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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

Anzac.

WITH Australians the name of Anzac has grown into a great tradition, and the anniversary of the landing on Gallipoli (25th April) was fitly commemorated throughout the Commonwealth. In every town and hamlet Australians gathered to pay a tribute of respect and reverence to the memory of brave men who fought and died for a cause they believed, and we believe, to be true and just. Reverence for their memory we must feel, or else be recreant to the best within us, and as a people we cannot afford to be recreant to any high ideal—that was the spirit of the nation-wide commemoration. Just thirteen years ago the Australian citizen soldiers went into the real business of war—a war which in the light of events that are now history was for us absolutely inevitable—with undefeatable courage. They made a name for themselves and for their country, and through their service and their sacrifice added a new and brilliant chapter to the story of our race. And what sort of men were they, and what was the dominant motive that impelled them?

Mr. Bean, the Australian war historian, in simple and noble language, gives us the thrilling answer:—"It lay in the mettle of the men themselves. To be the sort of man who would give way when his mates were trusting to his firmness; to be the sort of man who would fail when the line, the whole force, and the allied cause required his endurance, to have made it necessary for another unit to do his own unit's work; to live the rest of his life haunted by the knowledge that he had set his hand to a soldier's task and had lacked the grit to carry it through—that was the prospect which these men could not face. Life was very dear, but life was not

worth living unless they could be true to their idea of Australian manhood. Standing upon that alone, when help failed and hope faded, when the end loomed clear in front of them, when the whole world seemed to crumble and the heaven to fall in, they faced its ruin undismayed.''

The Sugar Position.

"I THINK it is necessary that the Australian public should be fully advised of the sugar position, as statements are appearing in the Southern Press which are not accurate,'' the Premier (Mr. W. McCormack) informed the Press recently.

Referring to the sugar duties in Britain, he declared that subsequent advices had confirmed the opinion of the cabled information expressed in his statement of 24th April. ''I stated there,'' he added, ''that the Australian industry had avoided a loss of 30s. per ton, or over £250,000, by the acceptance of the 99 per cent. instead of the Empire Federation's original proposal. However, whilst we have gained that advantage over the original proposal, it must not be taken as an added advantage over the previous tariff. The reduction of duty on foreign sugar under 98 per cent. without the reduction on foreign 99 per cent., as stated previously, reduced the competition on foreign refined; but Queensland's higher class sugar must of necessity face the competition of foreign raws, on which the duty has been reduced. The added preference to Queensland's sugar over 99 per cent. is, therefore, nominal and ineffective. The Queensland sugar industry will benefit by the increased demand by British refiners for raw sugars, but to what extent the admitted advantage of the new tariff will operate remains to be seen. Undoubtedly, there appears to be a slight advantage, but to what the advantage will be can only be determined when the actual results of competition become operative.''

The Coming Northern Cane Harvest.

RECORD crops are expected to be harvested in the Herbert and Tully cane areas in the coming season. The cane is in a satisfactory condition, and it is probable that the crushing will be continued for several weeks of next year. In a report to the Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby), the Northern field assistant (Mr. A. P. Gibson) states that the cane crop forecast for 1928 is 230,000 tons for Macnade and 237,000 tons for Victoria, or a total of 467,000 tons for the Herbert River district. This estimated tonnage is 105,000 tons greater than that milled last year, when 361,628 tons yielded 49,637 tons of sugar. Although it was difficult to give an estimate of the crop, except in approximate terms, of such a new and ever-increasing area as the Tully district, the probable harvest will be something like 210,000 tons, as against last season's crushing of 202,856 tons.

The Banana Industry—Beetle Borer Investigation.

THE Minister for Agriculture and Stock (Mr. W. Forgan Smith) has announced that he is arranging for Mr. J. L. Froggatt, of the Entomological Staff of this Department, to visit Java this month, for the purpose of making inquiries there with a view to procuring the necessary stock to breed up the insects known to be natural enemies of the banana beetle borer. It is estimated that the banana industry has a value to this State closely approaching £1,000,000 sterling per annum, and it is capable of further expansion. The banana beetle borer has proved to be a serious pest to the industry, and the Entomologists of the Department, and Mr. Froggatt in

particular, have given close attention to this pest. The Committee of Direction is offering a reward of £5,000 to any private citizen who discovers a means whereby the beetle borer may be effectively controlled, and the fact that the fruitgrowers of this State are prepared to offer such a substantial reward is indicative of the damage done to their industry by this pest. The beetle borer is known to exist in Java, but in that country it is not considered an insect of economical importance; and it is possible that it is there kept under subjection by natural native enemies known to exist in Java, one being a beetle and the other a fly. There is no conclusive evidence available, however, to indicate that this possible means of control of the beetle borer would be efficacious in Queensland, but it does appear that biological control offers more promise of success than that likely to be achieved by any other means; besides the results in Java are most encouraging. Apart from his main mission, Mr. Froggatt will, while in Java, investigate the insect pests of crops common to both Java and Queensland. At the same time, he will make a note of tropical crops, such as tea and coffee, now raised in Java, that might also be useful in Queensland.

Transport of Bananas.

"EFFICIENT transport of bananas by railway is a problem that a special committee is being appointed to deal with," said the Acting Premier and Minister for Agriculture and Stock (Mr. W. Forgan Smith) recently in the course of a Press interview. He added that the matter will be dealt with in conjunction with the system of establishing banana experiment stations for research in cultivation and pest problems. On the transport committee the Commissioner for Railways (Mr. J. W. Davidson) will have a representative, and the body will recommend improvements that might lead to the better transport of bananas by rail. Consideration of this phase is made necessary by the expansion of the industry in the North, and the increasing crop now being marketed in Southern areas.

School of Instruction in Pig Husbandry.

ARRANGEMENTS have been made to hold a School of Instruction in Pig Husbandry at the Queensland Agricultural High School and College from Monday, 11th June, to Saturday, 23rd June, and applications to attend the school are being invited from those who are desirous of improving their knowledge of pig raising. Theoretical and practical instruction will be given in the breeding, cross-breeding, feeding, marketing, judging, diseases, and care and management of pigs. It is proposed, in addition, that, in the course of the currency of the school, to arrange visits to bacon factories so that those attending may have the opportunity of studying all the operations involved in the treatment of bacon pigs of varying ages and weights. Schools of Instruction in Tractor Management and Butter Factory operation have already proved their practical value, and it is anticipated that the School in Pig Husbandry will be equally popular and instructive. The fee for the complete course has been fixed at £2 13s. 6d. for each student, exclusive of the additional cost entailed in the visits to bacon factories, which is expected to be about £1 4s. Both men and women may attend the school. Officers of the Department of Agriculture and Stock will assist the Principal and the regular staff of the College. Applications from those desirous of attending should be sent to the Principal, Queensland Agricultural High School and College, T.P.O. South, Queensland, as early as possible, in order to facilitate arrangements for the course. All inquiries concerning the school, cost, railway fares, and the like should be addressed to the Principal.

Bureau of Sugar Experiment Stations.

PLANT PATHOLOGY AND SUGAR TECHNOLOGY.

APPOINTMENT OF INVESTIGATION OFFICERS.

The Minister for Agriculture, Mr. W. Forgan Smith, has informed the Press that at a recent Executive Council Mr. Arthur Frank Bell and Mr. Norman Bennett were appointed Investigation Officers in Plant Pathology and Sugar Mill Technology respectively. These two officers will be attached to the Bureau of Sugar Experiment Stations.

Both gentlemen were sent early in 1924 by the Department of Agriculture and Stock to visit the chief canegrowing centres of the world, and have just returned to Queensland after a tour extending over four years.

After leaving Brisbane, Mr. Bell's first stopping place was Honolulu, where he spent a short time. He then proceeded to California, where he remained for eighteen months attending lectures and doing research work in the University of California. During the summer vacation of 1925 he joined Dr. H. W. Kerr, another of the Department's sugar scholars, and they made a tour of Louisiana, Florida, and Cuba. A comprehensive study of the sugar-cane agriculture of those places was made. Mr. Bell then returned to the University of California for a further year's work, and in the summer of 1926 he made an extensive tour, which included visits to Central America, Porto Rico, and the British and French West Indies, returning to the United States to attend the International Botanical Conference.

He then crossed to England, and did a year's research in the Royal College of Science in the University of London. During the vacation of the College he visited a number of research centres in Holland and Germany. From England he returned to Hawaii, and through the courtesy of the Hawaiian Sugar Planters' Association spent some four months as an honorary member of the staff of the Experimental Station.

Leaving Honolulu in December of 1927, he went viâ Japan and China to the Philippine Islands, where he spent a month. Here he was joined by Mr. Norman Bennett, and they proceeded to Java together and spent a month in various parts of the island.

From the point of view of scientific sugar production, Mr. Bell is of the opinion that we have much to learn from Hawaii and Java, although we compare very favourably with the other sugar countries. Both the Javan and Hawaiian stations employ some forty to fifty scientists, and are doing some remarkably fine work. Incidentally, these stations have been responsible for the breeding of P.O.J. 2878 and H. 109 respectively, both of which have been of incalculable value to the sugar industry of these two places.

From an agricultural point of view, these two countries have three outstanding policies. The first of these is the careful planning of a breeding programme for some years ahead, and taking all precautions to ensure a complete knowledge of the parentage of the canes produced. P.O.J. 2878, which has increased the Javan yield per acre by some 20 per cent., did not arise in a haphazard fashion, but is the culminating point of several years of carefully planned breeding.

The second line of policy is the use of the "checkerboard" system in all experimental work. This consists in laying out all comparative experiments in the manner of a checkerboard, with about ten repetitions of each experiment. This ensures against errors on account of variations in soil, and also allows of the results being examined mathematically to determine whether any differences between treated and controlled plots are significant.

The third point is the recognition of the desirability for unrestricted interchange of knowledge between all persons engaged in the sugar industry. In both Java and Hawaii one may have access to any figures in both the sugar houses and the field, and men from neighbouring plantations are always welcome to any information. These people have realised that working behind closed doors is out of date, and that the greatest benefits to both the individual and the State are only obtained by the mutual dissemination of knowledge.

Mr. Norman Bennett, the Investigations Officer for Sugar Mill Technology, first went to Java and spent three months in the island visiting factories and studying the various methods of control and manufactures carried out by the mills and estates. The elaboration of these methods has been worked out by the Dutch scientists of the Proefstation over a period of thirty years.

From Java he went to Scotland, where he spent nine months with a Scotch engineering firm before visiting the English refineries and machinery manufacturers.

In September, 1925, he proceeded to the canegrowing State of Louisiana, in the United States, which at that time was busily engaged in the reconstruction of an industry that had come to the verge of ruin owing to adverse seasons, insect pests, and diseases of the local cane varieties. He spent fifteen months in Baton Rouge at the Louisiana State University under Dr. G. E. Coates, Dean of the Audubon Sugar School. As the university is operated by State funds, the experimental station staff was brought into close relationship with the university, and Mr. Bennett was able to do university work under the direction of the station officers in the chemical department of the university.

While in Baton Rouge he was able to obtain good practical experience at the model factory on a large scale, and experiment on the possibility of beet culture and beet sugar manufacture in Louisiana. He had also the opportunity of getting further experience in the manufacture of sorghum syrup and plantation white sugar manufacture.

In 1927 he spent the cane season in Cuba, and whilst there attended the second meeting of the World's Cane Sugar Technologists' Association as the representative of the Queensland Department of Agriculture and Stock. Returning to Louisiana he visited the refineries and machinery manufacturers on the east coast, and then went to San Francisco, where he visited a few beet sugar factories before proceeding to Hawaii, where he spent a month visiting factories on the different islands of the group.

He then left for the Philippine Islands and Java before returning to Queensland.

The third travelling scholar is Mr. H. W. Kerr, who is now a doctor of philosophy. Mr. Kerr has been appointed Investigation Officer for Soils, but he will not actually take up his duties here until about August next, as he is now in Hawaii. Since he has been away, Mr. Kerr has been in Java, the Philippines, Hawaii, Louisiana, Florida, Cuba, the University of Wisconsin, and the Rothamstead Experiment Station in England.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

Importance of Collecting Cane Grubs.

During this month grubs will probably be much in evidence in many canefields which last season were comparatively free from serious infestation. Wherever possible, these should be picked up from behind ploughs, while at the same time every encouragement should be given to insectivorous birds, such as the Ibis, Pewee, &c., to take active part in this useful work.

Grubs of the greyback cockchafer will be mostly in the second and third stages of growth (width of head about 3/16ths to 5/16ths of an inch), and those of *Lepidiota frenchi*, our smaller dark-reddish cane beetle, are in the third instar, and having finished feeding will soon be transforming to the pupal condition.

It should not be forgotten that this common-sense method of control is recognised as being beneficial, and systematically practised as a matter of course in other sugar-growing countries.

Assuming that 50 per cent. of the grubs collected in this way would, if left in the field, have produced female beetles (which is a very fair estimate), it follows that by picking up only a dozen grubs, one prevents the laying during the following season of about 216 eggs; which, if deposited in cane land, would produce enough grubs to completely destroy forty-three stools of plant cane.

Green Muscardine Fungus Attacking Cane Grubs.

At this time of year we may expect to find specimens of our primary scarabæid cane grubs victimised by the vegetable parasite *Metarrhizium anisopliæ*, which is generally present in our canefields from March to June. When attacked by this entomogenous fungus the body of the grub becomes quickly filled by the roots or mycelium, and gradually hardening turns at first white, and finally an olive-green colour, the latter condition being the fruiting stage of the fungus, which consists of a thin crust formed of chains of spores. Grubs affected in this manner do not decompose, but become mummified, and like a mouldy piece of cheese can be broken into pieces.

Growers can, if desired, extend the sphere of usefulness of this parasite by collecting all such green crusted-looking grubs, breaking them into powder, and thoroughly mixing this with about 100 times the quantity of moist, finely sifted soil,

rich in organic matter. This spore-infested earth should be sprinkled or sown as thinly as possible in the plough furrows when planting any areas of cane land known to be liable to become grub affected.

How to Fumigate Cane Grubs.

Growers desiring to obtain full information regarding soil fumigants, such as when and how to apply them, together with descriptions of same and cost per acre for material and labour, should write to the Director of the Bureau of Sugar Experiment Stations, Department of Agriculture, Brisbane, for a copy of a pamphlet published last month, dealing with the merits of paradichlorobenzene, carbon bisulphide, and calcium cyanide as efficient fumigants for combating the ravages of soil-frequenting grubs of cockchafer beetles. This separate issue is a reprint of an article which appeared in the February number of the "Queensland Agricultural Journal," vol. xxix., Part 2, pp. 97 to 113.

CANE PEST COMBAT AND CONTROL.

The Entomologist (Mr. E. Jarvis) at Meringa, near Cairns, has submitted the following report for the period March to April, 1928, to the Director of Sugar Experiment Stations, Mr. H. T. Easterby:—

Acetylene Light Attractive to Greyback Cockchafer.

In a leading article appearing recently in the "Australian Sugar Journal" (vol. xix., p. 645) the editor, when commenting on results obtained by the Assistant Entomologist at Bundaberg with regard to the very unimportant phototropic reaction manifested by females of our southern cockchafer (*Pseudoholophylla furfuracea* Burm., concludes by remarking: "It is recognised that these observations apply only to one variety of cane beetle, and it will be interesting to learn from our entomologists the bearing, if any, which the facts now established may be regarded as having upon the control of the other varieties, and particularly those so damaging to northern canefields." In view of the fact that several of our Cairns growers, chancing to read the report published by Mr. R. W. Mungomery in the February number of the above journal (vol. xix., pp. 656-657), have thoughtlessly taken his remarks to apply to cane beetles in general, including our northern "greyback cockchafer," it becomes advisable to briefly enumerate the various experiments carried out here in connection with the phototropism of *Lepidoderma albohirtum* Waterh.

When first entering upon the study of cane insects at the Gordonvale Entomological Laboratory in 1914, I was told by those who had preceded me in this scientific work, that it was no use attempting experiments with light-traps against our cane beetle, as this cockchafer was not attracted by artificial light.

Deciding, however, to obtain definite proof as to the correctness of such statements before setting aside this control method, an experiment was accordingly started during December, 1914, in a canefield on the "Carrah" Estate with a light-trap specially designed by the writer for studying the phototropic reaction of this species towards acetylene light ("Queensland Agricultural Journal," vol. v., p. 226). During the first three evenings of 14th to 16th December the following definite results were secured, proving conclusively that *albohirtim* is strongly attracted to white light:—

SKY CLEAR; NO WIND; NO MOON.			*L. albohirtum.*		
Date.	Average Temperature.	Hours.	Beetles Caught.	Male.	Female.
Dec. 14	70 deg. F.	8 p.m.—11 p.m. ..	51	40	11
Dec. 15	76 deg. F.	8 p.m.—9 p.m. ..	57	46	11
Dec. 16	77 deg. F.	8 p.m.—10 p.m. ..	62	45	17
			170	131	39

Further observations made about a couple of weeks later yielded additional information, proving that this beetle, without doubt, continues susceptible to artificial light long after the emergenee from the ground. Acetylene light was found to be

equally attractive to both sexes of this cane beetle throughout its aerial existence. The proportion of females captured at light about the middle of December varied, as shown above, from 20 to 25 per cent.; but three weeks later, early in January, catches during two consecutive evenings yielded 47 and 75 per cent. of female beetles (see Bulletin No. 17, p. 11). These differences accorded with expectations, as although male specimens are known to predominate for a week or so after the first emergence, the sexes can generally be met with in about equal proportions by the beginning of January, while towards the end of that month conditions are often reversed and females become the more numerous.

During the 1927-28 season, for instance, Mr. J. H. Buzacott (Assistant to Entomologist) carried out an experiment on 21st December with an acetylene lamp placed on uncultivated open forest country, about six chains distant from the nearest cane land.

It was interesting to note that while the light was too near the ground and enclosed in the trap, no beetles were caught, but directly the light was placed on top of the trap, bringing the acetylene flame about 5 feet above ground level, "it was immediately assailed by greybacks from the neighbouring shrubs, 31 being trapped in less than half an hour." These specimens, when examined later, were found by Mr. Buzacott to compromise 15 males and 16 females. On the same evening the present writer exposed a larger Millar lamp on the corner of a veranda within a few feet of a small "weeping fig" tree (*Ficus benjamani*), hanging a white sheet on one side of the lamp to act as a reflector. No less than 146 greyback cockchafers were captured by this method in less than an hour, 91 being males and 55 female specimens.

The predominence of the former sex may in this case have been due to the fact that the fig tree had been harbouring, for several days previously, feeding beetles which had been amongst the first to emerge from the soil. Later on, about the beginning of January, however, 169 greybacks, when captured in a similar manner from the same fig tree, were found to comprise 93 females and 76 male cockchafers.

With reference to the behaviour and mode of reaction manifested by *Albohirtim* while under the phototropic influence, data in this connection will be found in Bulletin No. 17 of this office, pp. 8-11, 19, 20, 41, 42, and 66.

It will be seen from the foregoing details that, unlike the southern cane beetle, *P. furfuracea*, both sexes of our northern species, the notorious "greyback" cane beetle, are strongly attracted to artificial light.

Phototropic response of either a positive or negative stimulus varies greatly in different groups of insects. Various moths, beetles, or bugs, for instance, react negatively towards sunshine, or lamp light; that is to say, being lovers of darkness are repelled by such conditions. Common examples of this class are cockroaches, clothes-moths, bugs, grain weevils, &c.

Nearly all the butterflies, on the other hand, fly only during sunny weather (positive phototropism), while moths prefer the hours of darkness. Some insects will react positively towards artificial light up to a certain point, upon reaching which they may either become negatively phototropic and fly directly away from the source of illumination; or orientation may suddenly cease, and they may settle down close to the flame and remain quite motionless. Others, again, rush straight for the point of attraction and are burnt, or else will spin helplessly around the flame for a few minutes before meeting their fate.

In many dipterous or coleopterous insects phototropic reaction is displayed by the males only. The southern cane beetle, *Pseudoholophylla furfuracea*, affords an excellent example of the latter class, experiments carried out recently in Bundaberg by Mr. R. W. Mungomery having demonstrated the fact that only about 1 per cent. of specimens of this species taken in light-traps are of the female sex.

As an illustration of the manner in which phototropism may vary in species of closely related genera of the family *Melolonthidæ*, it will be of interest to mention that field experiments conducted about twenty years ago in America against beetles belonging to the genus *Lachnosterna*, showed that both sexes are readily attracted to light-traps, some species of this genus, however, displaying far more positive reaction than others. These beetles closely resemble in size, colour, and general appearance those of our southern cockchafer, *P. furfuracea*.

Eight or more species of *Lachnosterna* are known to be injurious to the roots and foliage of various economic plants in Illinois. Of these, *L. implicita*, perhaps, flies most freely to artificial lights, the number trapped in this manner in the year 1906, for instance, during field tests carried out at Urbana, extending over a period of twenty-six days (14th May to 28th June), being 2,517 specimens. Of these beetles 834 were found to be males and 1,683 females.

Dusting versus Spraying as a Control for Codling Moth in the Stanthorpe District.

By H. JARVIS and S. M. WATSON, Entomological Branch.

Introductory.

Considerable loss has been caused by codling moth in the apple orchards of the Stanthorpe district during the last few seasons, more particularly in 1926-27, and although the periodical spraying with arsenate of lead has been generally adopted throughout the district as the recognised means of control, yet the results achieved by orchardists have been disappointing, so much so that in many orchards last season loss from codling moth was greater than that sustained from fruit fly. Growers who applied as many as three or four successive sprays failed to adequately control codling moth.

There has, in consequence, therefore been a growing dissatisfaction with the wet-spray method, and numerous inquiries regarding the efficacy of dust mixtures containing arsenate of lead have been received.

Previous work in America would appear to indicate that a fairly satisfactory control of codling moth can be obtained there by the use of dusting mixtures containing arsenate of lead.

The experiment herein detailed was made for the purpose of obtaining information regarding the local use of dusting, as compared with wet spraying in regard to cost and efficiency, as a control for codling moth.

It is realised that the degree of the annual local infestation of codling moth is governed by seasonal weather conditions, and the encouraging results secured this season may not obtain next year; it is therefore considered desirable to repeat the experiment for at least three years in succession, and the work so far accomplished must be considered as being only of a preliminary nature.

The Experimental Plot.

The orchard chosen for the experiment was situated at the Summit, which is the highest point of the Granite Belt area, and is acknowledged to be the principal apple-growing centre in the district.

The plot used in the experiment covered an area of approximately one and three-quarters acres, and consisted of seventeen rows of trees having eleven trees to the row. The trees, which were planted 20 feet apart, were from six to seven years old and were of the variety "Granny Smith," which is one of the most extensively grown late varieties.

The trees had been pruned for wood production rather than for fruit, but notwithstanding this they set a heavy crop of fruit, as was the case in most apple orchards throughout the district.

During November and December there was a heavy fall of fruit, a not unusual happening with young vigorously growing trees, and the resulting crop was considered by the owner to be a very light one.

The spraying and dusting arrangements were as follows:—Of the seventeen rows comprising the plot, numbers one to five and seven to nine were treated with the dust mixture, leaving row number six untreated as a check row. The remainder of the rows, numbers ten to seventeen, were treated with the wet spray.

It will thus been seen that the number of dusted trees was equal to the number of wet-sprayed trees—viz., eighty-eight trees in each case.

Materials Used and Method of Application.

The spray mixture used in the experiment was applied with a power-spraying outfit at a pressure of 225 lb. The machine was driven by a gasoline engine rated at 2 horse-power. One man and one horse were used to operate the sprayer.

The dust mixture was applied with a one-man hand dusting gun, having a capacity of about 9 lb.

Four treatments in all were made with the dust mixture, the first of these coincided with the usual calyx spray, the second was applied nine days later, the third seventeen days after the second, and the fourth forty-six days after the third.

All dustings were made at dawn, which was considered to be the most suitable time. The dust mixture used was the Cloudform Dust A.P. No. 1, as supplied by its manufacturers. The mixture contained 15 per cent. arsenate of lead, and 85 per cent. reducer.

Three treatments only were given with the wet spray, the first application was the calyx spray, the second a cover spray eighteen days later, and the third spray sixty-two days after the second. The material used was arsenate of lead in powder form.

All applications of dust and spray were made from at least two sides of the trees, which were thoroughly covered, and in applying the wet spray the spraying nozzle was held at least 3 feet from the tree, thus giving a well distributed spray and also reducing the amount of drip to a minimum. Practically no spray was wasted.

The dates of application, strength at which materials were used, and cost figures are shown in the accompanying Table No. 1.

The cost figures for the dusted plots are calculated on skilled labour at 2s. 6d. per hour, the cost of dusting material being at the ruling local price of 29s. 6d. per 56 lb. The cost of treating the wet-spray plot is based on the rate of 30s. per day of eight hours, this being the price locally charged for the hire of man, horse, and spraying apparatus. The cost of arsenate of lead is at the rate of 1s. 9d. per lb.

Codling Moth Infestation of the Season.

The codling moth infestation throughout the district was not heavy—in fact, it was the lightest for some years—hence the number of treatments given was considered to be sufficient. The time of application of both dust and spray was necessarily governed by weather conditions, and it was not practicable owing to heavy winds and rain to make all the applications at what was considered to be the most critical time. Only one dusting was made in a still atmosphere. During the later dustings, there was a slight breeze from the south-east, thus a drift of dust was occasioned from the treated to the untreated trees, possibly to a slight extent reducing the infestation in the check row, which, as shown in Table No. 2, was only slightly over 7½ per cent. of the final crop.

It is, however, noteworthy that the orchards surrounding the experimental area did not all share to the same extent the comparatively light infestation experienced in the experimental orchard, and in one or two instances loss from codling moth in these adjacent orchards was not inconsiderable.

Summary.

The results so far obtained indicate that codling moth can be satisfactorily controlled by the application to the trees of a dust mixture containing 15 per cent. arsenate of lead and 85 per cent. reducer. It is also demonstrated that dusting, as carried out in this experiment, is slightly cheaper than wet spraying, for, although the actual cost of the dust is more than that of the spray material, this is more than equalised by the great saving of time and labour in dusting, as the dust can be applied more than four times more quickly than the spray, and this quickness of application should prove of much value when trees have to be treated at critical or unusual times in order to meet special weather and other conditions.

The best time to apply dusts appears to be when the atmosphere is still. This condition often occurs at dawn. Dust applied in a still atmosphere hangs suspended in the orchard like a white cloud completely enveloping the trees.

In both dusting and spraying for codling moth thoroughness of application at the most critical time is of the utmost importance, and failure to control codling moth by spraying is often due to hasty treatment at the wrong time. In the calyx spray it is essential that the spray be forced well into the calyx at a good pressure, and this can only be accomplished by a good spraying apparatus. It is noteworthy that the first application of both dust and spray in the experiment under discussion was made in a still atmosphere and at the most critical time.

One of the greatest advantages of dusting is that the dust is carried by the air right into the trees, covering almost every portion of the tree.

It will be seen from Table No. 2 that the percentage of loss from causes other than codling moth in the experimental plot has been remarkably small. Loss from other causes includes apples unsound or cracked, and individual fruits affected with bitter rot (*Glomerella cingulata*), Queensland fruit fly (*Chætodacus tryoni*), corn ear worm (*Heliothis obsoleta*), and fruit marked by "dead stings."

The term "dead stings" refers to apples in which injury by codling moth is only skin deep. It often happens that the young codling grub after gnawing through the skin of the fruit perishes, either from a dose of the poison or from other causes. The injury remains on the fruit, causing a permanent disfigurement, and is generally referred to as a "dead sting."

Seasonal Weather Conditions.

The season was the wettest experienced for seven years, and as will be seen from the rainfall table there was a good fall of rain almost immediately after the first two dustings and also after the first and third spraying, but in spite of the almost continuous wet weather traces of both dust and spray were observed on the fruit at the time of picking.

Acknowledgments.

The writers desire to express their appreciation of the opportunities afforded for carrying out this investigation by the owner of the orchard, Mr. W. Maggs, Inspector under the Diseases in Plants Acts, and for his very valued observations and co-operation throughout the experiment.

TABLE NO. 1.

DATA ON TIME AND COST OF APPLICATIONS.

Date of Application.	No. of Trees Treated.	Material used and Strength.	Quantity.	Time Required.	Cost.			Cost per Tree.
					Labour.	Material.	Total.	
			Lb.	H. Min.	*s.* *d.*	*s.* *d.*	*s.* *d.*	*d.*
19th October, 1927 ..	88	A. P. No. 1, Cloudform dust	14½	0 30	1 3	7 $7\frac{64}{100}$	8 $10\frac{64}{100}$	$1\frac{21}{100}$
28th October, 1927 ..	88		19	0 39	1 $11\frac{4}{10}$	10 $0\frac{8}{100}$	11 $11\frac{48}{100}$	$1\frac{83}{100}$
14th November, 1927 ..	88		18	0 37	1 $10\frac{3}{10}$	9 $5\frac{76}{100}$	11 $4\frac{6}{100}$	$1\frac{55}{100}$
30th December, 1927 ..	88		14	0 30	1 3	7 $4\frac{48}{100}$	8 $7\frac{48}{100}$	$1\frac{17}{100}$
		Totals	65½	2 16	6 $3\frac{7}{10}$	34 $5\frac{96}{100}$	40 $9\frac{66}{100}$	$5\frac{56}{100}$
			Galls.					
19th October, 1927 ..	88	Arsenate of lead, 4 lb. to 80 gals. of water	110	2 45	10 $3\frac{3}{4}$	9 $7\frac{1}{2}$	19 $11\frac{1}{4}$	$2\frac{73}{100}$
6th November, 1927 ..	88	Arsenate of lead, 2½ lb. to 80 gals. of water	72	1 48	6 9	3 $11\frac{1}{4}$	10 $8\frac{1}{4}$	$1\frac{47}{100}$
18th January, 1928 ..	88	Arsenate of lead, 2½ lb. to 80 gals. of water	92	2 20	8 9	4 $0\frac{3}{8}$	12 $9\frac{3}{8}$	$1\frac{74}{100}$
		Totals	274	6 53	25 $9\frac{3}{4}$	17 $7\frac{1}{8}$	43 $4\frac{7}{8}$	$5\frac{93}{100}$

TABLE NO. 2.

SHOWING CODLING MOTH INFESTATION AT TIME OF PICKING.

Treatment.	No. of Trees.	Total Quantity in cases.	Sound.		Unsound.		Codling Moth.		Dead Stings.		Other Causes.	
			No. of Cases.	Per Cent.	No. of Cases.	Per Cent.	No. of Apples.	Per Cent.	No. of Apples.	Per Cent.	No. of Apples.	Per Cent.
Dust ..	88	150	147	98	3	2	74	·7	20	·19	116	1·1
Wet spray	88	193	188	97·36	5	2·64	59	·5	31	·26	219	1·87
Untreated	11	18	16	88·9	2	11·1	92	7·56	6	·49	37	3·05

TABLE NO. 3.

CODLING MOTH INFESTATION DURING WHOLE SEASON, INCLUDING INFESTATION OF WINDFALLS.

Date of Examination.	Check Row.	Dusted Trees.	Wet Sprayed Trees.
12th December, 1927	58	5	9
5th January, 1928	41	4	3
28th January, 1928	18	11	4
28th February, 1928	31	18	8
At time of picking	92	74	59
Totals	240	112	83

TABLE No. 4.

RECORD OF RAINFALL DURING PERIOD OF EXPERIMENT.

Date.	Precipitation. (Points.)	
11 October	35	
13	60	
21	86	
22-24	51	
28	26	
4 November	62	
10	18	
21	100	
26	72	
27	85	
1 December	26	
3	20	
4	34	(Hailstorm.)
5-12	56	
13	25	
14	5	
15	5	
17	6	
19	36	
20	86	
24	6	
27	11	

TABLE No. 4—RECORD OF RAINFALL DURING PERIOD OF EXPERIMENT—*continued.*

Date.	Precipitation. (Points.)	
3 January	7	
6	20	
9	5	
13	7	
14	55	(Heavy storm with hail.)
19	25	
23	61	
24	11	
3 February	10	
4	20	
5	22	
6	80	
8	45	
11	46	
12	10	
13	8	
14	82	
15-17	510	
20	435	
16 March	130	
20	30	
28	48	

EMPIRE INDUSTRIES.

BRITISH CAPITALISTS' QUEST FOR PROFITS FROM FOREIGN TRADING.

The Minister for Agriculture and Stock, Mr. W. Forgan Smith, announced recently that his notice had been called to a statement that appeared in the cable news of the Melbourne "Age" of the 20th March to the effect that the Union Cold Storage Company had entered into a contract for the marketing of all Russia's dairy produce in Great Britain.

Sir Edmund Vestey, one of the directors, had stated that the company had traded satisfactorily with Russia for some time and was now extending to the Soviet a credit of £500,000, as well as 70 per cent. of the value of dairy products as soon as they are shipped. The Soviet would utilise these credits on dairying developments in Siberia and the Urals.

Mr. Forgan Smith added that in the event of the cable being substantially correct it was manifest that the British capitalists are much more interested in the quest for profits from trading than they are in the conservation of the industries within the Empire. The purchase from foreign countries of products that are being raised in abundant supplies within the British Dominions did not seem to be a policy that was likely to advance or cement trade relations between Great Britain and the Dominions. The Imperial Government has set up the Empire Marketing Board in order to foster trade within the Empire, and it appears that efforts in that direction will be abortive of real value until the capitalistic section generally is prepared to give wholehearted support to the objectives of the Board.

It has been the practice of Great Britain to draw largely from Denmark for dairy produce, and the output of butter and cheese during this season, both from New Zealand and Australia, will be quite up to the average in quality and tonnage. Any improved facilities that are now being offered by British capitalists for the intake of dairy supplies from Russia cannot do other than increase the keeenness of the competition amongst sellers on the London market, with the possible result of an unhealthy slump in prices.

The expansion of primary industries in Australia and New Zealand is dependent largely on the prices realised for the resultant products on overseas markets, and in this connection Great Britain is legitimately looked upon as a centre for absorbing a proportion of the increased production. The maintenance of a stable market overseas has also its effect in enabling our primary producers to keep their place on the land, a condition of affairs which is desirable in the interests of the Empire generally as well as of Australasia.

THE BANANA IN QUEENSLAND.

By GEORGE WILLIAMS, Director of Fruit Culture.

Since the publication of the 1919 edition of "The Banana in Queensland," the industry has materially increased in most districts, including the northern part of the State. Unfortunately, the banana weevil borer has similarly extended its ramifications, so that few districts are now free from its presence. Bunchy Top also made its appearance in the Southern district, and has been responsible for serious losses and decreased output in that area. Fortunately, it is confined south of the Maroochy River, so that the main producing centres are not influenced. The Gympie district has shown the greatest advancement, and can reasonably be expected to provide the main supplies for some time to come. The possibility of much expansion in the Northern district exists, but much care is essential in new districts that plants free from disease only are introduced. Though the effect of beetle borer is much minimised under purely tropical conditions, thrips responsible for spoiling the appearance of the fruit are fairly general, and the banana fruit fly is also apt to make its presence felt. The latter can be excluded by netting the bunches with joycenet, and, in suitable soil under generous and regular rainfall, thinning of suckers can be so arranged as to gauge the season of maturity and eliminate fruit maturing during the most unfavourable months of the year—a most important factor which cannot reasonably be applied in the Southern and Central districts. It will be admitted that the recent season's influence has been against the general production of first-quality fruit, but other influences may also be cited. The land selected is not always of the best quality, and the tendency is to plant a larger area than can satisfactorily be worked by the labour available. In many plantations, de-suckering is not practised to the extent which it should be, and the application of fertilisers where required is not general. Various factors may operate against the application of most efficient means in the plantation, among which the extortionate prices or rentals for banana lands is not the least. Just what area of bananas can be satisfactorily worked by one man varies somewhat according to local circumstances, but 5 acres may be accepted as a fair estimate, and his energies restricted to that area will, if intelligently applied, command a better return than if distributed over twice that extent. Where tall-growing varieties are cultivated, the area may be extended, as a much wider space between rows and plants is allowed.

Owing to the possibility of the introduction of further disease, no new varieties have been introduced since the introduction of the Gros Michel, which is reputedly responsible for being accompanied by the beetle borer—though there is ample evidence to suggest that this pest was also introduced amongst the plants occasionally brought from the South Sea Islands by the labourers recruited from those parts. Its existence in the indigenous banana of the North may indicate the possibility of its being indigenous, but an examination of numerous plants in different districts some years since failed to reveal any indications of its presence which, being now freely evidenced, discounts such possibility; as also does the fact of large areas being under cultivation in different parts of the North where the wild banana was present and no trace of the pest was noted.

PLATE 83.—ON A QUEENSLAND PLANTATION, NORTH COAST LINE—CAVENDISH BANANAS AND PINEAPPLES.

Varieties.

Among the varieties commercially grown, Cavendish takes precedence. On account of its dwarf habit it is much less liable to injury by heavy wind, and though its fruit may not carry quite so well as that of the Gros Michel, its advantages in other respects fully compensate for this deficiency, more particularly in the Southern part of the State. It is successfully grown on the coast lands from the Southern border to Cooktown, and the heavy shipments originally made from the North were entirely made up of this variety. The bunches carried up to 30 dozen excellent fruit, which was mainly shipped in the bunch; bunches under 14 dozen were cut into hands and crated and carried by sea satisfactorily. The bunches received a more or less rough handling, and the only occasion for surprise was that the losses were not much greater than recorded.

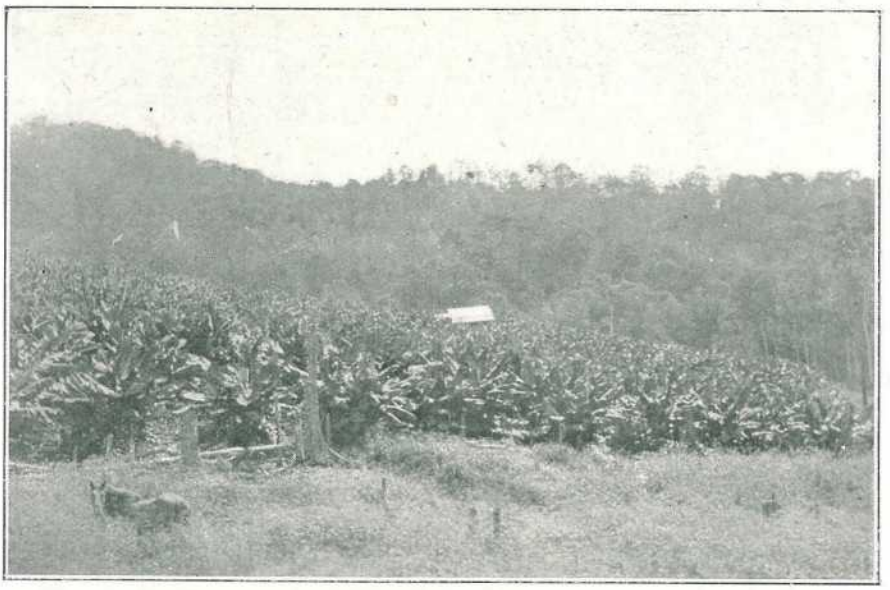

PLATE 84.—BRINGING NEW LAND UNDER TRIBUTE—A BANANA PLANTATION IN QUEENSLAND.

Sugar bananas were also exported from North Queensland in quantity, but invariably cased after being cut into hands, the cases being of 2 bushels capacity. Owing to its liability to the Panama disease this variety, which was at one time largely grown in the South, is now seldom seen, though in odd districts the plants are reported to have continued healthy. The growth being comparatively tall and slender, the foliage was subject to wind injury.

The Lady's Finger, of somewhat similar growth but more robust, is partially resistant to Panama disease and much less liable to affection by frost. It is almost entirely confined to the Brisbane district. The slightly angulated fruit, possessing a piquant flavour, is said not to be favoured in the Southern markets.

The Gros Michel is the tallest grower, attaining under most favourable conditions in North Queensland a height of 30 ft. Plants were some years ago distributed to various banana districts, but the

PLATE 85.—CAVENDISH BANANAS AT WOOGUMPAH, FIVE MONTHS AFTER PLANTING.

variety was recognised as not being well adapted to the Southern division. It luxuriates in the wet belt of the North, and where planted in well-sheltered localities can be expected to be satisfactory. It is claimed that the flavour of the fruit is not equal to that of the Cavendish, but as a marketable product the Gros Michel has the advantage in size.

PLATE 86.—"LADY'S FINGER" BANANAS GROWN AT PINKENBA, NEAR BRISBANE.

The fruit is produced on long bunches with much wider interspaces than those of the Cavendish. It is usually much less curved, which is an advantage in packing under the system now practised. Specimens of this variety recently received from Mr. W. Nott, Kennedy, were 10½ in. in length and 6½ in. in circumference.

Other less-known tall growers are the Dacca and Red Dacca (also called Claret and Ruby). Specimens of Red Dacca from the same grower were 8 in. in length and 7 in. in circumference. A variety also known under various names but principally Mons Marie, really a taller-growing type closely allied to the Cavendish, is included in small quantity. Various claims as to its local origin and superiority in various respects are ill-founded as it has no advantage over the original Cavendish, except in height attained, which is not a desirable one. Several less-known varieties are represented in odd specimens in parts of the State. The Plantains, of which three kinds were available some years since, have practically all gone out of cultivation.

Unfortunately, all our tall-growing varieties are subject to Panama disease—the Lady's Finger being the least susceptible. In districts where thrip is present, a disadvantage with the tall kinds is the difficulty in making application against this pest, which in infested bunches spoils the appearance but does not affect the quality of the fruit. Dusting the bunches in their earliest stages (the bracts being removed to give access) with a mixture of pyrethrum powder and finely sifted wood ashes is successfully applied in Fiji and has also given good results here, but calcium cyanide applied with a bulb duster is said to give equal results. The latter, however, loses its efficacy in less than half the time that the pyrethrum does, and the calcium dust is liable to seriously deteriorate even in air-tight containers when a portion of the contents have been removed. This is a most important detail which must be taken into account by growers who have adopted the use of cyanide dust. On account of its dwarf habit and consequent accessibility, and the fact of its being less subject to injury from heavy winds, the Cavendish variety is recommended for general planting. The Lady's Finger will, however, flourish under conditions which would be fatal to the Cavendish, though it is recognised that to obtain the best results most fertile soils reasonably well drained are indispensable.

Essentials of Success.

The initial and most essential features of successful banana culture are that the site selected is above frost level, that the soil is suitable, and the situation favourable, aspect and shelter being incidental to the latter. In the Southern and parts of the Central district high land is selected, generally of volcanic origin, though rough, stony, fertile ranges are fairly satisfactory. Steep slopes, offering difficulties in collecting the fruit, otherwise suitable, are freely availed of. They, however, present the disadvantage of being unsuitable for other forms of agriculture or horticulture after being deprived of their original fertility by the banana. Shelter is provided by the native timber where this is allowed to remain around the boundaries of plantations; the clearing of large areas is deprecated. One has only to glance at the general appearance of the plants in a sheltered part of an otherwise exposed area to observe the benefit. It is recognised that in a very narrow fringe of scrub growth much of this succumbs, but suitable land in the State is not so restricted that a fair margin of "cover" could not be allowed.

In the Northern district soil conditions are dissimilar. The coastal volcanic hillside soil is mostly of a loose, open nature, not capable of the retention of sufficient moisture, without which bananas will not flourish, and the effect of a dry spell in this class of soil is disastrous. The fertile

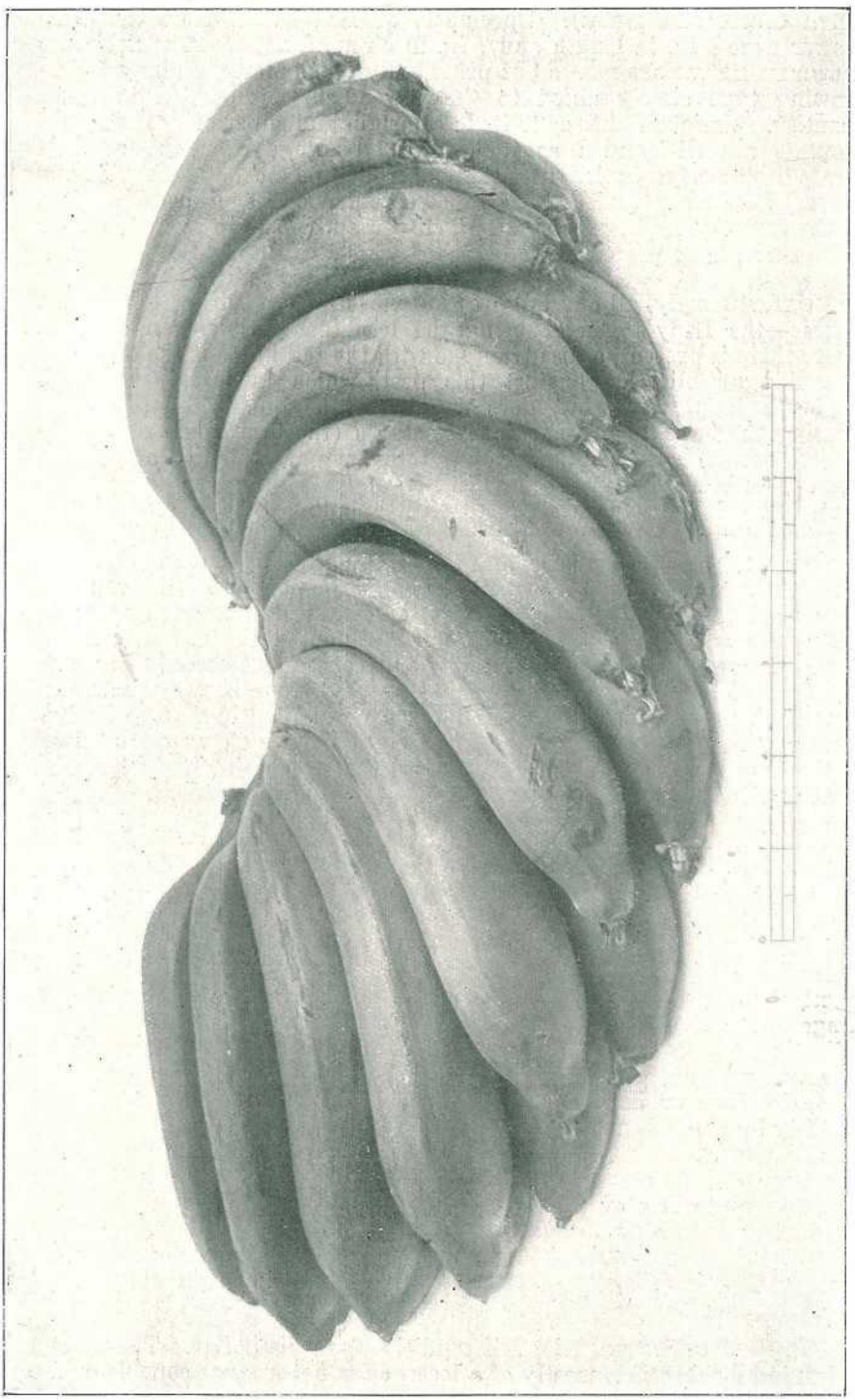

PLATE 87.—CAVENDISH BANANAS—A SPECIMEN HAND.

alluvial lands give very much better results. The growth is even and fairly continuous, and under such conditions de-suckering can be practised to the extent of determining within six to eight weeks when bunches will be in suitable condition for the market. It must, however, be remembered that a fairly accurate gauge as to the time of fruiting can only be applied to suckers in the sword leaf. On first appearances the sucker displays no foliage, subsequently it develops the narrow or sword leaf, and later its full foliage. After the latter stage has been in existence its age cannot readily be determined. The preliminary preparation of scrub lands is confined to merely felling the timber at a suitable time, firing, followed by logging—that is, cutting up the smaller unburnt branches or trunks up to 6, 8, or 10 in. or even larger diameter into suitable lengths and stacked for burning, heavier timber being allowed to remain where it fell. Although what is called a good burn—that is the destruction of a good percentage of the heavy branches in addition to small branches and foliage—is no advantage to the plant but rather the opposite, as to ensure it the surface soil must be in a dry condition and much of its most important ingredient, humus, destroyed. In tropical America the general practise is to first plant the sets or bits and fell the timber afterwards and leave it without burning, but in the dense growth of our vine scrubs this method is not applicable.

Planning and Planting.

Following clearing, marking out land according to distance which rows and plants are to be spaced will be attended to. Much has been written regarding the most profitable distance—one advocate stressed 6 ft. intervals with one follower to each plant; others 9 ft., 10 ft., and 12 ft. The latter distance has found the most favour where the Cavendish is planted, three followers being permitted in the first instance, and these in turn by one each. It should be recognised that a given weight is procurable from an acre, and the object is to attain that weight in the least number of fruit; also that overcrowding in addition to reducing the size of its product tends to materially shorten the profitable life of the plant. With tall-growing varieties, 16-ft. to 18-ft. spaces are favoured, and five to six stems allowed to develop as they take longer in coming into bearing than the Cavendish.

Removing the soil to form a hole of the required size and depth for the reception of the plant butt or part of a butt which is to be planted is the next operation. Diversity of opinion exists regarding the depth of planting which gives the best result, and returns are quoted in support of the various depths advocated, but the influence of soil, drainage, and location, also local conditions, each of which have an important bearing, are generally overlooked, and no hard-and-fast rule can be laid down. The depth of hole must be decided by local factors. In the deep alluvial soils of the Northern district, 18 to 20 in. would not be excessive; in some of the shallower Southern soils 12 in. would be sufficient—dependent on the size of the plant to be received. It would be detrimental to plant deeply where the subsoil is of a close nature, and though bananas could not be expected to give best results under such conditions their inclusion is much too frequent. It is generally accepted that whatever plant is selected—whether suckers, butts, or bits—the base should not be covered by more than 6 in. of soil. The deeper holes are not nearly refilled but are left for the complete filling to be gradually accomplished by other agencies, including the development of the plant. In refilling to whatever depth practised,

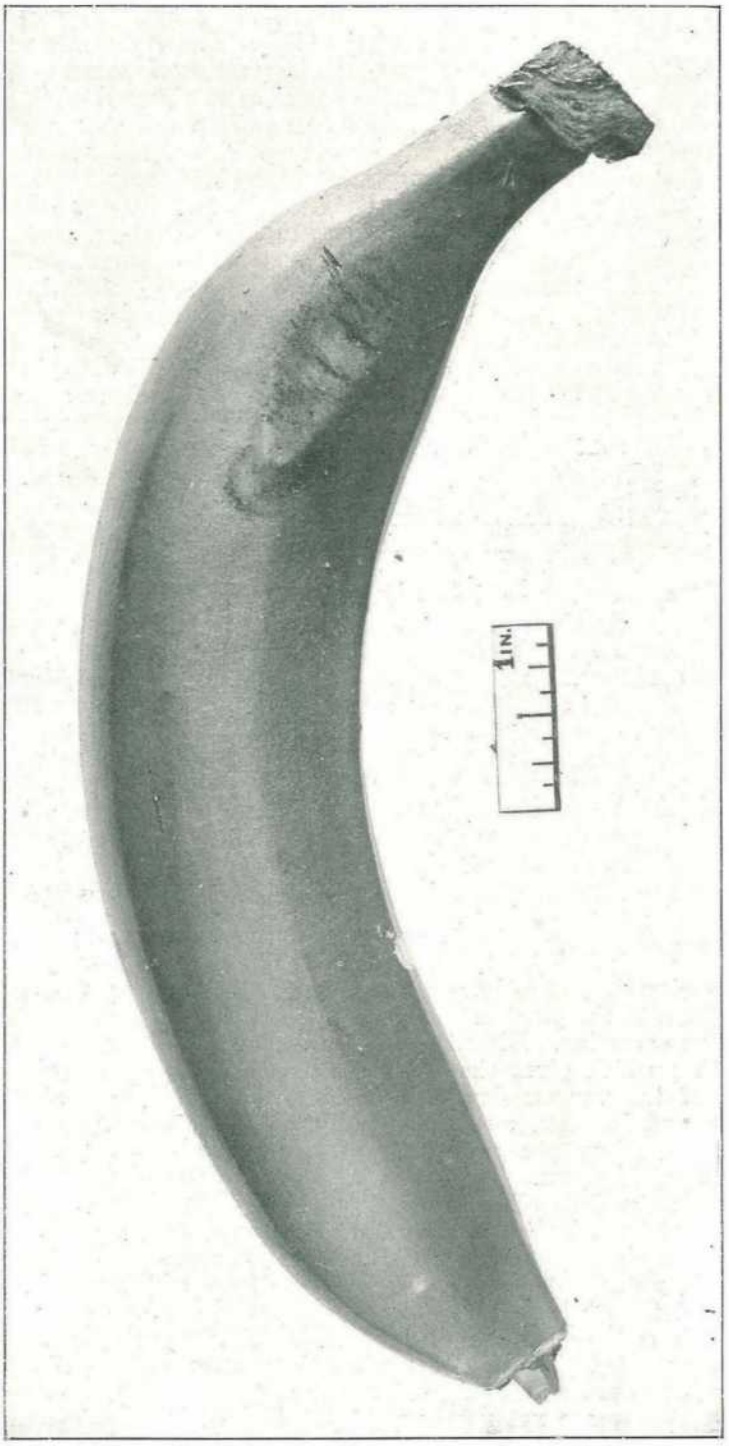

PLATE 88.—THE CAVENDISH BANANA.

instead of utilising the soil which has been removed the general practice is to break down with the mattock the surface soil immediately surrounding the hole, which, in addition to providing friable earth for the young roots to start in, forms a shallow basin which generally assists in the complete refilling being gradually effected. On hillsides or slopes, particularly where the fall is very marked, preparation for the reception of the plant offers more obstacles, but the same principles apply throughout. The most desirable seasons for planting vary according to latitude and rainfall, and, whilst in the Northern district it may be practised during the greater part of the year, it is desirable in Southern banana areas to confine to the early warmer months—some growers averring that planting after the end of December is inadvisable, others consider that the end of February is not too late—but early planting has the advantage of summer rains, which, aided by humidity, very materially assist growth. A result of late planting frequently is that a good hold of the soil is not obtained nor a robust constitution developed before the depressing influences of winter are felt.

Plants.

In tropical America planting is confined almost entirely to sections of butts called "bits"; in this State suckers (young offshoots) are almost entirely used, mainly on account of their availability and convenience for transport. Butts are rarely used. Almost every banana grower is acquainted with the most suitable type of suckers for planting, but the generality of planters are not, and are obliged to rely upon what is available. Size is not such an important feature as vigour, which is indicated in the diameter of the sucker and its length. A short tapered shape in young ones which have not developed foliage is most desirable. When the first leaves, which are very narrow in comparison with their length (hence are known as sword leaves, have developed, practically the same shape of sucker should be maintained. In the later stage, when the developed foliage is shown, the pseudo stem should be enlarged to correspond with the butt. In the first stages of full foliage, should suckers in this stage be utilised for planting, the stem should be cut off well below the foliage. If used at a further stage of development, the stem should be removed close to its base, and the centre gouged out sufficiently to prevent further growth from that source. The butt will be found to contain several more or less developed buds or eyes distributed over its surface, and two or three of these situated as near equidistant around the butt as possible are selected to remain, the others each having their "eye" gouged out to prevent growth other than from where it is intended to originate. The advantages of butts are that two or three (according to "eyes" permitted to develop) first bunches of good quality will be produced against a single bunch of generally second quality from a sucker; also the followers (the suckers which in time show up) are more readily controlled. The disadvantages are, difficulty of procuration and transportation, preparing and planting, and in districts where borer is present the impossibility of reasonably detecting its presence. The system of planting bits, wedge-shaped sections cut from a fairly well developed corm or butt each part containing one or more eyes, has more to commend it. Cutting the corm or butt into sections offers the greatest facility for determining whether beetle borer infestation is present. Whichever method is adopted either by planting butts, bits, or suckers, the greatest care is necessary to ensure the borer not being introduced with the plants, which should be unpacked and carefully prepared at some distance

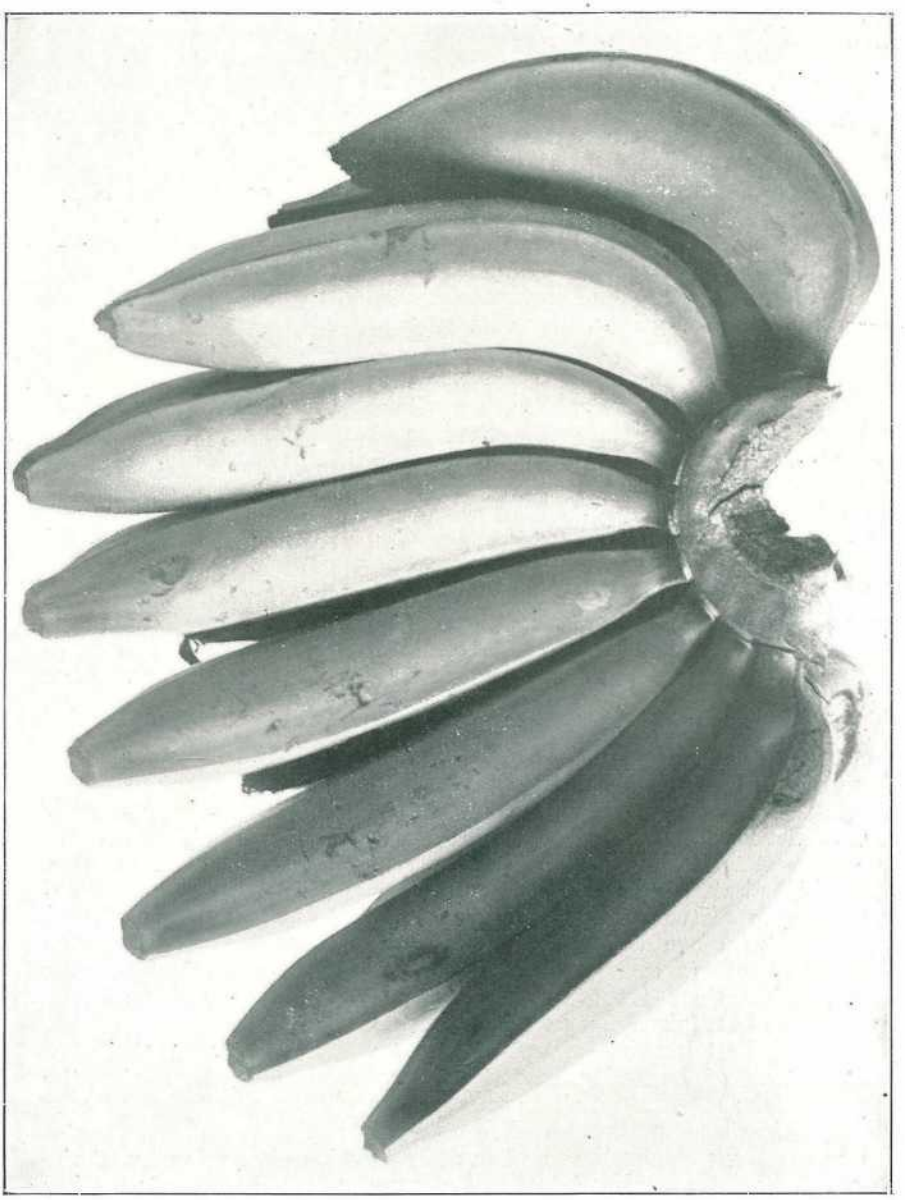

PLATE 89.—GROS MICHEL BANANAS GROWN BY W. NOTT, KENNEDY, NORTH QUEENSLAND.

from where it is intended they are to be planted. The material in which they are contained should be immediately burned following unpacking, which receives first attention on arrival.

Each plant should be carefully trimmed, roots cut close in to their bases, and the removal of all superfluous parts systematically performed; the removal of the lower extremity of the base of a sucker is often desirable, and the light paring of the external covering of the remaining part of the base advantageous. The immersion of plants for two hours in a solution of 1 oz. of corrosive sublimate in 6 gallons of water before planting has been recommended, and much could be said in its favour. Against thrips, immersion in a solution of tobacco sulphate has also been practised, yet by far the safest practice is to procure plants from a district free from such pests. But this does not remove the occasion of the trimming of plants to obviate the introduction of nematodes, an insidious pest working in and destroying the roots of plants and established more or less throughout the State, in respect of which the following extract by Henry Tryon from the 1919 edition is worth including:—

"This account of the disease as being due to the attacks of a parasite nematode, named *Heterodera radicola,* shows further that it is identical in origin and nature to a plant affection of very wide occurrence in the vegetable kingdom. This, Dr. A. B. Frank informed us already in 1896, as the outcome of his own observations and those of other inquiries, affected fifty different plant-species distributed in no less than thirty families—a statement that, as we now know, does not cover the full range of its distribution. According to this, the literature that has a bearing on the banana disease under consideration is very comprehensive indeed.

"The subject of the nature and cause of the disease is as fully treated of as is necessary for the purpose of this Bulletin; but it may be added that its virulence is not dependent on the number of nematodes attacking the root system so much as on the occurrence of such soil conditions as may contribute to the decay of parts already infested, and exhibiting the structural injuries that they are wont to determine, as fall to the well-being of the various organisms that promote this decay.

"Again, it may be remarked also that the parasite persists for a considerable period in the soil, during which it lives a free life or may remain there dormant in the egg; and that, in consequence of this, it can be disseminated by any agency by which soil or its particles are transferable—e.g., by flood water, horse implements, &c., and even occasionally by the wind.

"It may, too—as we have seen—establish itself in the root systems of many different plants, both weeds as well as cultivated ones; and hence not only can it be conveyed from spot to spot by their agency, but these various plant hosts offer the opportunity for its multiplication. Commonly, plots of bananas grown in Southern Queensland become infested with nematode gall worms by planting in land they occupy seedling tomato or tobacco plants already harbouring them. Accordingly, it is important that the agriculturist should study to recognise this disease in all plants liable to its attack, even in the earliest phases in which it betrays its presence in them.

"Again, banana plants become affected by it through being planted in soil in which nematode worms are already prevalent through having grown plants victimised also by this 'Root Gall.'

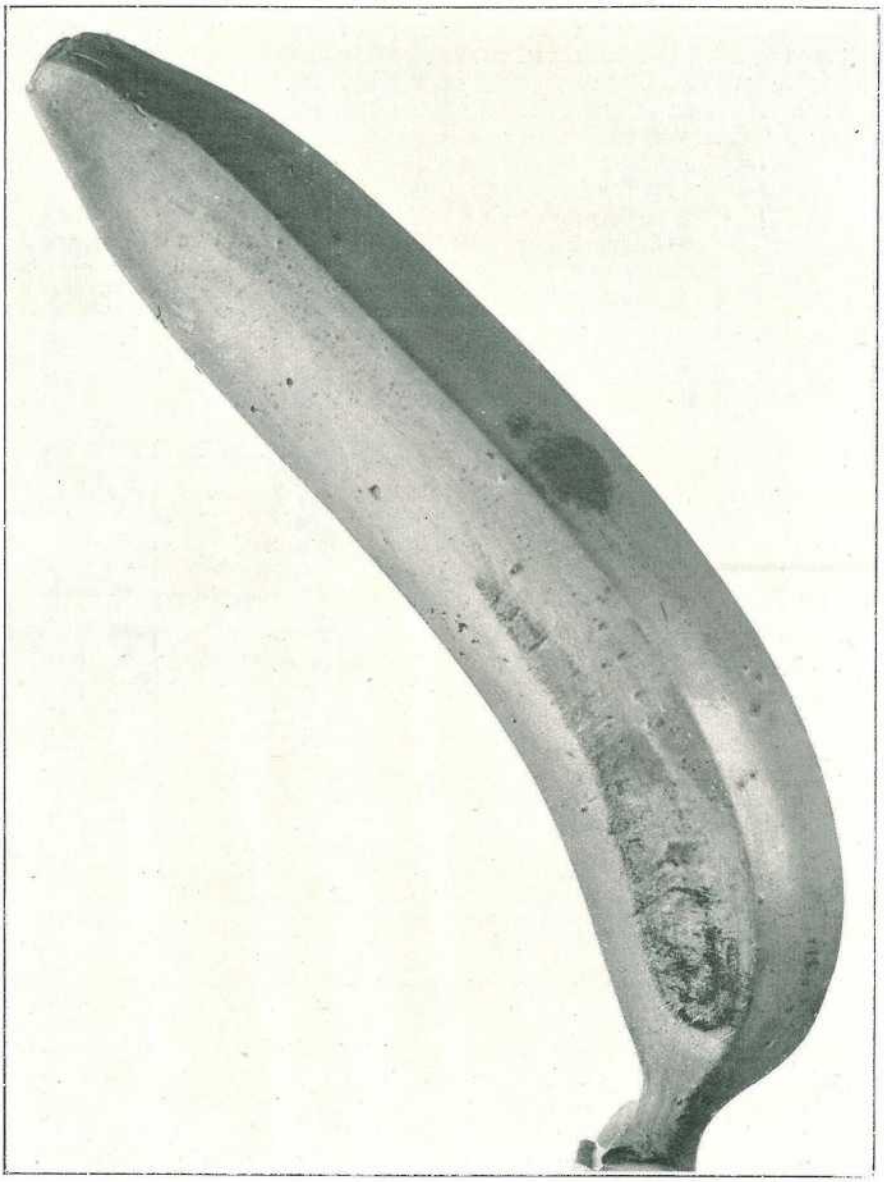

PLATE 90.—A SPECIMEN GROS MICHEL BANANA (10¼ in. x 6½ in.) GROWN BY W. NOTT, KENNEDY, NORTH QUEENSLAND.

"REMEDIES.

"With regard to the question of remedies, it may be pointed out that the nature of the malady is such that, as is obvious, direct applications to the plant will be of no avail. Nematode-affected plants sooner or later die, even though in dying they may yield fruit, and when they do not die, ill-health soon renders them unremunerative.

"As to treating the soil in order to rid it of root-destroying nematodes already present therein, measures that are available are not practicable under the circumstances of banana plantation in Queensland, and perhaps of those elsewhere also; and even so, were the cost connected with them not too excessive to admit of their application. These measures consist in sterilising with steam or high temperatures otherwise attained, or by the use of chemicals—themselves harmless to the soil. When the nematodes are prevalent in the soil, their number may doubtless be reduced to harmless proportions by the use of trap crops. This method involves planting some crop that the nematodes are specially partial to, and therefore will soon infest, and removing this carefully with its root system entire, before sufficient time has elapsed for mature eggs to arise, and these or the young worms issuing therefrom to gain access to the soil, and on such extirpation being perfected, introducing the cultivation of the plant to be raised.

"[*Note.*—From experiments conducted by Strubell in connection with the allied gall-worm of the Beet Root (*Heterodera schachtii*), this degree of development will take place in as short a period as five weeks.] This costly method has been found practicable and efficacious in dealing with so valuable a crop as the Sugar Beet. In practice the use of the trap crops has to be repeated several times, and the soil, in the intervals of successive planting, kept well tilled and free from weeds.

"It is, however, essential to adopt every means that can be suggested for excluding the parasitic nematode from land as yet 'clean,' and to especially provide that suckers employed to establish the banana plantation are quite free from disease and have been derived from plants that are themselves similarly healthy; but, since the detection of the disease is not always readily effected, this is a matter of no small difficulty.

"In Egypt, attention has been concentrated on procuring a banana that, whilst possessing the high qualities of the Cavendish variety, is highly resistant to nematode attack. Some success has already, it is stated, followed efforts in this direction; but these have not, in our opinion, so far produced results of any material value."

With the exception of isolated districts, the presence of beetle borer in varying degree is noted, and no practical means have been found for its eradication. Control to a great extent may be applied by dusting freshly cut surfaces of corms with Paris green and flour, or a mixture of Paris green and borax, and the labour entailed in providing and maintaining a supply of fresh baits is well expended. De-suckering is practised throughout the season when beetles are most active, and the cut surfaces of suckers offer a ready medium of applying the poison. Though the beetle was considered incapable of flight, late events have demonstrated its ability to cover long distances. Where its presence in isolated stools or plots is noted in otherwise clean plantations, digging out and burning all stools suspected of being infested should receive immediate attention and poisoned baits liberally applied in the vicinity.

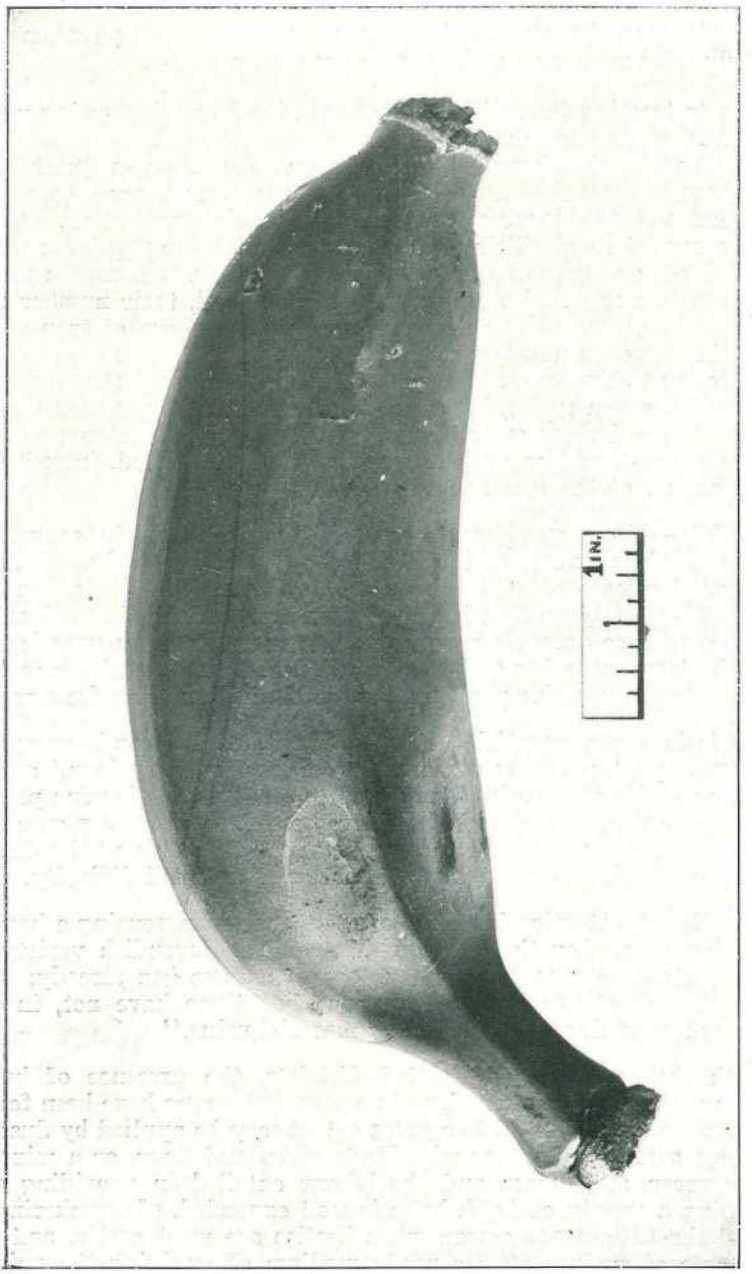

PLATE 91.—THE "LADY'S FINGER" BANANA.

Spacing.

The distances to be allowed between plants of the Cavendish variety has been a contentious subject, one literary grower persistently advocating 6 ft. as being quite sufficient for the Cavendish variety, each original plant being allowed one follower. For most obvious reasons the idea never caught on, 12 ft. being generally accepted with 9 ft. and 10 ft. in some localities. In good soil favourably situated, 12 ft. is considered a good average distance. This admits of the development of three stalks, each with one follower, which has been found more economical than lesser spaces where two or one follower only had room for development. Overcrowding in any sense is reflected in the size of the fruit.

Given fair conditions with the soil firmly trodden immediately around it, the young banana plant will require but little attention for some time, but weed growth will often be sufficient to warrant regular attention. Weed crops vary according to soils and districts, but all are treated alike and removed in the earliest stage possible. In isolated localities the introduction of new weeds, or rather permitting them to seed when introduced, requires attention. During continued wet weather keeping plantations reasonably clean, particularly where weed growth has secured a good preliminary hold, is practically impossible. On hillsides where the soil is liable to wash, the chipping of weeds is often undesirable, but planting the interspaces with cow-pea prior to the wet season will go a long way toward smothering the average weed, whilst serving the purpose of holding the land against wash. Two rows between each row of bananas will form a useful cover. Beans have been recommended, but their volubile habit entails much time in removing them where ascending the plants. Where land is most liable to erosion, and particularly where interspaced with stone, spraying to destroy weeds may be preferable to chipping. A satisfactory weedicide is obtainable on the Brisbane market at a reasonable rate, but, for the benefit of those who prefer making their own, the following formula may be given:—$\frac{3}{4}$ lb. of arsenic, 2 oz. of caustic soda boiled in 4 gallons of water. The addition of $\frac{1}{4}$ to $\frac{1}{2}$ lb. of soap will assist adhesion, and is essential in dealing with several forms of glossy foliage. Care should be taken that the fumes are not inhaled in boiling. Beyond weeding little can be done in a young plantation, particularly where situated in new scrub land, and intercropping is seldom practised, and, where given effect to, due regard should be given to the fact that the nutritive properties of the soil absorbed in the process are only lent and should be returned with interest. Beans, peas, and dwarf vegetables may be included, but planting tomatoes amongst bananas is at all times deprecated.

Cultivation.

Regarding cultivation of the soil in banana plantations, most of this must be done by hand; more often it is left undone. The land is frequently cropped until no longer profitable, and the old stools allowed to remain to breed and disseminate disease, if present. Where cultivation is possible it should be practised, and fertiliser as required to maintain the output worked into the soil. The energy required may be laborious but is profitable, and a light hoe-fork, where horse implements cannot be used, is the most suitable tool for the job. During winter months it will be found that the majority of banana roots are practically

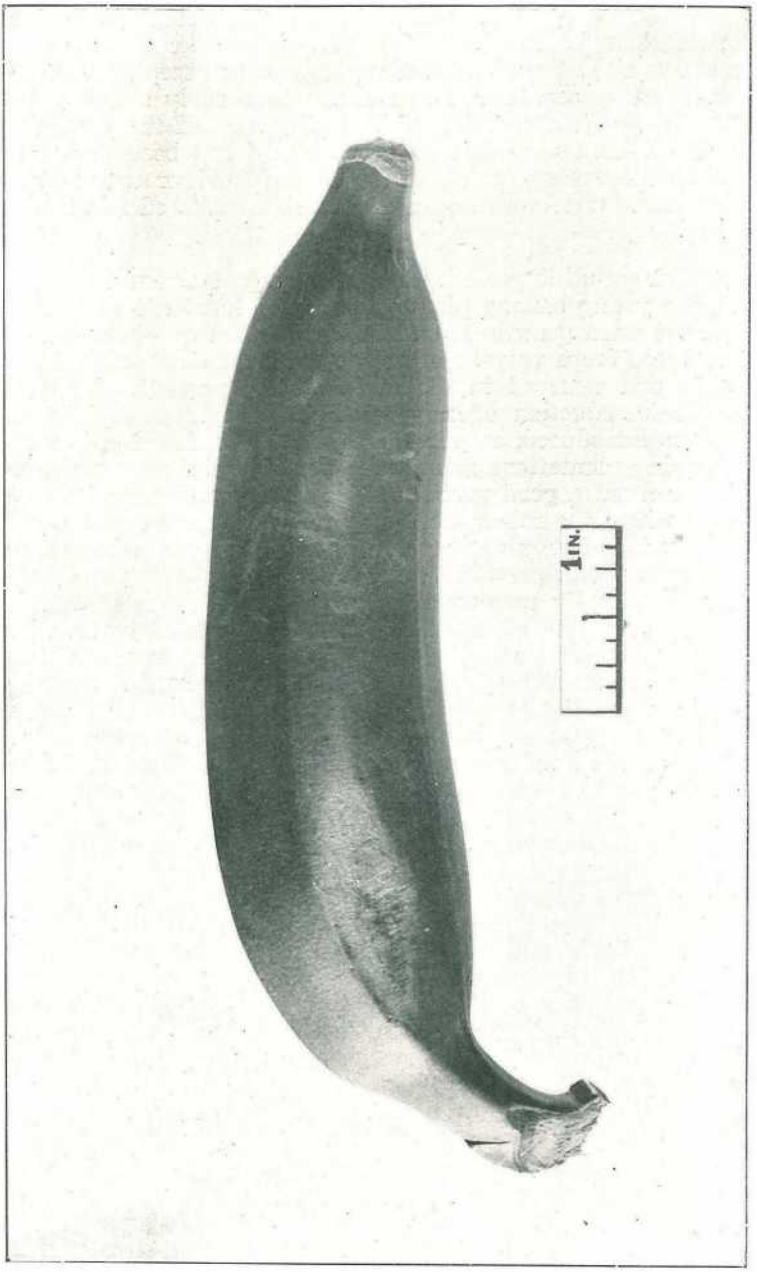

PLATE 92.—THE SUGAR BANANA.

dead or useless for absorbing sustenance, consequently working the land at this season will have no appreciable detrimental effect on the plant but the benefit evidenced in the spring growth most pronounced. The question of subsoiling by explosives for bananas is favoured, and where judiciously carried out during the drier winter months, also where charges have been exploded where plants are to be placed, has shown excellent results. Though the plant is usually looked upon as a surface rooter, given reasonable facility, roots will be found several feet beneath the surface, hence the reason for the finest Northern fruit being produced on a deep, free loam.

Following the growth of the original sucker—the feature no less noticeable in butts or bits—as it develops young suckers will in turn appear around its base, and the advocate of any system of de-suckering is sure to meet opposition even to the extent of advocacy of allowing all such to develop. A prevalent idea is that no suckers should be removed from the original plant until this has produced a bunch. Under some conditions this may be applicable, but the removal of the surplus is admittedly desirable if it could be effected without root injury. This raises the question of the most suitable tool for the purpose; the mattock, crowbar with a special bend for the purpose, grafting or draining tool, each has advocates, also the narrow gouge made under local patent. This is practically identical with the tool in use in the principal plantations in other parts of the world and is considered superior to anything else that can be applied. Desuckering should be effected in early stages, and cutting out the sucker with a wide blade severs the roots at a time when their whole energies are required for the sustenance and development of the productive plant. Injury to the main plant's base is cited against applying the method in the first instance, but the fact that the growth of the banana is from the interior and not the external layers minimises the possibility of effect of light external injury other than that applied to the roots.

Fertilising.

As would be expected from plants yielding such heavy crops, there is a constant drain on the fertility of the soil, and no matter how freely this may be present in the natural state, the effect of gradual depletion will be exhibited by the plant and also in its fruit as the process proceeds. A rather general belief is that fertilising need not be resorted to until the plants indicate its requirements, but this is false economy. Upon the maintenance of fertility, which includes humus, the life of a plantation under fair conditions much depends. The fertilisers recommended by the Agricultural Chemist (Mr. J. C. Brünnich) are as follow:—

"The humus content of the soil must be kept up by mulching with green manure crop, leaf mould, stable manure, &c., and any acidity in the soil must be overcome by liming with lime in the form of carbonate of lime, as limestone, shell sand, limestone screenings, &c.

"Even on exhausted soil, as long as the soil is in good physical condition and contains humus, bananas may be successfully grown by the aid of artificial fertilisers, applying from 5 lb. to 10 lb. of complete mixed fertiliser, 4-8-10, to each stool twice a year.

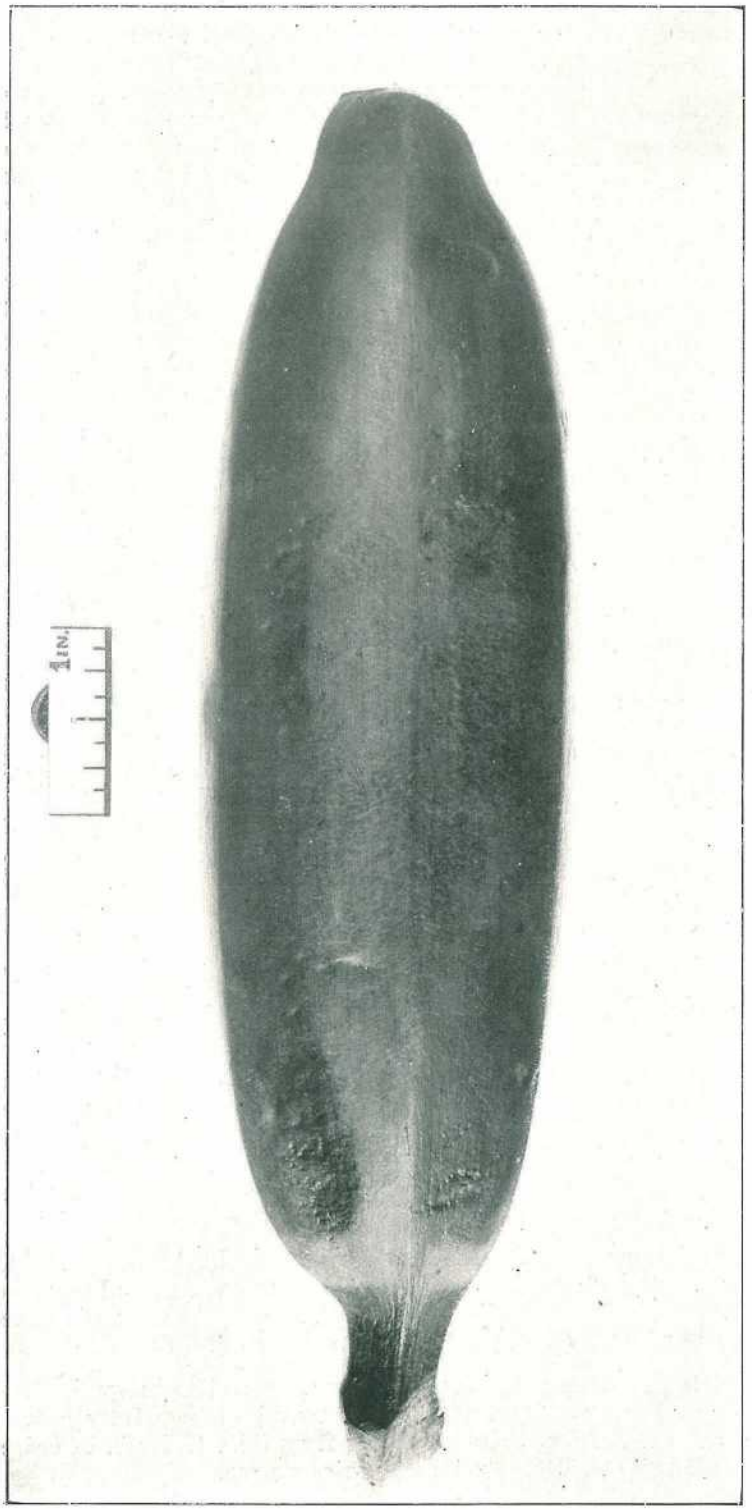

PLATE 93.—THE DACCA BANANA.

"The following mixtures will be found beneficial and will pay the grower by better returns of large bunches:—Use per acre—

Nitrate of soda, 2 to 3 cwt.;
Nauru phosphate and superphosphate mixed, 3 to 4 cwt.;
Sulphate of potash, 2 to 3 cwt.;

higher or lower amount according to age and quality of soil; or

Nitrate of soda, 2 cwt.;
Superphosphate, 1½ cwt.;
Sulphate of potash, 2 cwt; or
Dried blood, 2 cwt.;
Nauru phosphate and superphosphate mixed, 3 cwt.;
Sulphate of potash, 2 cwt.

"The artificial manure to be applied in two dressings—one towards the end of the summer, at the end of rainy season, and the other at the end of winter. Some soils contain a very small amount of salt, and in that case bananas will benefit by a slight dressing of common salt, up to 1 cwt. per acre, or by using muriate of potash in place of sulphate of potash."

Experiments conducted by the ex-Director of Fruit Culture in conjunction with the Agricultural Chemist at Buderim forcibly illustrated the practicability of bringing what were considered worn-out banana land to a stage of production equalled by its original cropping, but as much of our banana lands does not admit of applying the necessary cultivation and subsoiling, other means would be necessary where it was considered desirable to allow for future replanting. The advantages of a dense growth of lantana for reviving soil are well recognised, and though the process may be slow it is certainly effective. In the Mount Cotton district, an old cultivated area was abandoned to lantana for some years during which it grew profusely. More recently it was again put under bananas and has yielded most satisfactory returns. Adjoining scrub lands of similar formation, felled and planted for the first time failed to give equal results, though various fertilising formulæ have been applied to different small sections. For more rapid growth, and in many soils, probably equal effect would be obtained by planting the tree of Indian pea, though it would be necessary to keep the young plants reasonably free from weeds during the first few months.

Pests and Diseases.

Unfortunately, introduced pests and diseases have very materially added to the labour and trouble in banana culture, and the advantages of the maintenance of vigour in the plants is evidenced in respect of beetle borer in the North where the growth is fairly continuous and damage occasioned by the pests comparatively light. In the Southern district, abandoned plantations serve as a breeding ground, rendering the possibility of control much more difficult than if eradication of such was general. Fortunately, bunchy-top has been confined to the south of the Maroochy River, and its elimination, now that the origin of dissemination has been discovered, is a reasonable proposition. The information contained in the pamphlet on bunchy-top should be studied by every banana grower, so that he may recognise the disease on first appearance and promptly eradicate it. In parts of the Northern and a small area in the Southern district, thrips are responsible for causing injury resulting in the appearance of the fruit to the extent,

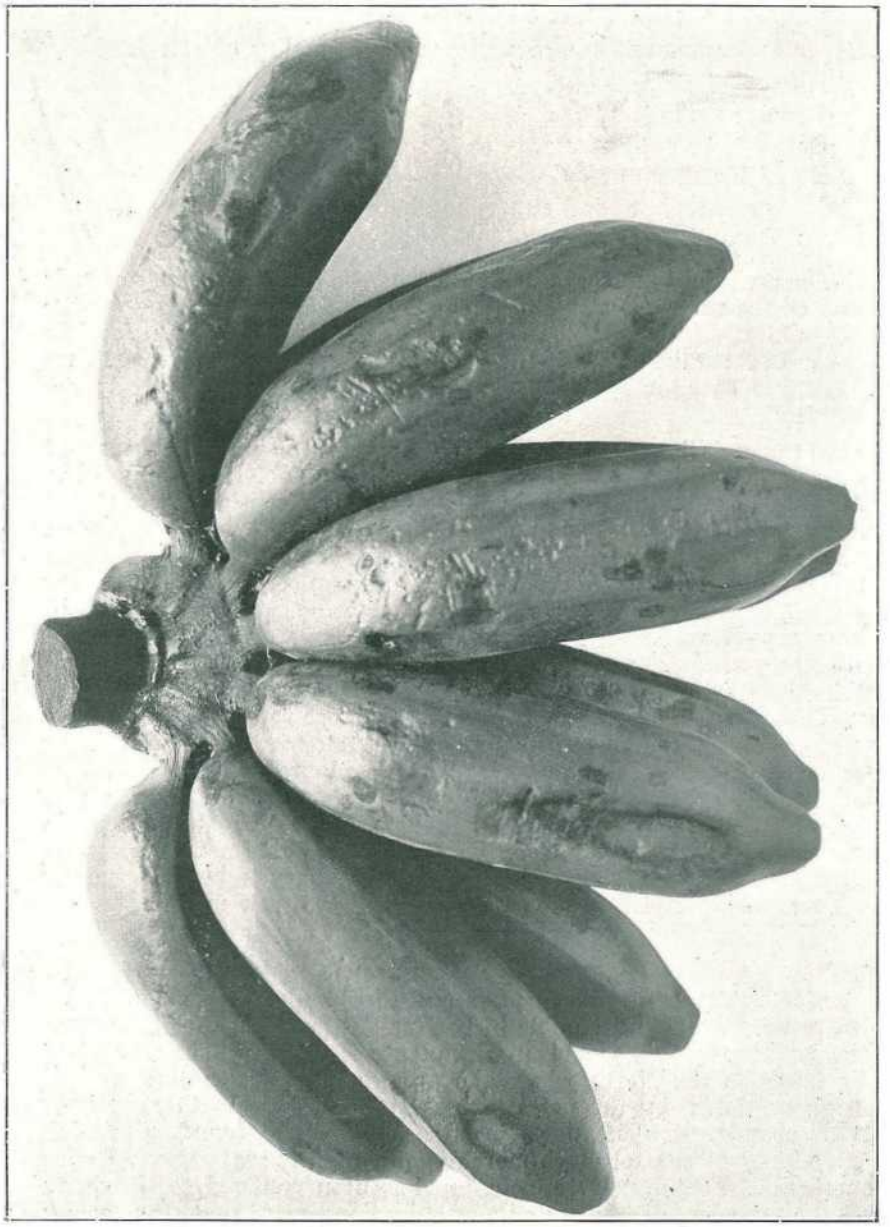

PLATE 94.—COPPER OR RED DACCA BANANAS (8 in. x 7 in. circumference) GROWN BY W. NOTT, KENNEDY, NORTH QUEENSLAND.

by discoloration, of its being practically unsaleable. This minute insect attacks the fruit in the earliest stages; the result, a browning of the skin, varying from slight indications between the fingers to the whole exterior of the fruit developing later. Various applications have been made to keep it in subjection, and in the North notings are being made as to whether its presence is general or seasonable. In Fiji, where the banana trade was a big item, a mixture of finely powdered wood ashes and pyrethrum powder was regularly blown by a hand duster amongst the young fruit, the bracts being removed for the purpose. Satisfactory results followed this method in Central Queensland. Calcium cyanide has been recommended, and a fair test under exactly the same conditions is being conducted.

What is widely known as leaf spot has, by a Fijian authority, been classified as identical with the Sigatoke disease, but a local authoritative pronouncement is awaited before accepting the identification as complete. Where disease is present it must receive attention; where apathy is shown it will attain the upper hand. The collecting, handling, and packing fruit are details to which most particular care and attention should be applied. Just at what stage to cut the bunch from the plant at the different seasons can only be determined by experience and observation, but the longer it is allowed to remain, consistent with reaching its destination in suitable condition, the better. It will be recognised that, during the cooler months, a much further stage of advancement can be allowed than under warmer conditions; accuracy can best be gauged by carefully noting the prominence in angles of the fruit, which become less noticeable as growth and development advance. The condition of heat and humidity (or its absence) prevailing during the growth of fruit also exercises influence on its keeping qualities.

Being of a soft nature with a particularly sensitive exterior, careful handling of the fruit in removing and transporting the bunch is most essential, also in the subsequent handling, though it is less subject to injury after being cut for twenty-four hours—particularly where dehanded—than at the time of immediately following the gathering. The market requirements of the Southern States are stated to be better met by fruit packed in 1½ bushel cases, either singly or in twos or threes, than by packing in hands or parts of hands, or in individual bunches. Whether the two former are the most efficient means of landing fruit in the best condition is disputed in favour of the third; but given suitable transport facilities, the bunch is the most effective method. Where any doubt exists as to the keeping quality of the fruit on the bunch it can readily be removed by partially disconnecting by bending several odd fruit on a bunch so that the fibres only retain them, and awaiting result. A straw wrapper, samples of which have been submitted by Mr. Skerman, is calculated to avoid much damage that would otherwise be inflicted on bunch shipments, but the disadvantage of rough roads and other difficulties encumber the adoption of bunch transport for the present.

Summary of Essentials.

The essentials to successful banana culture are:—Suitable soil in a sheltered situation free from frost, healthy suckers (or bits) for planting, that these be properly planted and that the necessary attention in weeding, working (where practicable), and especially desuckering be applied throughout the plantation. A most important recommendation is not to plant a larger area than can be efficiently worked.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1928 AND 1927, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Mar.	No. of Years' Records.	Mar., 1928.	Mar., 1927.		Mar.	No. of Years' Records.	Mar., 1928.	Mar., 1927.
North Coast.					*South Coast*—continued:				
	In.		In.	In.		In.		In.	In.
Atherton	9·08	26	7·69	6·48	Nambour	9·32	31	3·58	18·24
Cairns	18·06	45	21·83	9·72	Nanango	3·35	45	0·50	7·94
Cardwell	16·25	55	9·76	8·21	Rockhampton ...	4·71	40	2·92	5·66
Cooktown	15·37	51	24·78	8·12	Woodford ...	8·01	40	2·34	16·46
Herberton	8·17	40	6·72	6·27					
Ingham	15·78	35	6·89	8·59	*Darling Downs.*				
Innisfail	26·33	46	34·50	20·08					
Mossman	18·07	14	15·47	10·37	Dalby	2·73	57	1·28	4·85
Townsville	7·61	56	7·16	3·03	Emu Vale ...	2·45	31	1·56	3·82
					Jimbour	2·54	39	1·11	6·40
Central Coast.					Miles	2·67	42	0·39	5·85
					Stanthorpe ...	2·69	54	1·86	3·24
Ayr	6·77	40	5·84	3·48	Toowoomba ...	3·83	55	1·61	5·20
Bowen	5·71	56	14·36	3·39	Warwick	2·58	62	1·19	2·05
Charters Towers ...	3·65	45	12·15	4·35					
Mackay	12·11	56	23·19	18·44					
Proserpine	11·92	24	17·13	23·00					
St. Lawrence ...	5·67	56	4·77	2·22	*Maranoa.*				
					Roma	2·73	53	0·78	1·06
South Coast.									
Biggenden	3·93	28	1·78	8·24					
Bundaberg	5·33	44	0·74	9·26	*State Farms, &c.*				
Brisbane	5·73	77	2·14	7·88					
Caboolture	7·65	40	2·44	14·21	Bungeworgorai ...	1·68	12	0·76	1·54
Childers	4·74	32	2·07	6·88	Gatton College ...	3·33	27	1·44	2·88
Crohamhurst ...	11·74	35	3·15	22·78	Gindie	2·61	27	1·95	6·51
Esk	4·86	40	2·63	7·08	Hermitage ...	2·33	20	0·88	2·56
Gayndah	3·17	56	0·22	4·45	Kairi	8·66	12	10·16	4·75
Gympie	6·21	57	2·13	17·01	Sugar Experiment Station, Mackay	11·08	29	22·52	14·53
Kilkivan	3·90	48	1·37	11·29					
Maryborough ...	6·19	55	2·79	7·75	Warren	2·63	12	...	3·60

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for March this year, and for the same period of 1927, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
Divisional Meteorologist.

FRUIT AND VEGETABLES.

"*The Fruit and Vegetables Act of* 1927," which was passed last session, came into force on the 5th April, 1928, and Regulations have been issued under the Act.

These Regulations are similar to those issued under the Fruit Cases Acts, which this Act supersedes, with such alterations as have been found necessary. They prescribe standards for the cases to be used and grade standards for pineapples, grapefruit, tomatoes, apples, pears, bananas, oranges, and mandarins, and also make special provision for fruit intended for factory use. Maturity standards have also been prescribed, and these must be complied with before fruit is offered for sale.

PASTURE NOURISHMENT.

By providing grasses and other pasture plants with food in the shape of fertilisers, the quality of the herbage is greatly improved. The use of superphosphate stimulates the growth and seed production of legumes, which are extremely valuable plants in a pasture. The amount of mineral matter in the grasses and clovers is also increased, particularly the elements lime and phosphorus, which are essential for the animals' health and development. Where there is a marked increase in the lime content, the percentage of nitrogen present in the pasturage is also increased.

The main reasons, therefore, why sheep prefer top-dressed to unmanured portions of a paddock are that—

1. The percentage of mineral ingredients is higher in the former, and the animals' needs for such substances as lime and phosphorus are being supplied.

2. The top-dressed pasture is more palatable and contains a greater amount of protein, due mainly (*a*) to the increased growth of clovers, (*b*) to the increased percentage of nitrogen present in the pasturage as a whole.

An ample supply of protein is most important, as this is the chief supply of nitrogen available to the animal. Protein is required for the production of flesh, blood, muscles, tendons, ligaments, brain matter, wool, horns, hoofs, &c. Young growing animals, females producing and rearing young, and animals being prepared for mating, require feed which is well supplied with protein, in order that they may function properly. The amount of fertility removed from the soil by sheep grazing on pastures corresponds to the quantity of the marketed product, whether it be wool or mutton, or both, and to make up for this withdrawal, the material should be returned to the soil in some other form.

It will be seen, therefore, that by nourishing the pastures through the application of fertilisers, not only is the quantity of feed increased but a considerable gain in the nutritive value of the plants takes place. The universal use of superphosphate as a top-dressing for pastures is mainly due to the following facts:—

1. It stimulates the growth of leguminous plants, such as clovers, which are particularly relished by stock on account of their palatibility and high feeding value.

2. It encourages the growth of most of our palatable introduced grasses, and also many of our rapid-growing, nutritious native species.

3. It is an economical fertiliser to use, and the residual effect is apparent for more than one season.

Top-dressed pastures remain greener and consequently are more palatable to stock than unmanured areas, and by not drying out readily the danger from bush fires is lessened.

MORE HINTS FOR THE SMALL SHEEP MAN.

Reference was made in these notes recently to the operation of sheep classing and its importance to the owner of even the smallest flock. It was pointed out that in every flock there is room for improvement, and on account of the casual methods by which many of them are built up the need in the case of the small flock is usually particularly great. It was recommended that every sheep owner should periodically class his ewes at least to the extent of culling out all the low-grade animals, and some general directions were given as to the lines on which selection should be practised by the small flock owner from both the fat lamb and wool production points of view.

Culling.—When breeding for wool, states the Sheep and Wool Expert of the Department of Agriculture in the article quoted, the proportion to be culled will depend on the evenness of the foundation flock, and how drastic the owner is prepared to be. After the first culling, there will not be so many to remove from the original lot of ewes, although it will be advisable to examine the flock each year, as some animals may deteriorate quickly. As soon as the teeth become faulty it is well to cull such sheep out on account of age—"cast for age" as it is termed. The class of country and the amount of risk the owner is prepared to run if a dry season follows will decide at what stage it is wise to cull for age. Under dry conditions the aged ewes, especially if in lamb, are naturally the first to feel the pinch.

Each year the ewe hoggets will come up for inspection, and here judgment is required. On numbers of station properties, as high as 33 per cent. of the ewe hoggets are culled each year. This keeps the flock at a high standard and allows for a percentage of the cull hoggets to be fairly attractive and worth good prices in the

market as breeders. When classing, the fact that the ewes are rearing lambs must be considered, as ewes with lambs at foot cannot be expected to be in the pink of condition; they should not, therefore, be culled because of lack of condition alone. If hoggets have encountered severe conditions after being weaned they may not be well grown, and it may be advisable to hold them over till a later period before passing judgment upon them.

When culled for any reason except for age, a distinguishing mark should be put in the plain ear so that they can be easily recognised in the yards, and on no account should they be bred from, as their faults are likely to be intensified in the progeny. The wisest plan is to try to fatten all the culls and dispose of them to the butcher at the earliest opportunity.

Comebacks and Crossbreds.—In a flock of comebacks, if breeding for wool, care should be taken that the size of frame necessary in a sheep of this type is not sacrificed to the production of a superfine class of wool. If the comeback flock is used for lamb raising, roominess of frame, milk production capacity, and early maturity must be specially considered.

These remarks concerning frame and conformation apply equally to a crossbred as to a comeback flock, though to a lesser degree. The main consideration in regard to the wool is to make the flock as even as possible, and because of the greater value attaching to the finer classes of crossbred wool, it is advisable to cull the coarser-woolled animals with the object of getting a flock that will cut a fairly even clip of medium to fine crossbred wool.

The Ram.—In selecting the ram for wool-growing purposes, the small flock owner is advised to go to some reputable breeder where he can be sure of procuring a pure-bred animal. If he is satisfied with his purchase—satisfied that improvement is being made in his flock by the introduction of this particular type—he should continue to use the same strain, as he will not get such even results if he buys from different studs even though the animals are apparently similar in shape, class of wool, &c. When buying a ram, or rams, it is well to have in mind the type of the ewes that it is intended to breed from, especially any faults or weaknesses they possess, for these may be corrected in the progeny by the judicious selection of a ram strong in those points in which the ewes are weak. For example, if the ewes are lacking in density, a ram with plenty of density should be selected.—Agricultural and Pastoral Notes, New South Wales Department of Agriculture.

QUEENSLAND SHOW DATES.

The following show dates have been listed by the Queensland Chamber of Agricultural Societies for the present year:—

MAY.	
Beaudesert	2-5
Taroom	2
Maleny	2-3
Longreach	2-3
Kalbar	2
Charleville	2-3
Wondai	3-5
Oakey	4
Mitchell	8-9
Mundubbera	9-10
Boonah	9-10
Murgon	10-12
Blackall	8-10
Roma	15-16
Gayndah	16-17
Ipswich	16-18
Springsure	16-17
Wallumbilla	22-23
Biggenden	24-25
Toogoolawah	25-26
JUNE.	
Marburg	2-4
Childers	2-6
Lowood	8-9
Bundaberg	7-9
Wowan	7-8
Miriam Vale	13-14
Gladstone	20-21
Mount Larcom	22-23
Gatton	28-29
Rockhampton	27-30
JULY.	
Mackay	3-5
Kilcoy	5-6
Esk	13-14
Townsville	10-12
Woodford	12-13
Nundah	14
Charters Towers	18-19
Caboolture	19-20
Ingham	20-21
Rosewood	20-21
Charters Towers	18-19
Laidley	25-26
AUGUST.	
Bowen	1-2
Royal National	6-11
Crow's Nest	22-23
Coorparoo	-25

WINTER FODDER CROPS AND FERTILISER TRIALS, CENTRAL DISTRICT, SEASON 1927.

By G. B. BROOKS, Instructor in Agriculture.

Winter Fodder Demonstration Plots.

During the past ten years it has been the practice of the Instructional Branch to arrange with farmers in suitable localities to plant various fodder crops in order to demonstrate the best varieties to grow either for dairying or pig raising purposes.

Largely as a result of these activities, the growing of winter fodders has become so universal in several districts here that it was decided to decrease the number of demonstration plots to four and to give increased attention to summer growing crops, mainly sorghums. The farms on which the plots were located are as follows:—J. R. Adsett, Jambin; H. Wolff, Ambrose; S. Hoare, Alton Downs; and J. Lindley, Wowan.

Providing Green Material for an Extended Period.

Although several varieties of cereals were sown in the respective plots, this was not done with the view of carrying out comparative trials, but to demonstrate the value of making provision for a supply of green material during the months when the natural grasses have lost their succulence. Owing to the climatic conditions invariably experienced during the winter in the Central district, the keeping up of a supply of green feed for the dairy herd by successive sowings of one variety cannot be profitably carried out. Given a supply of soil moisture, advantage has to be taken to sow a number of varieties which will mature at widely different periods. Planting is carried out as soon as the hot humid summer weather has passed, so that feed may be available during early winter. April has been found to be a suitable month in which to sow.

Varieties to Plant.

The following varieties were sown, maturing in the order given:—Skinless Barley, Cape Barley, Florence Wheat, Huguenot Wheat, Ruakura Oats. The oats invariably mature much later than the other cereals mentioned, consequently if not required for green feed can be converted into hay. Field peas were mixed with all cereals at the rate of half a bushel to the acre. This mixture not only gives greatly increased weights of green fodder, but adds very materially to its feeding value.

Rate of Seeding.

The rate of seeding per acre was as follows:—Wheat and Skinless Barley, 1 bushel; Cape Barley and Oats, 1½ bushels.

Seasonal Conditions.

There was sufficient moisture present in the soil at the respective places to ensure a satisfactory germination. Prior to coming into ear, however, a long, dry spell was experienced, more particularly at Alton Downs, where the soil is a heavy basalt. This had the effect of decreasing the returns, more particularly of the early maturing varieties.

Another feature that has an important bearing upon green weights is that, owing to the different periods of maturity, it was not always possible to visit the plots at the time when each sort was at its stage of maximum development. As already mentioned, it was not, however, a matter of comparative trials, but an effort to demonstrate to surrounding farmers the particular type of varieties to grow.

Yields of Green Material.

The weights of green fodders recorded at the respective places are as follows. Unfortunately, circumstances did not permit of the weights of the crops being secured on Mr. J. Lindley's farm, Wowan.

Winter Fodder and Fertiliser Trials.

Areas on which combined fodder and fertiliser trials could be carried out and extending over several years were arranged for in two districts, viz., Boyne Valley and Wowan. The crops grown were similar to those in the demonstration plots with

the exception that field peas were omitted. As a result of the prolonged drought there was practically no subsoil moisture, consequently the crop had to depend almost entirely upon isolated showers. The trials at Wowan were carried out on the farm of Mr. A. E. G. Barnard, the soil being a brown Brigalow scrub loam and fairly representative of the district.

In the Boyne Valley the plot was located on the farm of Mr. A. J. Turner, Ubobo, the soil being a sandy, alluvial loam. Dry conditions were experienced shortly after germination, causing the respective varieties to come into ear very early, the result being low yields. The following table gives the quantity of the various fertilisers applied, together with yields of green material secured per acre.

It will be noted from the results that practically no benefit was obtained from the fertilisers applied. Any difference in weight would appear to be due to slight variation in soil.

WINTER FODDER AND FERTILISER CROP TRIALS WITH A. E. G. BARNARD, WOWAN.

Planted, 11th June, 1927—Tons per acre.

Plot.	Fertilisers—Cwt. per acre.	Florence Wheat.	Skinless Barley.	Ruakura Oats.	Hugenot Wheat.	Total.
A.	Unmanured	4·86	6·48	13·67	6·47	31·48
B.	1 cwt. sulphate ammonia 2 cwt. Nauru superphosphate 1 cwt. sulphate of potash	5·04	6·48	13·5	6·47	31·49
C.	1 cwt. sulphate of ammonia 2 cwt. Nauru superphosphate 1 cwt. muriate of potash ..	4·86	6·12	13·5	6·84	31·32
D.	1 cwt. dried blood .. .. 2 cwt. Nauru superphosphate 1 cwt. sulphate of potash ..	5·04	6·12	13·67	6·3	31·13
E.	1 cwt. dried blood .. .. 2 cwt. Nauru superphosphate 1 cwt. muriate of potash ..	5·04	6·3	13·86	6·47	31·57
F.	2 cwt. dried blood .. .. 4 cwt. Nauru superphosphate 2 cwt. sulphate of potash ..	5·04	6·47	13·67	6·47	31·65
G.	Unmanured	5·22	7·02	14·4	6·84	33·48
H.	1 cwt. dried blood .. .. 2 cwt. Nauru superphosphate 1 cwt. sulphate of potash ..	5·04	6·12	13·5	6·47	31·13
I.	½ cwt. dried blood .. .. 1 cwt. Nauru superphosphate ½ cwt. sulphate of potash ..	5·22	6·47	13·5	6·47	31·66
J.	2 cwt. Nauru superphosphate 1 cwt. sulphate of potash ..	4·86	6·47	13·67	6·3	31·30
K.	1 cwt. dried blood .. .. 2 cwt. Nauru superphosphate	5·04	6·47	13·67	6·12	31·30
L.	1 cwt. dried blood .. .. 1 cwt. sulphate of potash ..	5·04	6·66	13·14	6·47	31·13
M.	Unmanured	5·04	6·66	13·32	6·47	31·49

Rainfall.—Previous month, 12 points; during growth, 800 points.

WINTER FODDER AND FERTILISER CROP TRIALS WITH A. J. TURNER, Ubobo, Boyne Valley.

Planted—8th June, 1927—Tons per acre.

Plot.	Fertilisers—Cwt. per acre.	Algerian Oats.	Skinless Barley.	Florence Wheat.	Hugenot Wheat.	Total.
A.	Unmanured	2·63	2·55	2·98	3·87	12·93
B.	1 cwt. sulphate of ammonia 2 cwt. Nauru superphosphate 1 cwt. sulphate of potash ..	3·00	2·98	3·37	4·33	13·68
C.	1 cwt. sulphate of ammonia 2 cwt. Nauru superphosphate 1 cwt. muriate of potash ..	3·09	2·82	3·43	4·52	13·86
D.	1 cwt. dried blood .. .. 2 cwt. Nauru superphosphate 1 cwt. sulphate of potash ..	3·02	2·55	3·34	4·23	13·14
E.	1 cwt. dried blood .. .. 2 cwt. Nauru superphosphate 1 cwt. muriate of potash ..	2·8	2·47	3·09	4·07	12·43
F.	2 cwt. dried blood .. .. 4 cwt. Nauru superphosphate 2 cwt. sulphate of potash ..	3·57	3·05	3·66	4·57	14·85
G.	Unmanured	2·98	2·25	2·78	3·64	11·65
H.	1 cwt. dried blood .. .. 2 cwt. Nauru superphosphate 1 cwt. sulphate of potash ..	3·14	2·47	2·91	3·86	12·38
I.	½ cwt. dried blood .. .. 1 cwt. Nauru superphosphate ½ cwt. sulphate of potash ..	3·11	2·47	2·97	4·02	12·57
J.	2 cwt. Nauru superphosphate 1 cwt. sulphate of potash ..	2·74	2·61	2·59	3·66	11·60
K.	1 cwt. dried blood .. .. 2 cwt. Nauru superphosphate	2·61	2·32	3·14	3·87	11·94
L.	1 cwt. dried blood .. .. 1 cwt. sulphate of potash ..	2·46	2·44	2·94	3·59	11·43
M.	Unmanured	2·28	2·27	2·55	3.34	10·44

Rainfall.—4th June, 4·23 points; total (on crop), 2·93 points.

DEMONSTRATION CROPS SUITABLE FOR PIG RAISING PURPOSES—CENTRAL DISTRICT, SEASON 1927.

While fodder crops previously mentioned provide for the dairy herd, the root crop plots are intended to demonstrate the advantage of making provision for a supply of pig feed for a period of some six months from planting. In order to carry this out, it is essential to utilise a number of crops that will mature in rotation, say, from the latter end of May to December.

The varieties included in the following list can be planted in the Central district during the latter end of March. There is considerable risk in planting prior to this date on account of aphis attack. Although Swede turnips may be sown somewhat earlier, there is little advantage to be gained by doing so, as the yellow variety, even if planted three weeks later, will be the first ready for use.

Varieties.

The crops selected, together with the time they become available for use (provided they are all sown during the latter end of March) are as follows:—

Rape—Available end of May and June—in a favourable season several cuttings are secured.

Yellow and Green Top Aberdeen Turnips—June and July.

Swede Turnip, Cabbage—July-August.

Silver and Sugar Beet, Field Carrots, Chow Moulier—August-October.

Long Red Mangels—October-November.

Yellow Globe Mangels—November-December. The Globe variety withstands the hot weather much better than the Long Red.

Method of Planting.

Sugar and silver beet, carrots, turnips, and rape were sown in rows about 2 feet 6 inches apart, sufficiently wide to permit of scuffling. All other varieties in 3-feet rows. The rape and silver beet were sown in a continuous row, the turnips and beet thinned to about 8 inches, the carrots from 4 to 6 inches, the Chow Moulier and mangels to 15 inches, while the cabbage was spaced somewhat wider apart.

It may be mentioned that, in the event of an indifferent germination of mangels and sugar beet, the blanks can be filled in by transplanting, preferably during dull, moist weather. On account of the enormous yields secured from mangels, the time spent in this work will be well repaid.

The following is a list of the growers, showing location and yield of the respective varieties:—

DEMONSTRATION ROOT CROPS, ETC., PLOTS—SEASON 1927.

Results—Yields in Tons per acre.

Crop—6.	J. Hales, Rosedale.	J. J. Kelly, Mount Larcom.	A. P. Lawton, Wowan.	S. Larson, Miriam-vale.	S. Larson, Colosseum.	A. Rake, Marlborough.
Rape, first cut	5·11	14·57	5·11	23·97	4·11	22·00
Rape, second cut ..	..	15·13	..	7·12	..	..
Silver Beet—						
First cut	15·72	17·28	6·28	13·75	15·22	14·00
Second cut	..	16·22	..	..	..	..
Chow Moulier	17·28	8·64	9·03	20·43	6·68	25·00
Pt. Aberdeen turnip ..	29·12	40·00	19·04	23·17	Not planted	Not computed
Gt. Aberdeen turnip ..	..	..	18·46	83·34	Not planted	Not computed
F'eld carrot	7·86	12·88	11·78	20·43	Not planted	19·00
Swede	31·07	40·15	21·12	39·82	Not planted	Not computed
Drumhead cabbage ..	21·22	25·53	6·28	22·00	Not planted	21·00
Sugar beet	34·72	22·41	16·00	40·20	22·40	Not computed
Long red mangel ..	33·50	33·50	28·39	53·14	31·11	29·11
Yellow Globe mangel ..	31·54	31·72	26·03	50·79	34·47	18·11
Planted	14–7–27	17–5–27	13–6–27	6–5–27	20–8–27	2–5–27

Pt.—Purple top.

Gt.—Green top. (This crop was not true to variety, being a white, soft, poor-keeping sort.)

IMMATURE ORANGES ON SOUTHERN MARKETS.

AN UNWISE POLICY.

The Minister for Agriculture and Stock, Mr. W. Forgan Smith, stated to-day that he had received a telegram from the Victorian Department of Agriculture to the effect that consignments of Queensland oranges were arriving in Melbourne in a green and immature condition.

The Victorian Department further intimated that the despatch of this fruit should cease or it will not be allowed to be sold in Victoria.

In commenting upon the above, Mr. Smith stated that it would seem that some of our growers, in their anxiety to catch the early market, are forwarding their oranges at least three weeks too soon. Apart from the injury this is likely to do to the citrus-growing industry of Queensland generally, the wisdom of such a policy, even for the individual, is very doubtful, as the green oranges in question have to compete with the ripe Valencia late oranges from New South Wales orchards that are now on the Melbourne market.

CONTAGIOUS MAMMITIS IN CATTLE.

METHOD OF VACCIN TREATMENT.

This serious disease is continually being brought under notice through outbreaks occurring in dairy herds, and its spread may be attributed partly to the carelessness of the dairy farmer and partly to the want of proper hygienic methods of controlling it.

The disease is a catarrhal affection and is limited, in most cases, to the delicate mucous membrane lining the milk ducts of the mammary gland. As a rule there is very little heat or swelling; moreover, the affected parts are not particularly painful.

The disease is caused by a tiny chain-forming micro-organism, or streptococcus, which attacks the mucous membrane and, by the development of its poisonous products or toxins, causes a rapid destruction of tissue cells and leucocytes (or white blood corpuscles) which are attracted to the spot. These dead cells produce that peculiar feature of the disease—a yellowish, purulent discharge, or pus, which can be withdrawn from the affected quarter.

Symptoms.

In the acute form the first symptoms are a diminution in the milk yield (usually in but one quarter of the udder); a definite acidity of the milk, and a tendency for it to become rapidly coagulated. Gradually the milk assumes a dirty, brownish colour and becomes more curdly, the amount of secretion from the affected quarter diminishing owing to the thickening of the milk ducts, which finally become impervious and the whole quarter is rendered useless. The lesions develop slowly, and first one quarter then another of the udder becomes involved, and later the milk secretion is liable to stop entirely. It will be observed in some cases of slight infection that the milk does not appear to be curdled, and the deposit when settled is so very small as to be overlooked.

Methods of Transmission.

Undoubtedly the transmission of the disease from cow to cow is through the agency of the hands of the milker or the cups of the milking machine. This appliance, which was designed to enable the farmer to produce cleaner milk than by any other method, must be kept scrupulously clean, and the cups should be sterilised after each milking by means of repeated washings with boiling water.

Before and after each milking of an affected animal, the hands of the milker and the teats and udder of the cow should be washed with some reliable disinfectant solution, such as Hycol, Kerol, or Cyllin diluted in the proportion of 1 part of disinfectant to 250 parts of water—that is, 1 teaspoonful to 1 quart. Care must be taken not to allow any of the milk or cream from healthy animals or any of the dairying utensils to become tainted with the disinfectant, as the flavour and odour might be detected in the butter. To obviate this the disinfectant, after being allowed to act for ten minutes, should be washed off with sterilised water—that is, water that has just previously been boiled and allowed to cool.

Once the disease has appeared in a herd, the owner should personally examine minutely every cow's udder before milking and note carefully the character of the first small quantity of milk drawn. Any cow that shows signs of the disease, or that is in any way suspicious, should be held over to the last for hand-milking, and on no account should the cups of the milking machine be used on her.

Milk from an affected cow must be considered dangerous. The animal should be milked last into a vessel kept specially for the purpose, and the milk scalded so as to destroy the mammitis germs. When it is cooled down it may be fed to the pigs.

Treatment.

Both preventive and curative treatment have been successfully carried out by means of vaccin prepared at the Stock Experiment Station, Yeerongpilly. When used as a preventive the vaccin confers a period of immunity to contagious mammitis which varies very considerably in individual animals, and in no case is it thought that this period exceeds twelve months. The most opportune time to use the vaccin for protective purposes is just before or after calving, when the cow is usually most susceptible.

A "stock" vaccin may prove useful as a curative, but the best results are usually obtained from an autogenous vaccin—that is, one prepared from the particular strain of germ affecting the animals it is proposed to treat. To prepare

such a vaccin it would be necessary for the Government Bacteriologist, Stock Experiment Station, Yeerongpilly, to receive a few teaspoonsful of strippings from the affected quarter of a cow, forwarded with as little delay as possible in a clean bottle with no preservative added. A few days are required to prepare the vaccin, which will remain potent for about six months.

Directions for Use.

The vaccin is injected into the loose subcutaneous tissue behind the shoulder in the same manner as tick fever inoculation is performed, and the ordinary 10 c.c. tick fever inoculating syringe and needle are necessary to carry out the work. These may be obtained from Surgical Supplies Ltd., Queen street, Brisbane, for about 25s. complete.

The full dose of vaccin in ordinary cases is 4 c.c., injected in two doses of 2 c.c. each, with an interval of forty-eight hours between the injections. Two injections of 2 c.c. each will usually effect a cure, but in cases of long standing it might sometimes be found necessary to continue the treatment.

Before the injections are commenced the syringe and needle, with the parts loosened, should be sterilised by boiling in water for ten minutes, and the skin of the animal at the proposed site of injection should be washed with a solution of Hycol, Kerol, or Cyllin—1 teaspoonful to 1 quart—for ten minutes.

CONTAGIOUS MAMMITIS VACCIN—SCALE OF CHARGES.

No. of Animals.	Charge.
	s. d.
1	2 6
5	6 3
10	10 0
20	16 8
25	20 0
40	30 0
60	40 0
80	46 8
100	50 0

JUVENILE POULTRY CLUBS.

SUGGESTIONS FOR THEIR FORMATION.

By P. RUMBALL, Poultry Expert, Department of Agriculture.

Briefly the objects of a Juvenile Poultry Club are the education of club members and the distribution of purebred stock which will naturally follow the formation of such clubs throughout Queensland's farming districts.

By young people being encouraged in the keeping of purebred stock, not only will they become impressed with the advantages of such stock over those of a non-descript nature, but they will demonstrate by example to parents and others the increased profits to be derived from such stock correctly managed; this will have the effect of building up flocks of good birds throughout Queensland. As many club members are the future agriculturists of Queensland, the imparting of the knowledge necessary to ensure poultry being kept at a profit is perhaps the most important feature of club work, as it means that any club member starting out in life in the future will commence the poultry section of his farm correctly, due to the early training that had been received. The advantages of club work, however, will not end with the poultry section of the farm. The principles necessary for success in this direction are similar to those necessary for the correct care for any class of live stock, or, in fact, any agricultural pursuit.

Several clubs were formed during 1927 at rural and other interested schools throughout Queensland on lines similar to those that are to be suggested. The stock in all cases was procured from the Queensland Agricultural College and High School, Gatton, but if clubs grow to any extent, it is anticipated that in many cases stock will have to be procured from private individuals. In any case, however, it will be necessary to commence the formation of a club fairly early to enable the necessary stock being ordered.

Suggestions for the Formation of Clubs.

Poultry clubs, to be of any value, will have to extend over several years, and in order to give them some degree of permanency it is suggested that a committee of management be formed, consisting of the head teacher and two interested parents.

When it is ascertained how many students are likely to join such a club, the committee should make arrangements for the supply to each club member of six pullets of the same breed about eight weeks of age. These could be procured for about 4s. per head, but it will be necessary to make arrangements for the delivery of chickens several months before the commencement of a club, as breeders would have to hatch and rear birds especially for such purpose.

Prior to the delivery of pullets to club members, sealed wing bands should be attached to each bird to prevent any suggestion of exchange of stock. The birds being of the same breed, price, and age, all club members would be on an equal footing at a start of any club.

The committee should arrange for a series of lectures by Government instructors or local breeders on such subjects as are seasonable, and that will assist in the successful rearing of stock, also organise visits to local poultry farms where possible.

As the period July to September is accepted as being the most suitable period for hatching stock from which the maximum egg production may be expected, a start in any club could not be made with pullets eight weeks old until August, nor should any club be commenced later than the middle of November.

Provision will have to be made by club members for the suitable housing of their birds some time before it is anticipated a start will be made with a club. A leaflet on this subject is at present available, and may be had free on application to the Under Secretary, Department of Agriculture and Stock, by the chairman of the committee of management of any club. Similar leaflets on other subjects could be obtained from time to time as necessary.

In order to encourage the interest of club members in their work contests must be arranged. In this direction two distinct contests are possible—(1) the development of the pullet, and (2) egg laying. In both contests allowance must be made for records as to cost, while in the latter contest provision could possibly be made in some public egg-laying trial for a special section for juvenile club members. The suggested lines for each contest are as under.

Pullet Development Contest.

From the time a club member receives his birds until the termination of this contest a complete record of foods used and their cost must be kept; a Club Show to be held four months after receipt of birds, where they will be judged on development; a report to be made by each club member on the completion of the contest, giving reasons why the various foods were used and his general observations. Prizes to be awarded to students gaining the greatest number of points, allowing 40 points for development, 20 points for records, and 40 points for report.

Laying Contest.

On the completion of the development contest a laying contest will commence, extending over such period as the committee of management thinks fit. This, however, should be continued until a short time before schools break up in December. This would mean an eight or nine months' test.

Here again complete records as to cost of feed and method of feeding would form a feature of the contest. The average numbers of eggs produced per bird of various grades would form another, while a report on general observations and reasons for the action of club members in the use of certain feeds would form the third. Points could be allowed on the following scale:—30 each for records and egg production and 40 for report.

The question of marketing of the product of club members could well occupy the attention of the committee. Club members should be encouraged to co-operate in the marketing of their product, and it may be possible for the committee to assist by arranging for all the eggs produced being received one day a week by a storekeeper or agent, packed and forwarded to the best market available.

The work of poultry clubs could be further extended by arranging for breeding contests. This work could follow the second contest, as it is undesirable to encourage the breeding from pullets, as fully twelve months' knowledge of a bird is necessary prior to judging her as being fit for breeding purposes.

General Notes.

Arrowroot Board Election.

The recent election of members to the Arrowroot Board resulted as follows:—

Percival Pitman Outridge (Redland Bay)	115 votes
Johann Friedrich Wilhelm Sultmann (Pimpama Island)	104 „
Robert Stewart (Ormeau)	101 „
Hans Nickolaus Grantz (Norwell)	93 „
Beujamin George Peachey (Ormeau)	91 „
Alexander Clark (Dayboro)	84 „
Carl Brumm (Pimpama Island)	82 „
Peter Skopp	57 „
Wilhelm August Schipplock (Norwell)	48 „

The first five members will, therefore, be appointed and will hold office for a period of three years as from the 15th April, 1928.

Proposed Queensland Maize Board.

A notice has been issued of intention to create a Maize Board for the whole of Queensland with the exception of the Petty Sessions Districts of Atherton, Herberton, and Chillagoe for a period of five years as from the 1st March, 1928.

The State has been divided into three districts—viz., No. 1, Pastoral District of Moreton; No. 2, Pastoral Districts of Darling Downs and Maranoa; and No. 3, the rest of Queensland, with the exception of the Petty Sessions Districts of Atherton, Herberton, and Chillagoe. Two representatives will be elected from each district, and will hold office until the 28th February, 1930.

Nominations for membership on the Board must be signed by at least ten persons who have had growing intended for sale maize (grain) on areas of not less than 10 acres since the 1st October, 1927, and must reach the Returning Officer, Department of Agriculture and Stock, Brisbane, before 5 p.m. on the 10th May, 1928.

Any petition for a poll to decide whether the Board shall be created must be signed by at least fifty such growers, and must reach the Minister on or before the 26th May, 1928.

Broom Millet Board Election.

Growers named as follows have nominated for election as growers' representatives on the Broom Millet Board:—George William Harberger, Coalstoun Lakes; Hans Niemeyer, Hatton Vale; and Erich Max Schneider, Binjour Plateau.

As only two members are required, an election by postal ballot will take place on the 16th May, and the successful candidates thereat will hold office for a term of one year.

Queensland Canegrowers' Council—Defence Fund Levy.

The question of making a further levy by the Queensland Canegrowers' Council on growers of sugar-cane at the rate of ¼d. per ton on sugar-cane harvested during the season ended 29th February, 1928, such levy to be utilised for the purpose of augmenting the defence fund created by the levy on the 31st July last, has been answered in the affirmative by the canegrowers. The ballot was conducted by the Department of Agriculture and Stock, and the counting of votes took place at that Office with the following results:—

For the levy	1,371 votes
Against the levy	1,313 „

The proposal for the making of a further levy has therefore been approved of by the growers.

Staff Changes and Appointments.

Messrs. P. P. Outridge (Redland Bay), J. F. W. Sultmann (Pimpama Island), R. Stewart (Ormeau), H. N. Grantz (Norwell), and B. J. Peachey (Ormeau) have been appointed members of the Arrowroot Board, as from 15th April, 1928, to 14th April, 1931.

Mr. H. St. J. Pratt, Inspector under the Diseases in Plants Acts at Stanthorpe, has been appointed Assistant Instructor in Fruit Culture.

Messrs. T. R. E. Mitchell (Manager, State Nursery, Bribie) and J. Hall (of Innisfail) have been appointed Inspectors under the Diseases in Plants Acts.

The non-commissioned officer in charge of the Longreach Police Station has been appointed an Acting Inspector of Stock.

Constable Thomas Smith, of Laidley, has been appointed an Inspector of Slaughter-houses.

Messrs. J. A. Goode, J. Shanks, and J. Malcolmson, of Mackay, have been appointed officers under the Animals and Birds Acts.

The following have been appointed representatives on the Kalamia Local Sugar Cane Prices Board:—

Millowners' representatives—Messrs. R. H. Farrar and B. E. Toll.
Canegrowers' representatives—Messrs. W. J. Ferguson and T. P. Olsen.
Chairman—Mr. R. A. Tait.

Mr. W. M. Kennedy, of Tanby, has been appointed an Honorary Inspector under the Diseases in Plants Acts.

Mr. E. S. Smith has been appointed a member of the Central Sugar Cane Prices Board during the absence through illness of Mr. John Smith, millowners' representative.

Mr. W. T. M. Penhallurick, of Coorumbene, Rolleston, has been elected a member of the Leichhardt South Dingo Board, vice Mr. W. L. Leslie, deceased.

The Officer in Charge of Police, Talwood, has been appointed Acting Inspector of Stock.

Mr. F. C. Shaw, Coolangatta, has been appointed Inspector of Slaughter-houses until the 25th May, 1928.

Mr. H. J. Campbell, who has recently been appointed an Inspector of Slaughter-houses, is to be attached to Ingham.

Mr. V. A. Rafter, police constable stationed at Nebo, has been appointed an Inspector under the Slaughtering Act as from the 2nd instant.

Mr. W. H. Robinson, of Nambour, has been appointed an honorary Inspector under the Diseases in Plants Acts as from the 24th instant.

The transfer of Mr. L. P. Doyle, Inspector of Stock, from Cloncurry to Urandangie, has been cancelled, and in lieu thereof, Mr. Doyle is being transferred to the Camooweal District.

Mr. J. C. Pryde, of Spring Bluff, has been appointed Inspector of Stock as from 4th April, 1928, to 2nd May, 1928.

The following Police Constables have been appointed Inspectors of Slaughter-houses:—S. J. S. Carnell, P. H. Wiles, J. S. V. Gill, M. R. Anderson, and G. F. Bauer.

Messrs. Thomas Salisbury (of Cedar Creek) and Wm. J. Millar (of "Renfrew," Mooloolah) have been appointed Honorary Inspectors under the Diseases in Plants Acts.

Mr. A. F. Bell, Investigations Officer (Plant Pathology), Bureau of Sugar Experiment Stations, has been appointed an Inspector under the Diseases in Plants Acts.

The appointment of Mr. H. F. Sibley as Inspector of Slaughterhouses has been confirmed as from 19th September, 1927. Mr. Sibley is stationed at Charters Towers.

The resignation of Mr. H. C. Russell, Inspector of Accounts under the Dairy Produce Act, has been accepted as from the 31st March, 1928.

Mr. James Purcell, of Toowoomba, has been appointed Chairman of the Butter Board.

The following have been appointed Representatives on the undermentioned Cane Pest Boards:—

Lower Burdekin Cane Pest Board—
Millowners' Representatives—Messrs. Charles Samuel Wynter and Reginald Hales Farrar.
Canegrowers' Representatives—Messrs. Arthur H. Land, Hans Victor Hansen, and Wm. Ewart Gladstone Smith.

Plane Creek Cane Pest Board—
Millowners' Representatives—Messrs. Alexander Innes and John Christopherson Nicholson.
Canegrowers' Representatives—Messrs. Robert Arthur McKie, Alexander Patterson, and Sidney Tremble Dent.

Mackay Cane Pest Board—
Millowners' Representatives—William Begg Fordyce and Phillip Hector McLean.
Canegrowers' Representatives—John James Hedrick, F. J. Stevens, and G. F. Williams.

A Gladstone Sanctuary.

Facing Island, near Gladstone, has been declared a sanctuary for animals and birds, and Messrs. J. Paine, B. J. Adams, and A. E. Adams have been appointed officers under the Animals and Birds Acts to act as rangers for the sanctuary.

The Royal Society of Queensland.

The Annual Meeting of the Society was held in the Geology Lecture Theatre of the University at 8 p.m. on Monday, 19th March, 1928.

His Excellency the Governor, Sir John Goodwin, occupied the chair.

The Annual Report and Financial Statement were adopted.

The following officers were elected for 1928:—

President: Professor T. Parnell, M.A.

Vice-Presidents: Professor E. J. Goddard, B.A., D.Sc. (*ex officio*), and Professor J. P. Lowson, M.A., M.D.

Hon. Secretary: Mr. D. A. Herbert, M.Sc.

Hon. Librarian: Dr. J. V. Duhig, M.B.

Hon. Treasurer: Mr. E. W. Bick.

Hon. Auditor: Professor H. J. Priestley, M.A.

Members of Council: Professor R. W. Hawken, B.A., M.E., M. Inst. C.E., Dr. T. G. H. Jones, A.A.C.I., Dr. E. O. Marks, B.A., B.E., M.D., Professor H. C. Richards, D.Sc., and Mr. C. T. White, F.L.S.

Dr. O. S. Hirschfeld was unanimously elected as an ordinary member.

Dr. T. A. Williams and Mr. W. W. Bryan were proposed for ordinary membership.

Professor T. Parnell was inducted to the position of President for 1928, and Professor E. J. Goddard delivered his Presidential Address entitled "Virus Diseases: Their Bearing on the Cell Theory and other Biological Concepts." On the motion of Mr. H. A. Longman, seconded by Dr. J. V. Duhig, a vote of thanks was accorded the retiring President for his address. A vote of thanks to His Excellency the Governor was carried on the motion of Professor H. C. Richards, seconded by Mr. J. B. Henderson.

Farm Notes for June.

FIELD.—Winter has set in, and frosts will already have been experienced in some of the more exposed districts of the Maranoa and Darling Downs. Hence insect pests will to a great extent cease from troubling, and weeds will also be no serious drawback to cultivation. Wheat sowing should now be in full swing, and in connection with this important operation should be emphasised the necessity of at all times treating seed wheat by means of fungicides prior to sowing. Full directions for "pickling" wheat by copper carbonate treatment are available on application to the Department of Agriculture, Brisbane. Land intended for the production of early summer crops may now receive its preliminary preparation, and every opportunity taken advantage of to conserve moisture in the form of rainfall where experienced; more particularly so where it is intended to plant potatoes or early maize. Where frosts are not to be feared the planting of potatoes may take place in mid-July; but August is the recognised month for this operation. Arrowroot will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes, yams, and ginger. Should there be a heavy crop, and consequently a glut in the market, sweet potatoes may be kept by storing them under cover and in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe, and will rot or dry up and shrivel in the sandpit. Before pitting, spread the tubers out in a dry barn, or in the open if the weather be fine. In pitting them or storing them in hills, lay them on a thick layer of sand; then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them; then put down another layer of tubers, and repeat the process until the hill is of the requisite size, and finally cover with either straw or fresh hay. The sand excludes the air, and the potatoes will keep right through the winter. In tropical Queensland the bulk of the coffee crop should be off by the end of July. Yams may be unearthed. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples. Gather all ripe bananas.

Cotton crops are now fast approaching the final stage of harvesting. Growers are advised that all bales and bags should be legibly branded with the owners' initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus address labels.

Orchard Notes for June.

THE COASTAL DISTRICTS.

The remarks that have appeared in these notes for the past two months apply in a great measure to June as well, as the advice that has been given regarding the handling, grading, packing, and marketing of the citrus crop still holds good. As the weather gets cooler the losses due to the ravages of fruit flies decrease, as these insects cannot stand cold weather, and consequently there is only an odd one about. The absence of flies does not, however, permit of any relaxation in the care that must be taken with the fruit, even though there may be many less injured fruit, owing to the absence of fruit-fly puncture, as there is always a percentage of damaged fruit which is liable to speck, which must be picked out from all consignments before they are sent to the Southern States if a satisfactory return is to be expected. If the weather is dry, citrus orchards must be kept in a good state of tilth, otherwise the trees may get a setback. Old worn-out trees can be dug out and burnt; be sure, however, to see that they *are* worn out, as many an old and apparently useless tree can be brought round and made to bear good crops, provided the trunk and main roots are still sound, even though the top of the tree is more or less dead. The whole of the top of the tree should be cut off and only the trunk and such sound main limbs left as are required to make a new head. The earth should be taken away from around the collar of the tree, and the main roots exposed, any dead roots being cut away and removed. The whole of the tree above ground and the main roots should then be dressed with a strong lime sulphur wash or Bordeaux paste. The main roots should be exposed for some time, not opened up and filled in at once. Young orchards can be set out now, provided the ground is in good order. Don't make the mistake of planting the trees in improperly prepared land—it is far better to wait till the land is ready, and you can rest assured it will pay to do so in the long run.

When planting, see that the centre of the hole is slightly higher than the sides, so that the roots, when spread out, will have a downward, not an upward, tendency; set the tree at as nearly as possible the same depth as it was when growing in the nursery, cut off all broken or bruised roots, and spread those that remain evenly, and cover them with fine top soil. If the land is dry the tree should then be given a good watering, and when the water has soaked in the hole can be filled up with dry soil. This is far better than watering the tree after the soil has been placed round it and the hole filled up. Custard apples will be ripening more slowly as the nights get colder. If the weather becomes unduly cold, or if immature fruit is sent South, the fruit is apt to turn black and be of no value. This can easily be overcome by subjecting the fruit to artificial heat, as is done in the case of bananas, during the cooler part of the year, when it will ripen up properly and develop its flavour. Grade custard apples carefully, and pack in cases holding a single layer of fruit only for the Southern markets.

Pineapples, when at all likely to be injured by frost, should be protected by a thin covering of bush hay or similar material. The plantation should be kept well worked and free from weeds, and slow-acting manure, such as bonedust or island phosphates, can be applied now. Lime can also be applied when necessary. The fruit takes longer to mature at this time of the year, consequently it can be allowed to remain on the plant till partly coloured before gathering for the Southern markets, or can be fully coloured for local use.

Banana plantations must be kept worked and free from weeds, especially if the weather is dry, as a severe check to the plants now means small fruit later on. Bananas should be allowed to become full before the fruit is cut, as they will carry all right at this time of the year; in fact, there is more danger of their being injured by cold when passing through New England by train than there is of their ripening up too quickly.

Bear in mind the advice given with regard to the handling, grading, and packing of the fruit. It will pay you to do so. Land intended for planting with bananas or pineapples during the spring should be got ready now.

Strawberries require constant attention, and, unless there is a regular and abundant rainfall, they should be watered regularly. In fact, in normal seasons an adequate supply of water is essential, as the plants soon suffer from dry weather or strong, cold westerly winds. Where not already done, vineyards should be cleaned up ready for pruning—it is, however, too early to prune or to plant out new vineyards.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

All kinds of deciduous fruit tree are now ready for pruning, and this is the principal work of the month in the orchards of the Granite Belt area. Don't be frightened to thin out young trees properly, or to cut back hard—many good trees are ruined by insufficient or bad pruning during the first three years. If you do not know how to prune, do not touch your trees, but get practical advice and instructions from one or other of the Departmental officers stationed in the district. In old orchards do not have too much bearing wood; cut out severely, especially in the case or peaches, or you are likely to get a quantity of small unsaleable fruit. There are far too many useless and unprofitable fruit trees in the Granite Belt area, which are nothing more or less than breeding-grounds for pests, such as fruit fly, and are a menace to the district. Now is the time to get rid of them. If such trees are old and worn out, take them out and burn them, but if they are still vigorous, cut all the tops off and work them over with better varieties in the coming season—apples by grafting in spring and peaches and other stone fruits by budding on to young growth in summer. Planting can start now, where the land is ready and the trees are to hand, as early planted trees become well established before spring, and thus get a good start. Be very careful what you plant. Stick to varieties of proved merit, and few at that, and give so-called novelties and inferior sorts a wide berth. Take the advice of old growers, and do not waste time experimenting with sorts that have probably been tested in the district and turned down years ago. When land is intended for planting this season, see that it is well prepared and well sweetened before the trees are put in, as young trees seldom make a good start when planted in sour and badly prepared land.

Slowly acting manures—such as bonedust, meatworks manure, or island phosphates—can be applied now, as they are not liable to be washed out of the soil, and they will be available for the use of the trees when they start growth in spring. Lime can also be applied where required. Badly drained land should be attended to, as no fruit trees will thrive with stagnant water lying round their roots.

On the Downs and Tableland all kinds of fruit trees can be pruned now, and vines can be pruned also in any district where there is no danger from late frosts, and where this can be done the prunings should be gathered and burnt, and the vineyard ploughed up and well worked to reduce the soil to a good state of tilth, so that should rain come it will absorb all that falls and the moisture can be kept in the soil by cultivation subsequently.

Citrus fruits will be at their best in the Western districts. The trees should be watered if they show signs of distress, otherwise all that is necessary is to keep the surface of the land well worked. All main-crop lemons should be cut by this time, as, if allowed to remain longer on the tree, they only become overgrown and are more suitable for the manufacture of peel, whereas if cut and cased now they will keep in good order so that they can be used during the hot weather.

The Home and the Garden.

THE BABY'S FOOD—ADVICE TO MOTHERS.

A mother called at a baby health centre recently with a six weeks' old baby and asked advice on how best to wean her little one. "But why wean the child?" inquired the sister. "Cannot you feed it naturally, and afford it the greatest blessing a mother can give her baby?"

"Oh! My baby was premature, and everyone tells me that a premature baby cannot be breast-fed," replied the mother. "I have very little milk, and am afraid I could never feed my baby naturally. Already I have buried three premature babies, and I am anxious about this one."

"All the more reason why he should be breast-fed," said the sister. "If you want to rear him, then you should do all in your power to breast-feed him."

That conversation (writes Dr. E. Sydney Morris, Director of Maternal and Baby Welfare (New South Wales), illustrates the ignorant and sometimes fatal advice frequently proffered to young mothers who are in difficulties, by relatives and friends, whose intentions are no doubt good, but who lack knowledge. It also shows how necessary are the facilities for disseminating sound mothercraft knowledge, which is the object of the baby health centres.

When first brought to the centre, this baby was six weeks' old, and weighed 6½ lb.; he was breast-fed at intervals of three hours, but was very cross and difficult

to handle; a test-meal disclosed that he was only receiving 1¾ oz., and therefore the mother was advised to supplement the breast supply by giving her baby extra food after each feed. The mother was also shown how to stimulate the breast by hot and cold sponging, and was advised to visit the centre to receive massage.

Further inquiry elicited the fact that if the mother had been badly informed regarding the feeding of her baby, she had equally bad ideas as to her own diet. A "friend" had volunteered the information that fruit and green vegetables would upset the baby, and as a result the mother was denying herself the most important items in the nursing mother's diet. The sooner such ridiculous notions are banished, the better it will be for everyone. As continually pointed out, the nursing mother requires a normal, wholesome diet; she should have three good meals a day, and should drink plenty of cold water, including a glass before feeding her baby; she should also have plenty of fresh air, rest, and sufficient out-door exercise to maintain her general health.

KITCHEN GARDEN.

Cabbage, cauliflower, and lettuce may be planted out as they become large enough. Plant asparagus and rhubarb in well-prepared beds in rows. In planting rhubarb it will probably be found more profitable to buy the crowns than to grow them from seed, and the same remark applies to asparagus.

Sow cabbage, red cabbage, peas, lettuce, broad beans, carrots, radish, turnip, beet, leeks, and herbs of various kinds, such as sage, thyme, mint, &c. Eschalots, if ready, may be transplanted; and in cool districts horse radish can be set out.

The earlier sowings of all root crops should now be ready to thin out, if this has not been already attended to.

Keep down the weeds among the growing crops by a free use of the hoe and cultivator.

The weather is generally dry at this time of the year, so the more thorough the cultivation the better for the crops.

Tomatoes intended to be planted out when the weather gets warmer may be sown towards the end of the month in a frame where the young plants will be protected from frost.

FLOWER GARDEN.

No time is now to be lost, for many kinds of plants need to be planted out early to have the opportunity of rooting and gathering strength in the cool, moist spring-time to prepare them for the trial of heat they must endure laer on. Do not put your labour on poor soil. Raise only the best varieties of plants in the garden; it costs no more to raise good varieties than poor one. Prune closely all the hybrid perpetual roses; and tie up, without pruning, to trellis or stakes the climbing and tea-scented varieties, if not already done. These and other shrubs may still be planted. See where a new tree or shrub can be planted; get these in position; then they will give you abundance of spring bloom. Renovate and make lawns, and plant all kinds of edging. Finish all pruning. Divide the roots of chrysanthemums, perennial phlox, and all other hardy clumps; and cuttings of all the summer bedding plants may be propagated.

Sow first lots, in small quantities, of hardy and half-hardy annuals, biennials, and perennials some of which are better raised in boxes and transplanted into the open ground, but many of this class can, however, be successfully raised in the open if the weather is favourable. Antirrhinum, carnation, picotees, dianthus, hollyhock, larkspur, pansy, petunia, *Phlox Drummondi*, stocks, wallflower and zinnias, &c., may be sown either in boxes or open beds. Mignonette is best sown where it is intended to remain. Dahlia roots may be taken up and placed in a shady situation out of doors. plant bulbs such as anemones, ranunculus, freesias, snowflakes, ixias, watsonias, iris, narcissus, daffodil, &c. The Queensland climate is not suitable for tulips.

To grow these plants successfully it is only necessary to thoroughly dig the ground over to a depth of not less than 12 inches, and incorporate with it a good dressing of well-decayed manure, which is most effectively done by a second digging; the surface should be raked over smoothly, so as to remove all stones and clods, thus reducing it to a fine tilth. The seed can then be sown in lines or patches as desired, the greatest care being taken not to cover deeply; a covering of not more than three times the diameter of larger seeds, and a light sprinkling of fine soil over small seeds, being all that is necessary. A slight mulching of well-decayed manure and a watering with a fine-rosed can will complete the operation. If the weather prove favourable, the young seedlings will usually make their appearance in a week or ten days; thin out so as to leave the plants (if in the border) at least 4 to 6 inches apart.

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.

	May 1928.		June, 1928.		MOONRISE. May 1928.	June, 1928.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	6.20	5.13	6.38	6.38	3.36	3.36
2	6 21	5.17	6.38	5.1	4.6	4.13
3	6 22	5.16	6.39	5.1	4.34	4.47
4	6.22	5.16	6 39	5.1	5 4	5.30
5	6 23	5.15	6.39	5 1	5 37	6.20
6	6 23	5.15	6.40	5.1	6.12	7.10
7	6.24	5.14	6.40	5 1	6.51	8.6
8	6.24	5.13	6 41	5.1	7 37	9.4
9	6.25	5.12	6.41	5.1	8 26	10.4
10	6 25	5.11	6 41	5 1	9 20	11 5
11	6.26	5.11	6 42	5.1	10 15	...
						a.m.
12	6 26	5.10	6.42	5.1	11.15	12.5
13	6.27	5.10	6.43	5.1	...	1.7
					a.m.	
14	6.27	5.9	6 43	5.1	12.16	2.11
15	6 28	5.9	6.43	5.1	1.17	3.16
16	6.29	5.8	6.44	5.1	2.20	4.24
17	6 30	5.7	6 44	5.2	3.24	5.35
18	6 31	5.6	6.44	5.2	4 31	6.45
19	6 32	5.6	6 44	5 2	5.41	7 51
20	6.32	5 5	6 44	5.2	6.52	8.52
21	6.33	5.5	6.44	5.3	8.2	9.46
22	6.33	5.5	6.44	5.3	9.8	10.28
23	6.34	5.4	6.45	5.3	10.11	11.5
24	6.34	5.4	6.45	5.3	11.6	11.39
25	6.35	5 3	6.45	5.4	11 54	12.6
					p.m.	
26	6 35	5.3	6.45	5.4	12 33	12.37
27	6.36	5 3	6.45	5.4	1.8	1.11
28	6.36	5.2	6 45	5.5	1.39	1.39
29	6 37	5.2	6.45	5.5	2.7	2.14
30	6.38	5.2	6.46	5.6	2.40	2.47
31	6.38	5.2			3 6	

Phases of the Moon, Occultations, &c.

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

5	May	○	Full Moon	6 11 a.m.
13	,,	☽	Last Quarter	6 50 a.m.
19	,,	●	New Moon	11 14 p.m.
26	,,	☾	First Quarter	7 11 p.m.

Apogee, 5th May at 2 30 p.m.
Perigee, 19th May at 3 36 p.m.

An occultation of Epsilon Kapricorni by the Moon will occur in the morning on the 13th; about 1·45 in the latitude of Mackay and only a few minutes before 2 at places further south in Queensland; the reappearance of the star taking place about half an hour later at Mackay and a less number of minutes at places further south.

Kappa Kapricorni will be occulted on the same morning, about two hours and a quarter later.

This month will be remarkable for the number of phenomena which will be unobservable in Queensland. These will include the total Eclipse of the Sun, near midnight on the 19th; also the apparent conjunctions of Mars with the Moon on the 15th; of Uranus on the 16th, of Jupiter on the 17th, of Venus on the 19th, of Mercury on the 20th, and of Neptune on the 26th. Mars and Uranus, though in orbits many millions of miles apart will appear, in binoculars or telescope, to be very near to one another, especially on the 25th.

In May practically the only evening star will be Saturn, rising about one hour after sunset on the 1st and soon after sunset on the 15th. Mercury will be too insignificant, being on the far side of its orbit, beyond the Sun.

Venus and Jupiter will be visible in the east before sunrise and Mars higher up in the north-east.

7	June	○	Full Moon	10 13 p.m.
11	,,	☽	Last Quarter	3 51 p.m.
18	,,	●	New Moon	6 42 a.m.
25	,,	☾	First Quarter	8 47 a.m.

Apogee, 1st June, at 6.6 p.m.
Perigee, 16th June, at 11.54 p.m.
Apogee, 29th June, at 9.42 a.m.

The occultation of a small star in Libra (magnitude 5·8) will occur on the 2nd at about half-past 7 p.m. and may be conveniently observed from such places as Brisbane, Toowoomba, Warwick, and other places in Southern Queensland. At more northern parts of Queensland this occultation will occur some minutes earlier.

A star of about the 3rd magnitude in the Scorpion will be occulted by the Moon soon after half-past 12 on the night of the 2nd. A telescope will be necessary to observe it on account of the brightness of the full Moon.

Mercury will be at its greatest elongation, 23 degrees east on 3rd June; but its luminosity will be a good deal less than it was three weeks earlier.

The principal astronomical event of the month will be the total eclipse of the Moon on the night of 3rd June, between 9·31 and 10·47.

Lamda Sagitarii (magnitude 2·9) will be occulted by the Moon on the 5th so soon after rising at Warwick that both will be very near the eastern horizon.

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.