barrows, and sows at the age of about four or five months are styled "shoats," but here they are called "store" pigs, and the term is a general one including all grades; a group of store pigs often includes breeding sows in poor or rough condition—in fact the group might include any class of pig in poor or half-fat condition.



PLATE 53.—DOWN ON THE FARM.

The Piglet appreciates its bottle. A Domestic Scene on the Farm of Mr. R. Wight, Market Reports' Officer, Station 4 Q.C., Brisbane.

Runts.

The "runts" of a litter are the small, weedy, or weakly pigs. They often do not pay for rearing, as they require too much special care and attention.

Rickety Pigs.

Pigs that suffer as a result of a long train or steamer or road journey and that arrive at the saleyards or factories "down" in the hindquarter, or that are unable to walk, or that walk with difficulty, are usually styled "rickety" or "groggy" pigs. The term is an erroneous one so far as its reference to the disease called "rickets" is concerned, although pigs suffering from rickets exhibit much the same symptoms.

Scrub or Mongrel Pigs—i.e., The "Razorback" of American Literature.

A scrub or mongrel is an animal of mixed or unknown breeding without any definite type or markings. Other terms used to describe mongrels are "bronchos," "razorbacks," "wild pigs," "bush pigs," &c.

Purebred, Pedigreed, or Stud Pigs.

An animal that is included in this class is one of pure breeding, representing a definite, recognised breed, both of whose parents were purebred animals of the same breed. To be classed as purebred, live stock must be either registered, eligible for registration, or (in the absence of public registry for that class) have such lineage that their pure breeding can be definitely proved and recorded. To be of good type and quality, the animal must be healthy, vigorous, and a creditable specimen of its breed; its breeding must be pure.

In Australia the interests of the stud pig breeder are cared for and fostered by the Australian Stud Pig Breeders' Society, which organisation has branches in each of the States. The Queensland Branch Secretary is Mr. R. G. Watson, Inns of Court, Adelaide street, Brisbane, from whom, or from the Instructor in Pig Raising, further details *re* the operations of the society may be obtained at any time.



PLATE 54.—FEEDING THE ORPHANS.

Mrs. Percy Campbell, of Duroc-Jersey fame, attending to the orphans on the farm at Lawn Hill, Lamington, *via* Beaudesert, Q.

It is scenes like these that illustrate the keen, intelligent interest Queensland's womenfolk have in farm affairs. A little extra care and attention mean much in matters of this description.

Thoroughbred.

In speaking of pigs the term "thoroughbred" means the same as purebred. In American and English literature the term "standard bred" is also largely used. This is a term that we rarely use at all—it refers to the purebred animal.

Crossbred.

This term applies to the progeny of purebred animals of different breeds—that is, a Berkshire boar mated to a Tamworth sow produces crossbred pigs; both parents are purebred pigs but of different breeds. The crossbred pig is very popular as a "meat" pig, and is produced for market purposes in practically every district where pigs are bred. Crossbred males should be castrated; they should not be permitted in the herd as sires. The crossbred sow, on the other hand, if of good type and conformation, makes an excellent breeding sow when mated to a purebred boar.

Grade.

This term differs from that referred to above, in that it is applied to the progeny of a purebred boar mated to a crossbred sow. Sometimes the term "grade" is used where the progeny are from parents whose breeding is pure, but whose pedigrees for various reasons have not been recorded. The offspring of a purebred boar and a grade sow is also a grade, but through progressive breeding becomes a higher or better grade. When a Berkshire boar is mated to a crossbred Tamworth-Berkshire sow the progeny are called grades. A sow of the latter class mated back to a Berkshire boar frequently produces progeny to all appearances purebreds; they are sometimes called three-quarter breds, having as it were three-quarters Berkshire and one-quarter Tamworth blood in their veins.

Any further information in connection with the classification and marketing of pigs or on any other aspect of pig raising may be had on application to the Department of Agriculture and Stock, William street, Brisbane, Queensland.

HORSE v. TRACTOR.

In selecting between the horse and the tractor the saving in expense must be considered. In the case of the horse the costs are almost all non-cash costs. In the case of the tractor the costs to a large extent are cash expenditures. The feed used by the horse is home-grown. The fuel used by the tractor must be purchased. The horse, however, must be fed every day, while the tractor requires fuel only when it works. The horseowner can remove this obstacle by planning more work for the horse, so that the feed consumed may be made up in work. Depreciation and interest charges are constantly accruing against the tractor, even when it stands still. These charges often amount to more than the expense of feeding horses when they are idle.

Unquestionably more labour is required to take care of horses, but the labour comes during those periods of the day when no other work would be done. It is questionable whether such labour really is an expense, for there is little or no opportunity of doing anything else. The original outlay for horses or tractors varies little. The tractor depreciates, while the horse is able to appreciate for a time at least. By proper handling and breeding, horses may be made to replace themselves. Only a cash expenditure can ever replace a tractor. The horse also adds to soil fertility. The usual number of horses required for farm work cannot do the work quickly enough. In such cases, tractors may be used to supplement horse labour, and then used for other heavy work and belt work. Whether or not horses should be used in such cases depends on the farmer. Extra horses are needed, and if there is not sufficient work to keep these extra horses busy throughout the year feeding becomes expensive.

On general farms, where feed is grown and the labour largely supplied by the farmer, the horse is the efficient type of power. When the tractor displaces horses trouble in the form of increased cash costs is likely to appear. On the other hand, it is often economical for tractors to supplement horse labour. It must be remembered, however, that such work is of a supplementary character. The horse is and should be the unit of farm power. The farmer should not be concerned about whether he should use tractors or horses, but should busy himself in getting the best horses possible for his work, and then keep them busy. Too often horse labour is inefficient because of poor horses.

With the right type of horses and proper breeding combined with efficient farm organisation and use, so that horses are worked to the maximum capacity, a great deal more work can be done on farms without an increase in cost of any kind, and at the same time the costs are all practically non-cash in character.

Horses supply a steady, regular market for many farm crops, and these crops can be so utilised that the labour charges and transportation costs of marketing can be eliminated. Furthermore, horses eat little more when working than when idle. Consequently, from the farmer's viewpoint, the management problem is to keep horses working. A slogan that could well be followed by farmers at present would be—keep horses and keep them busy.

Answers to Correspondents.

The subjoined replies are from a very large number posted from the Department to correspondents in the course of the month, and are selected because of their general interest. All inquiries should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Fertilizing Practice

R.J. (Narangba)—

The Agricultural Chemist, Mr. J. C. Brännich, advises: Basic superphosphate can be applied at any time to crops, like superphosphate or bonemeal. Basic super. can be mixed safely with nitrate of soda and sulphate of potash, and also with bonemeal. Nauru phosphate is not suitable for top-dressing or for making liquid manure, as it is practically insoluble in water. Nauru phosphate mixed with superphosphate is recommended as a substitute for basic superphosphate which is far too expensive for general use.

Tanning Pelts.

INQUIRER (Goomeri)—

To tan with wattle-bark is the most satisfactory method. Boil the chopped up bark, mixing about 1 lb. of bark with every two or three gallons of water. Skins should be free of all flesh, grease, and blood before tanning. As the tan is taken up by the skin fresh infusions of the same strength should be made. Small skins should be left in the tan for two or three days. Kangaroo skins should be left for about a week. Another method is the following "lightning process":—Over 2 quarts of bran pour 5 or 6 quarts boiling water, then strain. Put as much salt in an equal quantity of blood-warm water as it will dissolve. Mix the bran water and salt water, and to each gallon of the mixture, when lukewarm, add 1 oz. sulphuric acid. Then immerse the skins, stirring occasionally until tanned. Rabbit skins take about twenty minutes, sheep and kangaroo skins from forty to sixty minutes. When tanned, rinse in water and hang in a shady place to dry. If the skins are dry at first, soak in water before tanning. Work the hide well when drying by pulling it around a square post. When it is quite dry work in a little neatsfoot oil.

PIG RAISING.

*Selected replies from the correspondence of Mr. E. J. Shelton, H.D.A.,
Instructor in Pig Raising.*

Pig Literature.

A.L. (Jondowae)—

Yes, you will find conditions in Australia quite different to what they are in Scotland, and you will find it takes time to become acclimatised and used to our conditions; but you will soon get over that. We forward pamphlets on pig-raising, also copy of the last issue of the Journal, a publication to which every settler should be a subscriber. It costs but 1s. per annum, which pays postage on twelve issues, so it is a gift to farmers. If you list questions on which you would like local advice we would gladly place our knowledge and experience at your disposal.

Prices and Weights.

R.A.H. (Killarney)—

Copies of the current price schedules as issued by both the proprietary bacon companies and the Queensland Co-operative Company of Murarrie have been forwarded. You will note in the case of the proprietary company's schedule that column No. 1 indicates the live weight of the animal, and

the second column the estimated dressed weight, these allowing for deductions varying from 25 to 32 per cent. similar to those in operation at the Dandenong Bacon Factory. The third column indicates the actual rate per pound for prime quality pigs, whilst the fourth column represents the total value to be paid for animals of this weight. It is quite evident from your letter that the pigs were overweight. Top prices are only paid for pigs between approximately 100 and 125 lb. dressed weight. Pigs over or under these weights are not paid for at the same rate as you will note in the price schedules.

Breeds of Pigs.

A SYDNEY INQUIRER—

Question.—Which is the best breed of pig to go in for, whether purebred or crossbred, i.e., for market purposes, at any and all stages?

Answer.—This is a difficult question for an Instructor to answer, let alone a breeder of purebred stock. In one sense there is no best breed; that is why we have a multiplicity of breeds of live stock. Even races of men differ and white men find it difficult to live in some countries which nature evidently intended for the dark-skinned races. Then, again, no one breed could be classed as the best breed unless that breed suited the purposes for which they were intended. One might look upon a race horse as an excellent type of animal, yet a race horse would fare rather badly if harnessed to the plough. We take the opportunity of forwarding copies of the "breed" pamphlets in which will be found a great deal of useful information relative to various breeds and crosses.

For bacon pig production the standard cross in New South Wales and Queensland is the Berkshire-Tamworth—i.e., using the Berkshire boar on Tamworth and first cross (unrelated to the boar) Berkshire-Tamworth sows. For porkers the Middle Yorkshire boar (or a boar of similar breed) crossed on to Berkshire or similar type sows, but these crosses can only be looked upon as "guides" to what is possible in pig production if carefully and efficiently controlled. As to whether there is a better cross than, say, the Berkshire-Tamworth—well it would take a great deal of argument, possibly heated argument, to settle this point. The Victorian authorities consider that the Berkshire-Tamworth cross is a back number in comparison with the Large Yorkshire-Berkshire cross. We have not yet been able to experiment along these lines, hence can only be guided by their experiments, which as yet, of course, are only in the initial stages. We know the Large Yorkshire-Berkshire cross to be a really good one, one that the Danish and Canadian people and more recently still the New Zealanders and the Victorians have found to be both prolific, early maturing, and of even type.

Another debatable point is whether the Tamworth boar shall be crossed on to Berkshire sows or *vice versa*. We prefer the Berkshire boar crossed on to Tamworth or grade Tamworth sows, but good results will be obtained in the opposite direction, in fact we are often forced to recommend the Tamworth boar, for it is not an easy matter to secure good class Tamworth sows; whereas in pretty well every district good class Berkshires are available. Then, again, the breeders of Tamworths contend that Tamworth boars are splendid workers and in this respect their views must be considered.

The Gloucester Old Spot breed is as yet new to Australia, and they have not yet been tested out in close competition against the other breeds and crosses. The Gloucester Old Spot pig is not an attractive pig to look at (that is, of course, if you could believe that any pig is attractive looking) hence it will take time and local experience to demonstrate their commercial value. The Gloucester Old Spot have certainly done well so far, and their crosses have on many occasions "topped the market." They need to be crossed with the medium breeds to get best results for our markets, and in this connection again Gloucester Old Spot sows appear to be ideal mothers, producing large litters and suckling them to considerable advantage. This breed also is described and illustrated in the Gloucester Old Spot pamphlet.

Copies of these breed pamphlets and pamphlets on other aspects of pig-raising are available free of charge to any breeder sufficiently interested to write for them. Applications should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane, Queensland.

BOTANY.

Selections from the outward mail of the Government Botanist, Mr. C. T. White, F.L.S., which are of general interest.

Creeping Tick Trefoil.

R.S.B. (Brisbane)—

The specimen of clover-like plant is *Desmodium triflorum*, the Creeping Tick Trefoil. Species of *Desmodium* are known as "Tick Trefoils" because the pods break up into little one-seeded pieces that cling to clothing, &c. The Creeping Tick Trefoil makes quite a good turf and grows in a variety of soils. Like other legumes it enriches the ground. It is more persistent than clover, and once established there is always likely to be a certain amount of it mixed with grasses that would follow.

"Castor Oil Bush (*Adriana acerifolia*).

A.W.S. (Marlborough, Q.)—

The plant is *Adriana acerifolia*, fairly common in Central and Western Queensland. The only local name we have heard applied to it is "Castor Oil Bush," but the true castor oil is a common naturalised weed in Queensland so this local name is unfortunate. The plant is fairly abundant in parts but cannot be said to be an aggressive weed. It is freely eaten by stock and is not known to possess any harmful properties.

Nut Grass.

A.H.H. (Wollongbar, N.S.W.)—

There were no seed heads on the specimen sent, but I have no hesitation in identifying it to *Cyperus rotundus*, the common nut grass. This plant in Queensland extends some distance inland, particularly along river flats. The inland plants are often very robust in a good season. In Western Queensland it has some reputation as a sheep fodder. No analyses, so far as I know, have been made of the leaves, but, as you probably know, it is a sedge not a true grass and the nutritive value of sedges on the whole is rather low.

"Fairy Grasses"—"Love Grasses."

L.C. (Westwood, C.Q.)—The three grasses have been determined as follows:—

Sporobolus Lindleyi. This, and a few other grasses of a similar nature are known in Queensland as "Fairy Grasses." It is rather a useful grass in the mixed pasture, but is of short life, soon forming a mass of finely divided seed heads.

Eragrostis Brownii.

Eragrostis interrupta.

Species of *Eragrostis* are popularly known as "Love Grasses"; they are mostly of secondary importance as fodders, but are useful grasses in the mixed pastures. The grasses, with names attached, are enclosed herewith. In sending specimens it is as well to number each specimen, retain a duplicate, and names will be returned to numbers.

FRUIT CULTURE.

Following are selected replies by the Acting Director of Fruit Culture, Mr. Geo. Williams, to correspondents in the course of the month:—

Budding of Citrus Trees.

J.D. (Chowey, Gayndah Line)—

Citrus trees are successfully budded in early spring and also about April or May. It is necessary to remove the budwood from the parent tree when it is in a dormant condition. However, for spring budding, if not done earlier, buds may be removed now and placed in moist sand until required for use.

Coffee Culture.

L.B.B. (Innisfail)—

A leaflet on coffee culture has been posted. Owing to the present tariff, there is no prospect whatever of making coffee a paying proposition in any part of Queensland, consequently its planting is not recommended.

Pineapple Cultivation.

C.B. (Cooran)—

The first requirement for pineapple-growing is a well-drained soil of good depth and of at least moderate fertility. Suckers from the parent plant or gill sprouts, sometimes referred to as "buttons," which originate around the bases of the fruit, are preferable for planting. The ground should be in a state of thorough cultivation and free from perennial weeds. The most suitable season of the year is from September to January, both inclusive. Pines are usually planted in single rows on level ground about 7 feet between rows and 12 inches between plants. On hillsides, 7 feet intervals and 20 inches between the double rows and 20 to 24 inches apart for plants in the rows.

Pineapple Growing.

L.J.S. (Newdegate, W.A.)—

The Burnett and Callide Valley are not considered suitable for pineapple culture, as the pineapple requires a warm situation, free from frost. Regarding the cost of production, £50 per acre may be accepted as the minimum for clearing, preparing, and planting. The first crop would be expected in about eighteen months and the necessary cultivation in the meantime would be confined to weeding, which would be a comparatively small item provided the roots of perennial weeds were eradicated in the preliminary cultivation. The average market price of pineapples throughout the year would be about 7s. per case (1½ bushels). The amount of capital needed would depend largely on the first cost of land, if freehold. Six acres under pineapples would be the minimum to provide a satisfactory return from one man's labour.

Valencias—*Passiflora ligularis*—Nuts.

L.P.R. (Epping, N.S.W.)—

Buds of the Valencia orange sport may be obtained from Percival Bros., orchardists, Redland Bay. *Passiflora ligularis* seeds are not available as there are no plants up to the present fruiting in this State. It is expected, however, that they will be available next year. The department has no wood available of the Pecan Nut, but the Acclimatisation Society, Lawnton, near Brisbane, have a fair number of grafted trees and application to the manager at that address would receive attention. No difficulty whatsoever has been experienced in raising the thin-shelled Macadamia, but the practice has been discontinued on account of the price—1s. per nut—charged by the owners of the parent trees.

THE JOURNAL APPRECIATED.

Writing from Bunjurgun, a Fassifern farmer says (30th June, 1927):
 I'm sending the sum of 1s. to renew the 'Queensland Agricultural Journal,'
 and I can say this Journal has been in many things of great value to me.
 Also, I must say we farmers can be very thankful to the Department of
 Agriculture for the cheap and valuable information and teaching it has
 given to us through its Journal, and my hope is that all farmers think
 as I do and appreciate the work our Government does for us. . . ."

General Notes.

Wheat Board.

Regulation 3 under the Wheat Pool Acts has been rescinded, and a further regulation approved, providing that for the 1927-28 season representatives on the board shall be elected by growers of wheat who delivered to the board wheat harvested during any of the three previous seasons, growers of wheat to whom seed has been supplied by the board for the year in which the election is held, and other bona fide growers who may make application for a voting paper.

A Proclamation has been issued under the Wheat Pool Acts, providing for the Wheat Board to give security for financial assistance rendered by the Rural Credits Branch of the Commonwealth Bank.

Seed for Cotton Sowing.

The Acting Premier and Minister for Agriculture, Mr. W. Forgan Smith, has informed the Press that, on learning of the fire at the cotton ginnery at Glenmore, Rockhampton, he immediately arranged for the Cotton Specialist, Mr. W. G. Wells, to visit Rockhampton for the purpose of inquiring into the extent of the damage that had been occasioned by the fire upon the supply of cotton seed which was held at the ginnery. The Government was not financially interested in this cotton seed, but, of course, is concerned in the matter of the supply of ample quantities of pure cotton seed for next season's planting. The Minister has now been advised that the seed at Rockhampton had been so damaged as to render it unfit for planting purposes. However, it is intimated that the further supplies of seed cotton that will be available for ginning purposes in the future will provide ample supplies of seed to meet the requirements of the 1927-28 season.

Staff Changes and Appointments.

Mr. W. Ahern has been appointed Assistant to Cane Tester at the Inkerman Sugar Mill.

Mr. J. C. Pryde has been appointed Temporary Inspector of Stock, as from 1st July, 1927, to 12th August, 1927.

The resignation of Mr. A. B. Smyrell as Temporary Inspector of Stock, Coolangatta, has been accepted as from 30th June, 1927, as tendered.

Mr. E. M. Johnson, Temporary Inspector, Agricultural Bank, has been appointed Inspector, Agricultural Bank, as from 3rd July, 1927.

Mr. A. P. Deshon, Assistant Manager, Agricultural Bank, has been appointed Manager, Agricultural Bank.

The appointments of the following gentlemen as Inspectors under the Diseases in Plants Acts have been cancelled as from 16th July:—R. S. Molloy, Nambour; C. E. Rogers, Mooloolah; F. H. Scott, Landsborough; J. H. Warnek, Nambour; F. D. Young, Palmwoods; S. R. Donnelly, Glass House Mountains; and A. B. Tanner, Nambour.

The following have been appointed officers under and for the purposes of the Animals and Birds Acts:—J. Cowap, Bald Hills; G. W. Carseldine, Bald Hills; and J. A. Coleman, Tambourine Mountain.

It has been approved that Messrs. F. A. L. Jardine, S. C. Todd, and H. St. J. Pratt, Inspectors under the Diseases in Plants Acts, be attached to Nambour, Wallangarra, and Stanthorpe respectively.

Mr. R. J. T. Kidd, Inspector of Stock, Mackay, has been appointed also Inspector of Dairies.

Mr. F. C. P. Bell, Assistant under the Pure Seeds Acts, has been appointed Inspector under the Fertilisers Act, Pure Seeds Acts, and Stock Foods Act, as from the 1st July, 1927.

The following appointments have been rescinded:—Miss E. Brand, Assistant Cane Tester, Bingera Sugar Mill; Miss S. Riley, Assistant Cane Tester, Tully Sugar Mill; and Mr. E. J. Barke, Cane Tester, Marian Central Sugar Mill. Miss S. Riley has been appointed Cane Tester at the North Eton Central Mill, and the following have been appointed Assistants to Cane Testers at the mills respectively set opposite them:—Miss M. A. Lyle, Bingera; Miss M. Bennett, Farleigh; Miss O. Knight, Millaquin; Miss M. Morris, Moreton; Miss J. Orr, Tully; and Miss M. Orr, Pleystowe.

Fruit Marketing—Sectional Group Committees.

The regulations passed last year in connection with the various Sectional Group Committees have been amended to provide for the elections of members for the forthcoming year for all such committees, with the exception of the Citrus Sectional Group Committee, which will not hold an election this year.

Butter Board Election.

The following nominations have been received in connection with the election of a Growers' Representative to the Butter Board, Division No. 1a (North Queensland):—

Wilfred Alexander Johnston, Ravenshoe,
James Reed, Malanda,
Walter Scott, Pearamon,
William James Sloan, Malanda.

The date of the election has been fixed for the 4th August, 1927.

The Folly of Marketing Immature Fruit.

The Minister for Agriculture informed the Press recently that the maturity standards prescribed for local fruits are not always being observed. As a result, the effects of immature custard apples being rushed on to Southern and Brisbane markets has been a material falling off in the demand for this esteemed fruit. If allowed to remain on the tree until the interstices between the corrugations, which are so pronounced on the large types, show indications of changing to cream colour the fruit will satisfactorily ripen; but where picked at an earlier stage the fruit becomes brown and hard and, even if it softens, is of inferior flavour and gritty. The demand for other more widely known fruits (pineapples, &c.) is also affected by the sale of immature lines submitted by a limited number of growers, and if the practice is still persisted in, action will be taken by departmental inspectors.

Protecting the Banana Industry.

The Acting Premier and Secretary for Agriculture and Stock, Mr. W. Forgan Smith, in connection with banana planting operations for the coming season, has called attention to the restrictions that apply to the removal of suckers. These conditions which have been in force since last season are that an inspector may, if he is satisfied upon inspection of a nursery, orchard, or other place, that it is and always has been free from the disease known as Bunchy Top or any other proclaimed disease, issue a permit for the removal of plants from that place to any other place or part of Queensland mentioned in such permit. This is regarded as imperative to minimise the possibility of disease being introduced into clean areas or further distributed in localities where previously established. Permits for the removal of suckers will be issued where circumstances warrant, by inspectors in their various districts.

Proposed Queensland Maize Board.

Nominations for the election of six Growers' Representatives to the proposed Queensland Maize Board closed at the Department of Agriculture and Stock on the 27th June, when the following were received:—

District No. 1—

Chas. Bateman, Woodford;
Thomas Greer, Plainland;
Thomas Lewry Moon, Blenheim; and
Alfred Chas. Wagner, Boonah.

District No. 2—

Thomas Braithwaite, Tannymorel;
George Burton, Cambooya;
William Dearling, Oakey; and
Frederick Thomas Keable, Tannymorel.

District No. 3—

Hubert Tetley Horne, Coolabunia;
Joseph Henrikus Koets, Alma Creek; and
Charles George Young, Wowan.

The date of election has been fixed for the 5th August, 1927.

Castration of Pigs.

A well illustrated pamphlet by Mr. E. J. Shelton, H.D.A., Instructor in Pig Raising, on this simple surgical operation, containing detailed instructions written in everyday language, is now available free of charge on application to the Under Secretary, Department of Agriculture and Stock, Brisbane. As the demand is heavy and the edition limited early application is advised.

Radio Lectures for Farmers—Policy in Denmark.

Radio is proving of distinct economic value to the farmers of Denmark, according to a recent official report, which states that during the past few years the Danish agricultural industry has been aided, especially in its harvest work, by the radio service of the Meteorological Bureau. That this service has been of value to the farmer is now brought out by the fact that important Danish farm organisations have decided to work for its extension. To this end a committee has been appointed, which will co-operate with the Government Radio Control Bureau. This bureau has met the request of the farm organisation with sympathy, and at the present time plans are under way for the broadcasting of special programmes for the Danish farmer; at least two lectures dealing with agricultural problems will be broadcast each month, and from time to time agricultural experts will deal with seasonal agricultural matters in the same manner.

In this connection it is interesting to note that Station 4QG has been catering for the farmers of Queensland since its inception. A specially trained market officer (Mr. Robert Wight) is employed at the station, and personally conducts farmers' sessions daily.

A Business Proposition for the Future.

All over Queensland there are families whose happiness is the result of foresight of men, who, while still living, have made wise provision for the future. There are over 15,000 of these men who have made wise provision for the future of their families by making wills appointing the Public Curator their executor and trustee, for the simple reason that his office is permanent and is under the guarantee of the State of Queensland.

One of these men, who is typical of many others, looked into the face of his loved ones and thought—"They are happy now; but how can I ensure their happiness in the years to come?"

He made a will. For his wife, inexperienced in business matters, he placed a trust fund to protect her against the tragedy of ill-advised investments. For his children's education, he set aside a special fund. For his boys, he provided that their whole share of the estate should be paid to them at a matured age. For his daughters, he willed that their shares should be kept in trust during their lives, so that, married or single, they would be financially independent.

Then came the question. Who was to carry out these trusts? He decided that it would be unfair to his wife to ask her to manage property, which it had taken his utmost labour and efforts to accumulate; nor did he think it a fair thing to appoint any of his friends, no matter how trustworthy they might be, executors under his will, for they might die at any time, and throw the administration of his estate into hopeless confusion.

This prudent man, therefore, appointed the Public Curator of Queensland his executor and trustee because he has attributes and powers which no private person possesses, such as special legislative powers, continuous existence, accumulated experience, financial responsibility, perfected machinery of administration, and an experienced legal staff to carry out all the legal work of administration without extra cost to the estate.

Now, long after this prudent man's death, the Public Curator is still serving his family from year to year, his officers acting with understanding of each individual's needs, while observing a strict impartiality. Moreover, the money held in trust for his infants is accumulating at 5 per cent. per annum, and when the time comes for them to receive their shares the money will be immediately available.

As this man made provision, so any man can provide, in proportion to his desires and means, for his family's future.

Pamphlets giving full information concerning the Public Curator Office may be had on application, either to the Public Curator in Brisbane, to his Local Deputy at Rockhampton, Townsville, and Cairns, or to any Clerk of Petty Sessions in the State.

South Burnett Cleansing Area.

An Order in Council has been approved under the Diseases in Stock Act slightly extending the south-eastern boundaries of the South Burnett Cleansing Area.

Cheese Board.

The operations of the Cheese Board have, by Order in Council, been extended for a further period of three years—viz., from 1st August, 1927, to 31st July, 1930.

Swine Fever.

Under the Diseases in Stock Act an Order in Council was recently issued prohibiting the introduction into Queensland of swine from New South Wales and Victoria. This Order has now been rescinded and a further Order issued prohibiting the introduction into Queensland from other States of the Commonwealth of swine, with the exception that pigs for immediate slaughter, which, in the opinion of an inspector, are healthy, may be admitted with the approval of the Minister for Agriculture under such conditions as may be imposed by him. This prohibition is the result of swine fever being present in the other States of the Commonwealth.

Skin Dealers must be Registered.

In connection with the forthcoming open season for opossums and native bears the Department of Agriculture and Stock advises, for the information of buyers at auction sales of opossum and bear skins, that all dealers in these skins must be registered. A dealer is defined as a person engaged or about to engage in the business of dealing in these skins whether by purchase, sale, or auction, and whether on his own behalf or on behalf of any other person. All buyers must therefore be registered as dealers or retail dealers as the case may be. If a buyer is acting on behalf of his own firm, either as a member of the firm or as an employee, the registration of the firm would be sufficient, but if the firm is not registered it will be necessary for its representative to register as a dealer and pay the required fee of £10.

The Royal Society of Queensland.

The ordinary Monthly Meeting of the Society was held in the Geology Lecture Theatre on Monday, 27th June. The Vice-President, Dr. J. V. Duhig, was in the chair, and fifty members and visitors present.

Mr. J. R. A. McMillan, M.Sc., was unanimously elected as an ordinary member.

Dr. Duhig announced that His Excellency the Governor, Sir John Goodwin, had consented to become Patron of the Society.

The evening was devoted to the celebration of the Newton Bi-centenary, and the following addresses were given:—

“The Life of Newton,” by Mr. Heber A. Longman, F.L.S.;

“Newton as a Mathematician,” by Professor H. J. Priestley, M.A.;

“Newton as a Physicist,” by Professor T. Parnell, M.A.

A hearty vote of thanks to the lecturers, moved by Professor Hawken, seconded by Professor Scott Fletcher, and supported by Dr. Duhig, was carried by acclamation.

“Australia’s Fascinating History.”

Speaking on 22nd June at a meeting of the Royal Geographical Society of Queensland, which unanimously elected him president in succession to His Grace Archbishop Duhig who retired in his favour, His Excellency the Governor (Sir John Goodwin) said that he did not think any country, with regard to physical geography, could have a more fascinating past history than Australia. Years ago it was a country with an immense rainfall—probably the largest in the world—and the whole of its interior was covered with morasses and dense jungle growth, and tenanted by enormous animal marsupials. In thanking the society for the honour conferred upon him, His Excellency added that he felt very diffident about occupying the chair. He felt that he was a usurper, and that he was following in the footsteps of a man, Sir Matthew Nathan, who had set a standard and an ideal that would be very difficult to live up to. People sometimes asked what was the use of inquiring into such questions as the Barrier Reef, and the ancient fauna of Queensland? He would answer that by saying that knowledge was never useless, and in acquiring knowledge as to the past they might, and frequently did, acquire immense knowledge as to the present and future.

Atherton Tableland Maize Board.

An Order in Council has been approved under the Primary Producers' Organisation and Marketing Act, providing that members of the Atherton Tableland Maize Board appointed after the 31st August, 1927, shall hold office until the 31st March, 1929.

The Supercilious Critic.

Australians and New Zealanders are both proud and jealous of their splendid dowry, and the newcomer who begins to criticise too freely and to draw invidious distinctions between the old land and the new is liable to get himself disliked. If the British immigrant comes to condemn our inferiority, and to laud the superiority of the land he was glad to leave, in the hope of finding better things, he had far better have stayed at home. If he comes with courage and good humour to help in the progress of a young country, he will early find the road to prosperity and to the hearts of the native-born.—Auckland "Sun" (N.Z.).

False Economy.

Undue economy in education is a curious method of making good the unfortunate wastage of war. No one in his senses would advocate unnecessary or prodigal expenditure, but when the inevitable reply to all requests for improvements is the stereotyped "question of finance," there is need to decide whether education is not of greater importance than some of the objects on which money is being expended by the State. Any refusal to meet the just demands of education, and which ignores the effect on the future well-being of the nation, will bring disastrous results, for from a purely economic standpoint the most important part of the capital of a country consists of human beings. Expenditure on their moral, physical, and intellectual advancement is the most remunerative of all investments.—"Lyttelton Times" (N.Z.).

A Hen's Best Age.

A hen is in her prime during her first two seasons, after which time, generally speaking, she does not pay for the food she consumes. This refers, of course, to commercial stock, whose eggs are disposed of for edible purposes. There are many highly-bred exhibition birds that it would pay to retain in the flock were they only to produce a dozen eggs in the course of the twelve months. Birds of this description, however, are not included, as they belong to a class quite distinct from ordinary utility stock. Upon many farms dissatisfaction is felt at the scarcity of the egg supply, due to the fact that old birds are being depended upon that are quite past their prime, and that should be disposed of years earlier. Not only do very old hens produce far fewer eggs than those in their first or second season, but the chickens hatched therefrom lack vigour and stamina, and are generally difficult to rear successfully.

Magneto Hints.

Some owner-drivers, under the belief that it is almost impossible to remove a magneto without being capable of putting it back again in its proper place, never bother to look at the relative positions of the high-tension distributor brush and the segments. They will remove the holding-down band, take the magneto right off, and in the course of adjustment will rotate the armature; consequently, when replacing it, the connections will possibly be as much as a complete revolution out of timing.

It may be true that the modern magneto is practically impossible to replace incorrectly, owing to the couplings being so made that a wrong assembling would be impossible; but, in the majority of instances, this is not true. Therefore, when the magneto is being taken off, a glimpse should be taken at the couplings, and a few pencil marks made, so that the positions of the distributor brush and the high-tension segments will not be confused.

While the machine is apart from the engine, it would be as well to refrain from rotating the high-tension segments.

In the process of refitting, the armature-shaft should be turned until the distributor is in exactly the same position as it was when the coupling was dismantled. Having done this, no apprehension need be felt as to whether the magneto will work or not.

Always Find the Cause.

When anything goes wrong about the poultry yard find the cause. If the eggs are infertile and do not hatch, if the chicks die off, if the hens get sick or do not lay, in fact if anything happens that is not as it should be, stop and find the cause. How many times you hear people talking about luck. They have no luck raising early chickens. They never have any luck getting winter eggs or getting the pullets to lay before cold weather sets in. To hear them talk one would conclude that the poultry business was run on luck, but this is not true. Everything in the world follows cause and effect. A certain effect is produced by a certain cause, and this is just as true in the poultry business as in any other business, and should be controlled by man in all practical affairs.

Testing Tyre Pressure—A Good Motor Habit.

Major H. O. D. Segrave, 12 Princes street, Hanover Square, London, W1, writes, under date 20th May, 1927: I have had quite a busy time in public lately justifying motor racing on the familiar ground that it provides the engineer with much useful technical data. But if I may say a word more in defence of the profession which I am about to abandon, it is that the ordinary everyday motorist might pick up many ideas for his own comfort and convenience from some of the precautionary measures which at higher speeds are matters of serious importance.

One such idea is suggested by the adoption by about 95 per cent. of motor-car manufacturers of the balloon tyre, and, incidentally, the state of the roads as maintained by the few ha'pence that Mr. Churchill has left in the Road Fund. It is that motorists should acquire the habit of testing the pressure of their tyres once a week, and seeing that all four are kept up to the specified pressure.

Before I started on my run along Daytona Beach, I had my Dunlops tested with a gauge, because it was absolutely imperative that each should register 100 lb. pressure. If low or unequal pressure, with its adverse effect on balance and steering, is dangerous at racing speeds, it must be at any rate inadvisable at touring speeds.

The bumps caused by too high a pressure are a deterrent to errors in that direction, but there is no such insistent reminder when tyres are too soft or unequal in pressure. Hence the advisability of trusting to the gauge and not guesswork. At touring speed it may not be a matter of saving your life, but it does save your tyres' life.

How to Keep People on the Land.

At a recent Agricultural Bureau Conference in South Australia a paper was read by a farmer, Mr. R. H. Burns, of Artherton, on this subject. He said one of the most serious questions confronting Australia was the settling of men on the land. A bold policy of land settlement was needed in order to populate the great spaces of Australia. A serious aspect of the subject of the paper was the fact that the younger people, those who in many cases had been trained to farm life, were drifting to the city, because of its many and varied attractions. An attractive home life should prove one of the best remedies for the trend of the people to the town. The home should be made as comfortable as possible, and labour-saving devices introduced. If farmers were to spend more money in improving their homesteads it would lessen dissatisfaction, and they themselves would enjoy some of the comforts that they richly deserved. Recreation should not be overlooked, and children should be encouraged to take an interest in farm work. A musical instrument, with one or more members of the family able to play, would have an important part in the social side of farm life.

Speaking generally, the hired man on the farm had not had in the past a fair deal. He had not received wages equivalent to that of his city brother, he had to work long hours, and his living-room had been anything but comfortable in many instances. Again, no continuity of work was guaranteed, and he soon drifted to the city for constant employment. Where a farmer had to employ labour, the speaker recommended the engagement of a married man, who should be given an interest in the farm and the opportunity of making a little extra with cows and fowls. With comfortable houses, motor-cars, wireless, &c., and the assistance of a sympathetic Government, there was no reason why the people on the land should not be contented. Those men and women who had gone out into the mallee districts and also in the settled areas should be provided, wherever possible, with sufficient water, good roads, and be given every inducement to remain on their holdings to make good.

The "Mystery" of Farming.

"The idea that farming is a mystery, which can only be appreciated by a man with a lifelong apprenticeship to the soil plus a certain measure of sentimentalism about the beauties of nature and a few doggerel rhymes about sunsets and sunrises as methods of forecasting the weather, is just plain bunkum. Experience counts very much, of course, in farming, provided it is based on real observations worked upon by real intelligence. But intelligence and scientific study can make up in a few months for the lack of many years of experience in farming, just as in every other calling. Speaking broadly, therefore, a townsman of the character that wants to farm, and with a fairly good education, will make a better farmer than an agricultural labourer with a poor education and with consequent undeveloped faculties. And no townsman need fear to tackle farming if he is prepared to seriously undertake to learn the subject as he would any other."—Dr. Haden Guest, in "Canada as a Career."

The Drift to the "Big Smoke."

Given the hope of a reasonable return for work, a training sufficient to show that mental alertness is as profitable upon a farm as in any other profession, surroundings that give a little more than animal comfort, above all, the sense of independence, which is, perhaps, the most attractive feature of successful farming, the drift to the towns should soon cease to give rise to anxiety. In any case, however, the play of the natural economic laws will correct this present tendency. But a few years ago employers of labour in towns could not secure sufficient or suitable labour; to-day the reverse is the position. But men must find work and boys must start earning, and if there are no openings in the towns they will be forced to find work in the country. And no one will deny that there is ample scope for the employment of labour in a country like ours, the natural resources of which are so great, but which at present are only partially developed.—The "Taranaki News," (N.Z.).

Care of the Cow in Calf.

It is often the simplest tasks on the farm that get least attention. Take, for instance, the work of drying-off the cow prior to calving. Not every dairy farmer recognises the importance of seeing that the work is carried out thoroughly, mainly because it is not always possible to directly associate later trouble with faulty drying-off.

For the general health of the cow she must be given a rest from milking for six to ten weeks, or perhaps longer, before calving. Not only does the cow gain needed strength to assist her in calving, but the calf she is carrying benefits by the additional nourishment made available to it during that time.

It is not always an easy matter to dry-off the cow, particularly in the case of some very heavy milkers. What should be aimed at is a gradual stoppage of the secretion of the milk, and some have the idea that the simplest way to stop the milk flow is to cease to milk altogether. The trouble is that such a procedure does not immediately stop the secretion of the milk, and that which is secreted is left in the udder to cause such troubles as "pea in the teat."

The safest way to dry the cow off is to begin by milking once per day instead of the usual two milkings, or where a cow has only been milked once a day she could be given one milking every two days. Lessen the number of milkings, and nature takes it to mean that less is required, and she responds by making less available. Although the cow is milked less regularly, it is most essential that the udder be stripped thoroughly at every milking, in order to prevent such troubles as those mentioned above.

Under this treatment the flow of milk will soon lessen, and as it does the number of milkings should be still further reduced until finally the flow ceases altogether.

The choice of suitable food during the process of drying-off can be of some help in lessening the milk flow. Dry foodstuffs, such as hay and straw, will be found to produce less milk. At any rate, foods calculated to make or force the production of milk should not be given in quantities.

After turning the cow out as dry, it is a wise plan to bring her in again in seven days' time to make sure that she has been thoroughly dried off, for the least drop of milk secreted and left in the udder to decompose will be likely to cause trouble later on.

A dose of Epsom salts (1 lb.), to which has been added 1 oz. of ground ginger, will be found a useful purgative for cows that are being dried off.

Sunlight and Sanitation.

Moisture is required for the rapid propagation of bacteria, and floors that are left wet during the day naturally harbour millions of bacteria. Open up the shed to the sunlight, and many of these bacteria are thereby killed.

Some bacteria are more persistent to sunlight than others. Typhoid germs, for instance, are killed by being exposed to the sun for six hours. Other germs are killed in a much shorter period, but the tubercle bacillus, being protected by an oily covering, requires a longer exposure to kill it.

Peanut Board Election.

Nominations for the election of four Growers' Representatives to the Peanut Board closed at the Department of Agriculture and Stock recently, with the following result:—

District No. 1 (Wienholt and Nanango).—

Charles Frederick Adermann, Wooroolin;

John Coe, Memerambi;

John Wesley Johnston, Wooroolin; and

Malcolm Redman, Crawford.

District No. 2 (Central District).—

Alfred Skinner Clark, Sandhills (unopposed).

District No. 3 (Rest of Queensland).—

Richard Major Wise, Buderim (unopposed).

Two representatives will be required for the No. 1 District, and the successful candidates will hold office for a term of one year as from the 1st September, 1927.

The election will take place on the 30th August, 1927.

Atherton Tableland Maize Board Election.

The following nominations have been received for the appointment of five members to the Atherton Tableland Maize Board:—

Harold Henry Collins, Atherton;

Lyall Reginald Crouch, Atherton;

George Charles Finch, Atherton;

John Gargan, Atherton;

Harold Walker Hallett, Pearamon;

Vincent Patrick Higgins, Kairi;

George Douglas Howe, Tolga;

James Paul McCarthy, Tolga;

James Joseph McDonald, Tolga;

Neil Neilson, Kairi; and

Mark Sims, Atherton.

The present members' term of office will expire on the 31st August, and the new Board members will hold office until the 31st March, 1929, in order that subsequent members will take office before the commencement of each year's harvest.

The election has been fixed for the 30th August, 1927.

New Citrus Varieties.

Among the numerous seedling citrus trees raised in Queensland are several of outstanding merit and much superior to the majority of imported varieties. The Glen Retreat mandarin raised by Mr. W. H. Parker is universally admitted as the best of its class and is now of world-wide distribution. Amongst round oranges, Byfield Seedless (originating at Byfield, C.Q.) is worthy of much more attention than it has received. A novel and most commendable feature is the entire absence of seeds. The tree is of very robust growth and a good cropper; the fruit is fairly large, of good appearance, and excellent quality. In the same locality another seedless variety was brought under notice by Mr. Mortensen, which he had named Capricornian. The sample indicated St. Michael type, with numerous fruit closely set on the branches. More recently Richards' special mandarin has invited attention, grown by Mr. N. C. Richards, a most successful orchardist of Howard. The fruit is of very fine quality, in appearance and texture somewhat resembling the Emperor variety, and of large size, average weight exceeding 8 oz. The tree is vigorous, carrying numerous thorns and fairly resistant to disease.—GEO. WILLIAMS, Acting Director of Fruit Culture.

Farm and Garden Notes for September.

With the advent of spring, cultivating implements play an important part in farming operations.

The increased warmth of soil and atmosphere is conducive to the growth of weeds of all kinds, particularly on those soils that have only received an indifferent preparation.

Potatoes planted during last month will have made their appearance above the soil, and where doubt exists as to their freedom from blight, they should be sprayed with either Burgundy or Bordeaux mixture as soon as the young leaves are clear of the soil surface.

Land which has received careful initial cultivation and has a sufficiency of sub-surface moisture to permit of a satisfactory germination of seeds may be sown with maize, millets, panicum, sorghums, melons, pumpkins, cowpeas, broom millets, and crops of a like nature, provided, of course, that the areas sown are not usually subjected to late frosts.

Rhodes grass may be sown now over well-prepared surfaces of recently cleared forest lands or where early scrub burns have been obtained, and the seed is sown subsequent to showers. More rapid growths, however, are usually obtainable on areas dealt with, say, a month later.

In connection with the sowing of Rhodes grass, farmers are reminded that they have the Pure Seeds Act for their protection, and in Rhodes grass, perhaps more than any other grass, it is necessary that seed of good germination only should be sown. A sample forwarded to the Department of Agriculture will elicit the information free of cost as to whether it is worth sowing or not.

Where the conditions of rainfall are suited to its growth, *paspalum* may be sown this month.

The spring maize crop, always a risky one, requires to be sown on land which has received good initial cultivation and has reserves of soil moisture. Check-row seeding in this crop is to be recommended, permitting as it does right-angled and diagonal cultivation by horse implements, minimising the amount of weed growth, and at the same time obtaining a soil mulch that will, with the aid of light showers, assist to tide the plant over its critical period of "tasselling."

Although cotton may be sown this month, it usually stands a better chance if deferred until October. The harvesting of cotton during the normal rainy season is, if possible, to be avoided.

The sowing of intermediate crops prior to the preparation of land for lucerne sowing should be carried out in order that early and thorough cultivation can take place prior to the autumn sowing.

The following subsidiary crops may be sown during the month:—Tobacco and peanuts, plant sweet potatoes, arrowroot, sugar-cane, and cow cane (preferably the 40-stalked variety), and in those districts suited to their production yams and ginger. Plant out coffee.

KITCHEN GARDEN.—Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Manure for the garden during summer should be in the liquid form for preference. Failing a sufficient supply of this, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case, stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be of great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly dug beds. What the action of salt is, is not exactly known, but when it is applied as a top dressing it tends to check rank growth. A little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile, and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow Guada bean, providing a trellis for it to climb on later. Sow cucumbers, melons, marrows, and squash at once. If they are troubled by the red beetle, spray with Paris green or London purple. In cool districts, peas and even some beetroot may be sown. Set out egg plants in rows 4 ft.

apart. Plant out tomatoes $3\frac{1}{2}$ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinnach, lettuce, vegetable marrows, eastard marrows, parsnips, carrots, chicory, eschalots, cabbage, radishes, kohlrabi, &c. These will all prove satisfactory, provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

Orchard Notes for September.

THE COASTAL DISTRICTS.

September is a busy month for the fruitgrowers in the coastal districts of this State, as the returns to be obtained from the orchards, vineyards, and plantations depend very largely on the trees, vines, and other fruits getting a good start now.

In the case of citrus orchards—especially in the southern half of the State—it is certainly the most important month in the year, as the crop of fruit to be harvested during the following autumn and winter depends not only on the trees blossoming well but, what is of much more importance, that the blossoms mature properly and set a good crop of fruit.

This can only be brought about by keeping the trees healthy and in vigorous growth, as, if the trees are not in this condition, they do not possess the necessary strength to set their fruit, even though they may blossom profusely. The maintenance of the trees in a state of vigorous growth demands—first, that there is an adequate supply of moisture in the soil for the requirements of the tree; and, secondly, that there is an adequate supply of the essential plant-foods available in the soil.

With respect to the supply of moisture in the soil, this can only be secured by deep and systematic cultivation, excepting in seasons of good rainfall or where there is a supply of water for irrigation. As a rule, September is a more or less dry month, and when it is dry there is little chance of securing a good crop of fruit from a neglected orchard.

If the advice that was given in the Notes for August regarding the conservation of moisture in the soil has been carried out, all that is necessary is to keep the soil stirred frequently, so as to prevent the loss of moisture by surface evaporation. If the advice has been ignored, then no time should be lost, but the soil should be brought into a state of good tilth as quickly as possible.

Where there is a supply of water available for irrigation, the trees should receive a thorough soaking if they require it. Don't wait till the trees show signs of distress, but see that they are supplied with an adequate supply of moisture during the flowering and setting periods.

It is probable that one of the chief causes why navel oranges are frequently shy bearers in the coastal districts is that the trees, though they produce a heavy crop of blossoms, are unable to set their fruit, owing to a lack of sufficient moisture in the soil at that time, as during seasons when there is a good rainfall and the trees are in vigorous growth or where they are grown by irrigation, as a rule they bear much better crops. The importance of maintaining a good supply of moisture in the soil is thus recognised in the case of this particular variety of citrus fruit.

When the trees show the want of sufficient plant-food—a condition that is easily known by the colour of the foliage and their weakly growth—the orchard should be manured with a quick-acting, complete manure, such as a mixture of superphosphate, sulphate of ammonia, and sulphate of potash, the plant-foods which are soluble in the water contained in the soil and are thus readily taken up by the feeding roots.

Although the above has been written mainly in respect to citrus orchards, it applies equally well to those in which other fruit trees are grown. Where the land has been prepared for bananas, planting should take place during the month. If the plantation is to be made on old land, then the soil should have been deeply ploughed and subsoiled and brought into a state of perfect tilth prior to planting. It should also receive a good dressing of a complete manure, so as to provide an ample supply of available plant-food. In the case of new land, which has, as a rule, been scrub that has been recently fallen and burnt off, the first operation is to dig the holes for the suckers at about 12 ft. apart each way. Good holes should be dug, and they should be deep enough to permit the top of the bulb or corm of the sucker to be 6 in. below the surface of the ground.

Take great care in the selection of the suckers, and see that they are free from beetle borers or other diseases.

As a precaution it is advisable to cut off all old roots and to dip the corms for two hours in a solution of corrosive sublimate, made by dissolving 1 oz. of this substance in 6 gallons of water.

In old banana plantations keep the ground well worked and free from weeds and remove all superfluous suckers.

When necessary, manure—using a complete fertilizer rich in potash, nitrogen, and phosphoric acid, such as a mixture of meatworks manure and sulphate of potash, 1 of the former to 1 of the latter.

Pineapples can also be planted now. The ground should be thoroughly prepared—viz., brought into a state of perfect tilth to a depth of at least 1 ft., more if possible—not scratched, as frequently happens; and when the soil requires feeding, it should be manured with a complete manure, which should, however, contain no superphosphate.

Old plantations should be kept in a good state of tilth and be manured with a complete fertilizer in which the phosphoric acid is in the form of bones, basic phosphate, or finely ground phosphatic rock, but on no account as superphosphate.

The pruning of custard apples should be carried out during the month, leaving the work, however, as late in the season as possible, as it is not advisable to encourage an early growth, which often means a production of infertile flowers. If the weather conditions are favourable passion vines can also be pruned now, as if cut back hard they will make new growth that will bear an autumn crop of fruit instead of one ripening during the summer.

Grape vines will require careful attention from the time the buds start, and they should be regularly and systematically sprayed with Bordeaux mixture from then till the time the fruit is ready to colour, in order to prevent loss by downy mildew or anthracnose.

Where leaf-eating beetles, caterpillars, or other insects are present, the trees or plants on which they are feeding should be sprayed with arsenate of lead. All fruit-fly infested fruit must be gathered and destroyed and on no account be allowed to lie about on the ground, as, if the fly is allowed to breed unchecked at this time of the year, there is very little chance of keeping it in check later in the season.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Where not already completed, the winter spraying with lime-sulphur should be finished as early in the month as possible. Black aphid should be fought wherever it makes its appearance by spraying with a tobacco wash, such as black-leaf forty, as if these very destructive insects are kept well in hand the young growth of flowers, leaves, wood, and fruit will have a chance to develop. Woolly aphid should also be systematically fought wherever present, as once the trees are in leaf it is much more difficult to treat.

The working over of undesirable varieties of fruit trees can be continued. The pruning of grape vines should be done during the month, delaying the work as long as it is safe to do so, as the later the vines are pruned the less chance of their young growth being killed by late frosts. Keep the orchards well worked and free from weeds of all kinds, as the latter not only deplete the soil of moisture but also act as a harbour for many serious pests, such as the Rutherglen bug.

Grape vines should be swabbed with the sulphuric acid solution, mentioned in the Notes for August, when the buds begin to swell and just before they burst, as a protection against black spot and downy mildew.

New vineyards can be set out, and, in order to destroy any fungus spores that may be attached to the cuttings, it is a good plan to dip them in Bordeaux mixture before planting. The land for vines should be well and deeply worked, and the cutting should be planted with one eye only out of the ground and one eye at or near the surface of the ground.

In the warmer parts which are suitable for the growth of citrus fruits, the land must be kept well cultivated, and if the trees need irrigating they should be given a good soaking, to be followed by cultivation as soon as the land will carry a horse without packing.

In these parts fruit fly should be systematically fought, as it will probably make its appearance in late citrus fruits and loquats; and if this crop of flies is destroyed, there will be every chance of the early crops of plums, peaches, and apricots escaping without much loss.

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.

MOONRISE.						
1927.	AUGUST.		SEPT.		Aug.	SEPT.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	6.36	5.20	6.8	5.36	8.53	8.56
2	6.35	5.21	6.7	5.36	9.25	9.26
3	6.34	5.22	6.6	5.37	9.54	10.0
4	6.34	5.22	6.5	5.37	10.24	10.38
5	6.33	5.23	6.4	5.38	10.56	11.20
6	6.33	5.23	6.2	5.38	11.28	12.9
7	6.32	5.23	6.1	5.39	12.4	1.4
8	6.31	5.24	6.0	5.40	12.43	2.4
9	6.31	5.24	5.59	5.40	1.30	3.7
10	6.30	5.24	5.58	5.41	2.22	3.15
11	6.29	5.25	5.57	5.41	3.21	5.22
12	6.28	5.26	5.56	5.42	4.23	6.29
13	6.27	5.27	5.54	5.43	5.30	7.36
14	6.26	5.28	5.53	5.43	6.37	8.42
15	6.25	5.29	5.52	5.44	7.43	9.49
16	6.25	5.29	5.51	5.44	8.48	10.55
17	6.24	5.30	5.50	5.45	9.52	12.0
18	6.23	5.30	5.48	5.45	10.56	...
19	6.22	5.31	5.47	5.46	12.0	1.1
20	6.21	5.31	5.46	5.46	...	1.58
21	6.21	5.31	5.45	5.46	1.4	2.50
22	6.20	5.32	5.44	5.47	2.6	3.36
23	6.20	5.32	5.43	5.47	3.5	4.17
24	6.19	5.32	5.42	5.47	4.1	4.53
25	6.18	5.32	5.41	5.47	4.52	5.25
26	6.16	5.33	5.40	5.48	5.37	5.57
27	6.14	5.33	5.38	5.48	6.16	6.27
28	6.13	5.34	5.37	5.48	6.52	6.56
29	6.11	5.34	5.36	5.49	7.24	7.27
30	6.10	5.35	5.35	5.49	7.58	8.0
31	6.9	5.35			8.25	

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

6 Aug. ☾ First Quarter 4 5 a.m.
 13 " ○ Full Moon 2 37 p.m.
 20 " ☾ Last Quarter 5 54 a.m.
 27 " ● New Moon 4 45 p.m.

Apogee 4th August, at 4 18 a.m.

Perigee 16th August, at 1 42 a.m.

Apogee 31st August, at 9 12 p.m.

Mercury will be at its greatest brilliancy on 5th August. On the 6th Saturn will be stationary and in the head of the scorpion. The apparent nearness of Saturn and Beta Scorpil to the Moon on the 7th will be interesting to observe as soon as twilight permits these three bright objects to become clearly discernable high up in the north. About 5 o'clock in the afternoon Saturn will have disappeared behind the Moon in China, but not in Australia, and three hours later Beta Scorpil will also be occulted. On the same evening, about 10 o'clock, the occultation of Upsilon Scorpil will be observable at and near Cairns, but not in any lower parts of Queensland.

On the evening of 7th August any keen observer of the stars who has a three or four-inch telescope will find it, perhaps, sufficiently interesting to spend the greater part of the night in observing the apparent passage of the moon amongst the stars of Scorpio and Orphinucus. Such a proceeding is more to be recommended in the far north than in the south of Queensland, where the coldness of the air is likely to act as a deterrent.

About 10 minutes after 1 a.m. on the 17th the small star Upsilon Piscium will be occulted by the Moon, but at any place south of Warwick the star will be seen (with binoculars or telescope) only to skirt the edge of the moon.

4 Sept. ☾ First Quarter 8 44 p.m.
 12 " ○ Full Moon 10 53 a.m.
 18 " ☾ Last Quarter 1 29 p.m.
 26 " ● New Moon 8 10 a.m.

Perigee 13th September, at 3 42 a.m.

Apogee 28th September, at 9 6 a.m.

At the beginning of this month the Southern Cross will be prone, lying on its right side 30 degrees west of the South Celestial Pole, at about 8 p.m. Mercury will be in superior conjunction with the Sun on the 2nd, that is, on the far side of its orbit, almost behind the Sun. Towards the end of the month it will be well above the horizon after sunset, but not well situated for observation.

On the 4th there will be an occultation of Saturn by the Moon at 2.27 a.m., or nearly three hours after they have set.

On the 10th Venus will be in inferior conjunction with the Sun on the side of its orbit nearest to the earth and only about 25 million miles from it. It will be lost in the rays of the Sun, with its bright side away from the earth, but not in a direct line with it, being about 8 degrees southward.

On the 11th Psi Aquarii will be occulted at Warwick, between about 6.48 p.m. and 7.28 p.m.

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

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night: when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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