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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

A Bright Seasonal Outlook.

IMPRESSIONS of his recent official tour of the North were given by the Minister of Agriculture and Stock, Mr. Harry F. Walker, to the Press on his return. The whole of the North, from Capricorn to Cairns and the Atherton Tableland, was enjoying a remarkably fine season, said Mr. Walker, and the condition of the sugar-cane, maize, tobacco and other crops was excellent. The Minister had a strenuous tour with a heavy official programme to get through in the course of a very exacting itinerary in the middle of the monsoonal season. Heavy roads and swollen rivers were a daily experience. At each halting place farmers gathered to meet him and deputations and interviews often kept him engaged until midnight. The warm weather and beneficial rains, he observed, had caused phenomenal crop growth, and, altogether, the seasonal outlook was particularly bright. While in North Queensland the Minister paid a visit to the State Experimental Station at Bartle Frere, near Babinda, where experiments with bananas and other fruits were being carried out.

Mr. Walker was very much struck with the culture of tobacco near Mareeba, and he felt that when this year's crop was harvested in four or five months he should be able to speak with authority on the prospects of tobacco-growing in that area and in North Queensland generally. Experiments at Mareeba were being carried out very exhaustively. No pains were being spared to determine the most suitable variety and the best cultural methods to be adopted in the production of the crop.

The agricultural districts in the Central and Southern Divisions and the pastoral areas in the Western Division all benefited immensely by the recent continuous and generous rains, and, as a consequence, the seasonal outlook over nearly the whole of the State is particularly bright.

The Value of Trees—Dangers of Denudation.

STATEMENTS in a report issued recently by the Victorian Forests Commission are not without interest to Queensland farmers. That serious consequences are to be feared from forest denudation is a point very strongly emphasised in the report which states that the removal of forest cover, which affected otherwise assured

sources of water supply, had created an alarming problem in Victoria. In the Ovens Valley gullies miles long, and in places 30 ft. deep and wide, intersected comparatively level country. The deepening of these gullies meant the steady lowering of the water table and the desiccation of good farm lands. Huge gullies had been torn back into the hill sides. Washaways along the routes of roads and railways were becoming an increasing nuisance. Especially was this so in the north-east of Victoria, where a serious and growing maintenance expense was being forced upon road and rail authorities to cope with the speeding up of erosion by deforestation. On the hill sides of the lower Mitta basin there were unusually deep soil beds. These were slipping from the underlying rock beds, and in this area, in a distance of about 20 miles, approximately 200 landslides were visible. Siltation would become increasingly serious as irrigation works were extended. Deforestation along the catchments should be thoroughly investigated. Denudation as a result of settlement or fire must bring in its train a whole sequence of siltation troubles for the irrigation works, but more especially for the Hume Reservoir scheme. Soundings at Burrinjuck indicated already the progressive effect of silting. It might take many years to assume serious proportions, but the time to take action in controlling deforestation was at present. Equally serious was the problem of soil erosion due to wind. That was daily becoming a more urgent problem in many parts of the Mallee. The result was seen in the sand-drift problem causing roads, railways and fences to be submerged in sand, while fertile flats were also reduced in value. The first measure of protection was found in the reservation of sufficient areas to act as protection forests, for which the Forests Commission was continually pressing.

Agricultural Research—Empire Co-operation.

THE 1927-28 report of the Rothamsted Experimental Station at Harpenden records the fact that more and more workers are arriving from the overseas Dominions to carry on their studies at Rothamsted. None but university graduates are eligible, and most are, or are about to be, on the staffs of Government or other agricultural departments—men who will become leaders in the agricultural communities of their respective countries.

The most important of all these Empire developments has recently been inaugurated. At the Imperial Agricultural Conference of 1927 it was decided to set up in Britain a series of bureaux to act as general clearing houses of information and to promote interchange of ideas and methods between the agricultural experts of the different parts of the Empire.

At the invitation of the proper authorities, the director and other members of the staff have already visited the Sudan, Palestine, Australia, New Zealand, and Canada to discuss agricultural problems and possibilities of co-operation. In addition, visits are being paid to the United States and to European countries to discuss problems and methods with experts there, and generally to improve the equipment of the institution and widen the knowledge and experience of the staff.

The Future of Agriculture.

PROVIDED that farmers follow the lines of scientific production most suited to their localities, and that meteorologists are able to discover more about the weather, a progressive future is predicted for agriculture by Sir John Russell, the noted agriculturist and director of the Rothamsted Experimental Station in England. Some time ago, it will be remembered, Sir John Russell visited Australia and New Zealand and had much to tell us about modern agricultural developments. In the course of a recent article he discusses, among other things, the effect of the extending use of labour-saving machinery on the farm, and science as applied to agriculture. It seems reasonable to expect, he says, that specialisation and the use of labour-saving machinery will continue to increase in agriculture; and the expectation seems so good that a great deal of the scientific work is being shaped in accordance therewith. Specialisation has the advantage that it enables the farmer to become an expert at his job; it facilitates combined action in buying and selling, which in these days of organised business is absolutely essential; and it enables the farmer to utilise the resources of science. For the scientific worker specialisation means close adaption of crops to environment; the scientific problems are those associated with the relationships between plant of nutrients, and climatic conditions. Supply of nutrients is controlled by means of fertilisers. The art of cultivation—now gradually being reduced to a science—allows the control of air supply and to some extent water supply and temperature to the plant root. The reaction of the soil—whether slightly acid, slightly alkaline or neutral—is controlled by additions of lime or sulphur. In dry regions irrigation adds to the water supply, though it also concentrates into streaks and patches the salt which, in arid climates, is distributed

throughout the soil, making the areas barren. All these problems are capable of statement as scientific problems amenable to investigation by the ordinary methods of science. The adaptation of crop to environment is effected not only by changes in environment, but by changes in crop also; plant breeders are continuously bringing in new varieties of crops, and stock breeders are introducing new crosses among breeds of animals, the new forms in each case being more suitable to the surroundings, more acceptable in the markets, more resistant to diseases, or in other ways more acceptable than the old. Further, the scientific worker is gradually achieving some measure of control over plant and animal diseases and pests. Losses from these are always unwelcome, sometimes they are serious.

Finally, attempts are now being made to conquer the weather which, in the past, has dominated the farmers' activities. The constant factor of climate can already in part be overcome; dryness by irrigation; coldness, as in Northern Canada, by breeding varieties of plants requiring less time to complete their maturation. Even the variable factors of weather look as if they may in time be controlled to some extent. Modern statistical analysis as developed at Rothamsted shows the relationship between weather and fertiliser efficiency. If the general character of the season could be predicted, appropriate fertiliser recipes could be given to farmers, enabling them to take full advantage of the good features and to mitigate the bad effects of the harmful ones. Can meteorologists even make this prediction? If so, a great step forward in agriculture can be achieved.

The Need of a Forest Conscience.

COMMENTING on the tardy development of a national forest conscience, a writer in a recent issue of the Melbourne "Leader" expresses the opinion that every hill slope growing trees that holds back the soil, that fights erosion, should be treasured and improved. Every reservation that holds back the bank of a winding stream should be maintained on sound forestry principles. The day may come when the streams have to be straightened out, but always and for ever every bank should be protected from the action of flood waters by a fringe of good timber trees. Every pound of soil that goes down creek or river is so much loss. Good work is being done by the Forestry Commission, but much more is still needed, and the commission should receive the full support of every citizen and Parliament in its endeavours to rectify the mistakes of the past. Seventy years is but a beginning in forestry matters, but the records and results obtained during that period should form a guide to and an excellent basis for the operation of any future forest policy. Facts may be stubborn, but they are a much more lasting foundation for success than individual fads. It has taken the Americans some 260 years to bring their great forests to the verge of destruction, but Australians with the experience of the world before them have taken only a little over ninety years to bring their forests to the same condition of partial ruin. Constant demands are being made to throw open forest reservations for settlement, and bearing in mind the small area of good land now available, and the keen competition for such good land for occupation, it is fairly certain that many of the existing reservations as they are denuded of timber supplies will have to be utilised for settlement, and the proposal to make it compulsory that a certain area of all land under settlement must be devoted to forestry purposes is a wise and justifiable one.

With the development of systematic tree planting economics and æsthetics are both served and all concerned, landholder, school, township, State and nation will, in time, co-operate to secure and maintain such plantings. Parks, playgrounds, and recreational areas are a part of modern life. They could, in many instances, be improved and extended as national parks, and in time become a source of income, and at the same time furnish material for industry.

Every provincial centre or country town should seriously consider the possibilities and potentialities of a municipal timber reserve. It is not sufficient to confine activities to State school plantations. The need of wood for industrial purposes is already apparent, and the co-operation of all factors—town, country, State and nation—will only be effective when all realise to the full the urgent need for systematic forestry development and re-afforestation. One thing, however, is essential to the success of the proposal. The adaptability of the various trees to the various sections of the States should be made available, as well as the uses to which they may be put. Facts concerning what to plant, when to plant, where to plant, and how to plant should be prepared and widely distributed. Accurate information is the basis of successful effort, and the services of such bodies as the Forest League, the Tree Planters' Association, and other similar bodies should be availed of in an effort to arrive at the most suitable trees to plant, not only for each district of the State, but also for future utilitarian purposes.

THE QUEENSLAND SUGAR INDUSTRY.

By H. T. EASTERBY, Director, Bureau of Sugar Experiment Stations.

In this series of articles is incorporated the material for a revision of a Bulletin on the Sugar Industry which Mr. Easterby prepared some years ago. Since then the industry has developed to such a degree, and the conditions have so altered, that a revision has become necessary. At the same time, it is recognised that the sugar industry in Queensland, which supplies 96 per cent. of Australian-grown sugar, is so many-sided and is governed by so many factors that it forms in itself a complicated study of no mean magnitude, and one with which it is impossible to deal completely in much less than a large volume. The industry has also in recent years become bound up closely with both Federal and State policy.

Mr. Easterby has covered his subject thoroughly under several heads, each of which he discusses with all possible brevity while retaining every essential of a very interesting narrative.

In this instalment Mr. Easterby continues the review of the development of the industry in pre-Federation days.—ED.

PART III.

(a) Short History of the Industry prior to Federation.

(Continued.)

The Government of Queensland for the past sixty years or more have naturally been keenly interested in the welfare of the sugar industry, recognising that it was an asset of considerable value, and later on that it was destined to become Queensland's largest agricultural industry, giving employment to thousands and distributing millions in the shape of wages. The interest displayed in the industry is partly reflected in the number of Acts passed for its regulation and betterment.

Before the nineties, the Government of the day imported sugar-cane plants, and propagated canes for distribution in the Botanic Gardens, and from that time on have frequently brought out the best varieties growing in other countries.

In 1893, the Department of Agriculture sent Mr. Ebenezer Cowley —at that time overseer of the State Nursery at Kamerunga—to New Guinea, in order to obtain new kinds of sugar-cane, and he came back with a number, of which Batoe, Chenoma, Oraya, and Kikarea did the best, and were grown for some time. Indeed, Kikarea can still be found in the Logan district.

In August of 1895, Mr. Henry Tryon, Entomologist and Pathologist to the Department of Agriculture, was commissioned to proceed to New Guinea and collect a large number of sugar-cane varieties, which were to be sent to the State Nurseries of Kamerunga and Mackay in Queensland, and also to the Department of Agriculture in New South Wales. Mr. Tryon brought back sixty-six varieties, including the well-known

PLATE 60.—INTERIOR OF LABORATORY, SUGAR EXPERIMENT STATION, MACKAY.

"Badila," which is considered to be the best variety ever introduced into Queensland. The sugar industry undoubtedly owes a great debt of gratitude to the Department of Agriculture for this cane, to which successful canegrowing in the North is largely attributable. Seeing that in many of these areas 95 per cent. of the cane grown is of this variety, it is not stretching the point to say that quite a number of growers owe their success as cane farmers to it.

In 1898, the Government decided to establish a Sugar Experiment Station at Mackay, and a laboratory was erected on the grounds of the State Nursery and put under a chemist-in-charge. A strong feeling about this time made it evident that the sugar industry required scientific guidance and advice. Comparisons were made between yields of Queensland and those of Hawaii, and it was felt that an independent inquiry into the industry should be conducted. Representations were made to the Government for the engagement of a suitable expert to report upon the condition of the sugar industry in Queensland, and it was arranged for Dr. Walter Maxwell, at that time Director of the Experiment Station of the Hawaiian Sugar Planters' Association, to visit the colony and report upon its sugar industry.

In January, 1900, Dr. Maxwell presented his report to the Secretary for Agriculture and Stock. He reviewed the climate, geological formation, and soils, and pointed out that soils may be of great natural fertility, but if certain elements were removed they must be restored. He stated that in every district from Cairns to Isis recollections were preserved of the crops that used to be grown, from 70 to 80 and even 100 tons of cane per acre, while at the time of his inspection they had decreased considerably. He dwelt on ratooning, pests, disease, and irrigation. In speaking of the cane grown he said:—

> "It is found that most of the large sugar-growing estates, which were originally in the hands of the large planters, have been cut up into farms and rented or sold to numerous canegrowers, particularly in the case of the areas that are furnishing cane for the Government Central Mills the growing is done by farmers who have taken up and own or occupy those lands. These facts place before us a situation that is almost unique and peculiar to Queensland. In other canegrowing countries the estates are in the hands of extensive owners or controlled by large corporations, which state carries with it the consequence that a minimum number of white men are located on the land. In this colony the ownership or occupancy embraces a vast number of strong, responsible, and progressive white men, who are planted over all the sugar-growing areas. These men furnish the material which puts the mills into operation, and, as the mills depend wholly upon the field, it appears that the future of the sugar industry of the colony is very much in the hands of these numerous and small canegrowers.

"The principle of small ownership and occupancy is right and sound, leading as it does to the dividing of the matters at stake amongst a maximum number of responsible men, it furnishes a broad and safe basis for the industry. Small ownership and occupancy, however, have their peculiar drawbacks and dangers. In the numerous cases of occupancy by men who are renting the land, it has been found that the tenure is extended to farmers almost wholly without conditions. Under such agreement the lands can be cropped and recropped, the fertility reduced year after year and nothing returned to the soil, and the mills depending upon them closed for need of material. Whilst stating that these are the results that can follow and are following such a mode of tenancy, it has to be understood that farmers are not the only causes nor even the chief causes of soil beggaration; in fact the tenancy of the farmers is too recent in many cases to be responsible for the state of the soils, and, moreover, it is known that some large estates have done better since they passed into smaller hands. In the case of farmers who occupy and are working their own freeholds, the conditions are different, but the results may be and are, in many examples, the same. Many of these owners are men who were farmers in other countries, but their experience has not necessarily prepared them for the agriculture of cane. Again, numerous others were the followers of divers trades and crafts, and land work with them is a very recent thing."

The report then went on to deal with the manufacture of sugar.

Dr. Maxwell's recommendations were that the canegrowers and manufacturers' sections should form themselves into one body to be known as "The Sugar Growers and Manufacturers' Association of Queensland," to introduce modern scientific methods of agriculture, and still further improve modes of manufacture; that three Experiment Stations be provided, and a Director be appointed to establish such Stations and engage chemists, &c., examine soils, institute experiments, inspect mills, and advise canegrowers.

The outcome of this report was the introduction and passing of an Act to provide for the establishment and control of Sugar Experiment Stations, known as "*The Sugar Experiment Stations Act of* 1900."

Under this Act Dr. Maxwell was appointed the first Director, and took over the existing Sugar Experiment Station at Mackay. A chemical laboratory for soil, fertiliser, and other analyses was erected at Bundaberg, but the Experiment Stations for the Southern and Northern areas were not established till after the departure of the first Director.

It is rather curious that the heavy yields of cane mentioned as having been obtained in the early days in Dr. Maxwell's report, and even to this day spoken of by old canegrowers as being common on

virgin soils, were not duplicated when the new lands of Babinda, Tully, and South Johnstone were opened up. Certainly, heavy crops were harvested, but little was heard of 80 and 100-ton crops. Were the early pioneers of the sugar industry looking fondly back to their early struggles, and perhaps letting their imaginations have full play, or were these big crops actual realities in the days when the scrubs were plentiful and the land in its pristine condition? Of course, too, it has to be remembered that many of the crops in the Southern areas were from eighteen months to two years old.

The sugar production from 1891 to 1900 varied from 51,219 tons to 163,734 tons. In 1901, there were still some sixty sugar mills in operation.

Wages at this period (1900) were on the low side, although money had much more purchasing power than it has to-day. The common rate of wages for white field labourers, of whom there were not many, was about £1 a week and keep.

Nearly all the cane was cut at that time by Kanaka labour. It was estimated that a "boy" at 2s. 6d. per day often cut and loaded into a dray or wagon 3 tons of cane, at a cost of 10d. per ton, while with portable line the cost was somewhat higher, the average being 1s. 3d. per ton. The cost of cutting by white labour at that time was 3s. 6d. per ton.

The costs of growing cane on forest land and scrub, by white and black labour, have been given in a booklet on the Town and District of Mackay, as under:—

FOREST LAND.

	White Labour.				Polynesian Labour.		
	£	s.	d.		£	s.	d.
*Clearing, quarter cost	1	17	6	..	1	0	0
Ploughing four times, average ⅝-acre per day	1	14	6	..	1	12	3
Harrowing and rolling	0	10	2	..	0	6	3
Planting (cutting, carting, drilling, laying, and covering)	1	2	8	..	0	14	2
Hoeing three times	1	10	0	..	0	15	0
Supplying	0	10	0	..	0	5	0
Cultivation with horse implements	0	13	4	..	0	9	3
	£7	18	2	..	£5	1	11

* Only quarter cost against the first crop is here charged.

SCRUB LAND.

	White Labour.				Polynesian Labour.		
	£	s.	d.		£	s.	d.
Brushing and falling	2	0	0	..	1	0	0
Burning and clearing	2	5	0	..	1	2	6
Holing	3	10	0	..	1	15	0
Cutting plants, carting, and planting same	1	5	0	..	0	10	0
Hoeing three times	3	7	6	..	1	10	0
	£12	7	6	..	£5	17	6

Only the cost of labour in connection with field operations is included, such items as supervision and depreciation not being taken into account.

These figures were stated to have been collected very carefully at the time.

At the end of last century it was considered that the sugar industry was not being conducted upon the most economical and advanced lines, and that in many directions it could be improved. At that time the number of small uneconomic and inefficient mills were commencing to disappear, and more attention was beginning to be paid to the problems of manufacture. It was acknowledged that more progress had by that time been made since the days when every planter had his own factory, and when thirty mills in one district were turning out an absurdly low tonnage of sugar. It was, however, recognised that scientific control must enter into sugar making, and the most up-to-date mills began to search for chemists who could give assistance in manufacture. With the practice then coming into being of making raw sugar for the refiner instead of every mill being a law unto itself and searching for a market, the price became more certain, and the manufacturer could ascertain more definitely what he was likely to get for his product. Mechanical labour-saving appliances began to be used, at first with some hesitation, but as time went on and labour began to gradually increase in price, such methods became more widely favoured. It must be remembered that at the beginning of this century 40,000 tons of cane for a single mill was considered a big crop.

Some of the figures of one of the principal mills in the Mackay district for the 1900 season are here given:—

Tons of cane crushed	21,617
Number of growers	73
Tons of sugar manufactured—88 net titre	2,530
Average tons of cane to ton of sugar	8·54
Average cost of cane at the weighbridge	£0 13 8
Average cost of manufacture in mill per ton of sugar	£1 2 2
Average cost of manufacture and all expenses to f.o.b.	£7 8 2
Total cost per ton of sugar including maintenance and interest	£8 17 10
Output realised per ton	£9 19 7

We are now approaching the formation of the Australian Commonwealth, which carried with it tremendous changes to the Queensland sugar industry. These will be dealt with in the next sections.

[TO BE CONTINUED.]

USEFUL AND INTERESTING.

A Yerra (Gayndah Line) farmer writes (19th January, 1930):—"I have always found the Journal useful and interesting, and appreciate its earlier arrival."

Bureau of Sugar Experiment Stations.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

BY EDMUND JARVIS.

Inspection Before Planting Cane.

Nature's law, that like produces like, is too often overlooked, although in the long run any little trouble or expense that may be incurred by the observance of it will be found to have been well worth while.

The following hints, in connection with the matter of selection of suitable setts for planting, should prove useful to those cane farmers who aim at getting best results.

Damage to Setts by Larvae of Bud Moths.

Firstly, the question of clean healthy buds should always receive attention, as injury to these by small caterpillars of our bud moth (*Opogona glycyphaga*) is very likely to occur in soft varieties of cane like "Clark's Seedling," &c.

Badila also, is freely attacked, the damage, however, being usually confined to the rind. The presence of this cane pest is at once betrayed by the occurrence of short meandering tracks, gnawed by the caterpillar on the surface of the rind close against a node.

Weevil Borer (*Rhabdocnemis obscurus* Boisd.).

The presence of this formidable beetle is revealed by conspicuous holes in the ends of setts, indicating spots where its tunnels have been cut through transversely. Any grower aware of the occurrence of such injury, but still making use of these borer-infested plants, is deliberately courting future trouble and ultimate monetary loss. Only by strict examination of all canes procured from outside plantations, can one hope to keep this weevil borer from obtaining a footing in clean canefields.

Mealy Bug (*Pseudococcus* sp.)

Most farmers are familiar with these soft-bodied semi-globular insects which have the appearance of being dusted with white powder, and are found rather commonly under the older leaf-sheaths of cane. Although at present a minor pest in Queensland, it is not advisable to plant setts harbouring colonies of this mealy bug. Their presence on plants can be determined by removing any loose portions of leaf-sheath that may be adhering to the setts.

Advantages of Intensive Cultivation.

Unfortunately, this interesting subject, although of primary importance to our growers, seldom receives the attention it deserves. The more thorough cultivation the greater likelihood there is of our obtaining maximum results.

It should be remembered that a cane stool is, after all, a living organism, and just as animals respond to generous treatment, so it is with members of the vegetable kingdom.

Frequent cultivation to a depth of from 5 to 8 inches or more, on land of a friable nature, and which is well drained and properly manured, cannot fail to establish ideal conditions for plant growth and healthy development.

In such well cultivated land the fibrous feeding roots of young cane are able to extend some distance into the soil, instead of, as happens in poorly cultivated fields, being forced to grow quite close to the surface; thus permitting, in the former case, a longer period of time in which to disturb the cane grubs, before the stools have grown too high, or the roots taken full possession of the soil between the rows.

CANE PEST COMBAT AND CONTROL.

Mr. E. Jarvis, Entomologist at Meringa, reports as follows on the entomological work carried out at Meringa Experiment Station during the period December, 1929, to January, 1930, to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—

Interesting Occurrence of Cane Beetles.

On 17th January, notice was received at this station of a serious outbreak of greyback cane beetles on a plantation near Bamra. So numerous were these cockchafers over an area of about 70 acres that one or more specimens probably occurred

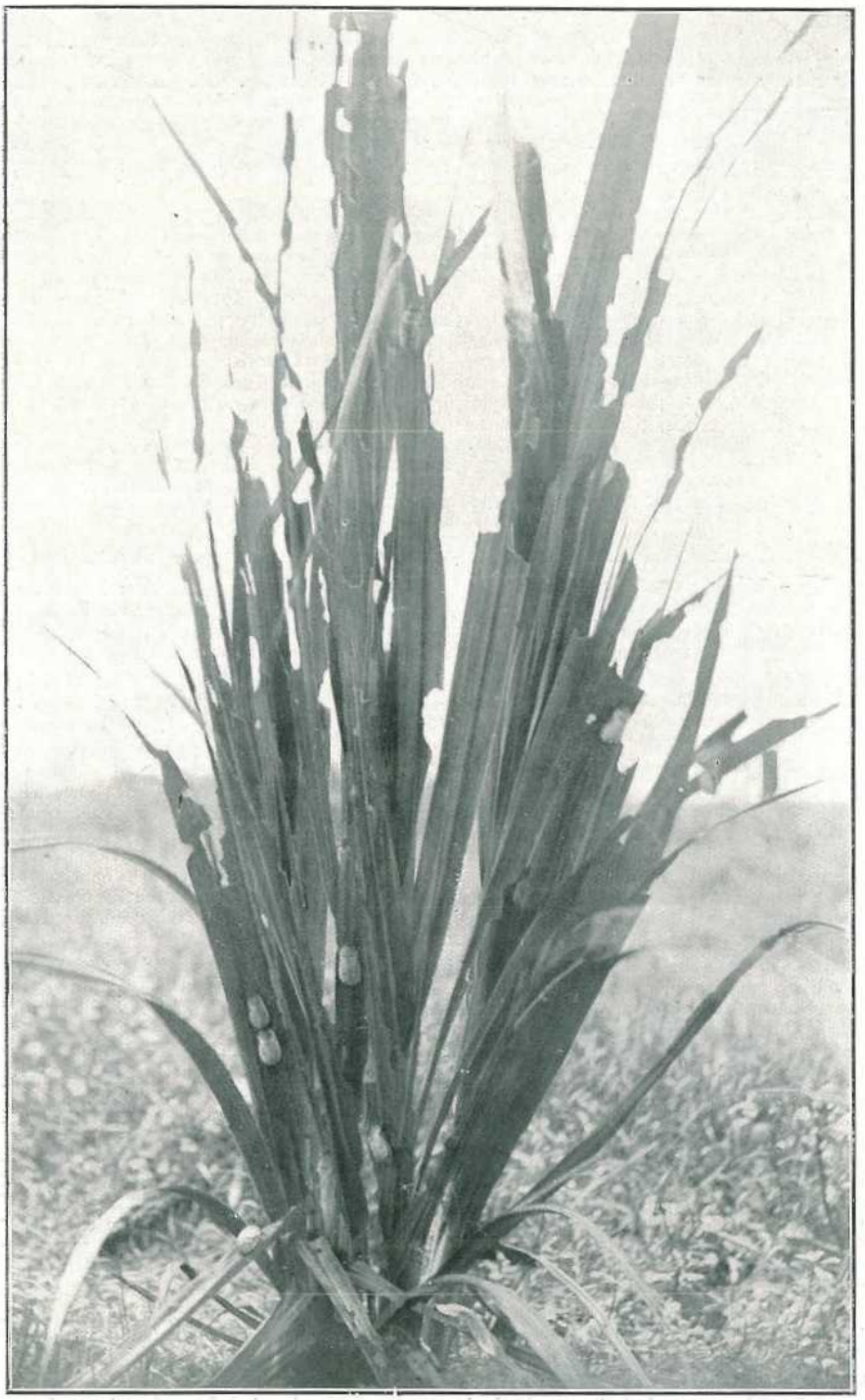

Photo.: J. H. Buzacott.]

PLATE 61.—YOUNG CANE STOOL OF VARIETY D. 1135, SHOWING LEAVES BADLY EATEN BY GREYBACK COCKCHAFERS (*Lepidoderma albohirtum* Waterh.).

Note these beetles resting on the leaves, near base of stool.

on at least 50 per cent. of the stools. In many cases from twenty to thirty or more were counted on a single plant, while on badly infested acres the leaves were practically destroyed, little more than the midrib remaining. The nature of such damage was peculiar and characteristic, the edges of blades which had been left close against the midrib being nibbled in such manner as to present a scalloped appearance (see accompanying photograph). On young central leaves, however, the blade was often entirely stripped to a distance of from 12 to 18 inches back from the point, leaving merely string-like filaments (the midribs).

Mr. J. H. Buzacott, Assistant Entomologist, who was sent to inspect this assemblage of beetles, was fortunate in securing some unique photographs of injured stools with greybacks resting on same. Some boys who were collecting at the time obtained two and a-half kerosene tins full of beetles from 4 acres of D. 1135 in a few hours, an amount representing about 11,000 female cockchafers. In such cases the common-sense remedial method of destroying as many of the beetles as possible in the immediate vicinity of an outbreak is all that can be done in the way of control, and usually proves effective. The importance of such work is realised when one considers that the above-mentioned two and a-half kerosene tins full of beetles captured at Banna would have produced (presuming half these specimens to have been females) about 326,400 grubs, a number able to completely destroy 6 acres of cane. It appears, therefore, that in such cases of infestation it is quite possible to effect a considerable saving, even by a few hours' collecting. This being so, the value likely to be secured from a well-organised campaign against this cockchafer during the first couple of weeks of the flighting season must surely be apparent to all.

Factors Accountable for Alarming Local Outbreaks of Greyback Cockchafers.

As a general rule greybacks, after emerging either from forest or cane lands, fly at once to the nearest feeding trees, and are seldom found resting upon or eating cane leaves. As a matter of fact, this food plant is anything but a favourite, being seldom eaten unless under compulsion or as a result of prevailing abnormal conditions.

With regard to the recent outbreak at Banna it would seem that these beetles probably emerged from cane land which had been much damaged by grubs last season. Had such infestation been at the rate of, say, five grubs per stool throughout an area of about 50 acres, the beetles escaping from this cane land must have numbered at least 2,000,000.

Owing to the long-continued dry weather experienced they were doubtless much weakened, and may have only just managed to reach the surface. The only food immediately available was found to be cane leaves, so, in order to gain sufficient strength to enable them to fly, they were probably forced to eat the first thing that offered in the way of food. Normally, this species (*Lepidoderma albohirtum* Waterh.), after emerging from the soil, endeavours without delay to reach the nearest feeding trees, amongst the top branches of which mating usually takes place at a height of from 20 to 30 feet from the ground.

In the case under consideration the beetles at Banna, after regaining strength, are likely to leave the cane, and seeing that there are few trees close at hand may travel several miles in search of suitable food, in which case they are not likely to return, but will probably lay eggs in the nearest cane land.

In the event of the Banna outbreak not having arisen locally from grub-infested cane fields, the presence of so vast an assemblage of beetles could be accounted for from the standpoint of migration. As mentioned in previous reports, the invasion of cane land in the early days around the Mulgrave and Highleigh districts was apparently brought about by beetles which had migrated there from extensive breeding grounds. The natural laws governing the movements of certain insects are too complex and varied to deal with here, but it may be mentioned that several species, including our greyback cockchafer, when chancing to multiply exceedingly over restricted areas, generally seek to migrate when possible in order to ensure a wider distribution of eggs, and to establish their grubs or larvæ on different classes of soil, thereby hoping to reduce the percentage of mortality likely to be caused by birds, parasitic insects, and other natural enemies.

The danger which invariably threatens any animal (man included) when happening to become overcrowded, or to increase abnormally, not only sounds a note of warning, but at the same time calls for wider dispersion of the species, as being the simplest and most effective remedy.

We will assume that the greybacks in question had migrated from forest country, and upon reaching green cane lands in the vicinity of Banna decided to come to rest in that locality. Had this happened the source of invasion would probably have originated either on some portion of the forest land reserved for a national park in the

parishes of Sophia and Bellenden Ker, or else on the State Forest Reserve in Cadgarra, lying south-west of Sophia and south of the parish of Grafton. In the former case the line of flight chosen by these beetles would have taken a south-easterly direction over the country lying between the Mulgrave River and the Pyramid Range.

It seems more likely, however, that the breakaway in the present instance would have occurred in the Cadgarra area, in which case the course of flight would probably have skirted the western slopes of the Pyramid Range, thus landing these cockchafers right over the centre of the districts of Banna and Aloomba.

FIELD NOTES.

Extracts from a Report on the Lower Burdekin, made by Mr. Albert P. Gibson, Field Assistant to the Director of Sugar Experiment Stations (Mr. H. T. Easterby), at the end of 1929:—

Canegrowing in the Lower Burdekin district is of a highly interesting nature owing to the fact that cane in these areas is irrigated. Considerable all-round improvements have been made here during the last few years, though much still remains to be done.

Work in the field and mill during the 1929 season proceeded without interruption. The crop in quantity and quality was excellent, and the greater part of it was crushed when it contained its maximum amount of sugar.

The total tons of cane milled at the four factories in this district constituted a district record and is as follows:—

	Tons.
Pioneer	134,789
Inkerman	164,328
Haughton	79,547
Kalamia	179,000
	557,664 tons.

Rainfall.

The average rainfall is about 42 inches per annum, but this is badly distributed. Most of it falls the first three months of the year, and in consequence irrigation is generally required to ensure a payable crop.

Cultivation.

Very often the depth of tilling and ploughing the same depth continuously forms a hard pan. This retards drainage, aeration, and deep rooting.

Drain where possible, plough in trash or legumes, and it is thought the application of molasses would gradually improve the soil texture.

Prepare the soil well before planting; some farmers strive to do this afterwards. The depth of ploughing and the number of ploughings really depends on the soil thickness and its texture; a shallow soil may be deepened and improved by gradually ploughing deeper.

Farmers should get to know their soil types and study cultivation, fertilising, and good disease-free varieties of cane most suitable for them.

Irrigation.

Water suitable for irrigation is generally cheaply and abundantly obtained in this district. The water after reaching the surface is gravitated through round or half round galvanised iron flumes or open earth ditches to the field supply drains, from whence it is delivered through pipes 2 ft. long by 2 in. diameter (placed in the drain banks) to the cane or interspace rows; upwards of sixty of these are sometimes watered at once.

Recommendations.

1. It is of paramount importance to have good drains, and these should be kept grass free. Much valuable time and water and money are saved when these are judiciously made and kept clean.

2. Dry farm newly planted cane as long as practicable. Irrigate the cane row until the foliage covers the bare spaces. By so doing deeper rooting is encouraged.

3. Watering the cane in the interspaces has the tendency to form a greater number of surface roots.

4. Irrigate the ratoons immediately after the trash is burnt and cultivate as soon after as possible.

Major Varieties Grown.

New Guinea 15 (Badila) and B. 208 grown on the better lands. H.Q. 426 and E.K. 28 grown on the poorer lands. B. 208 this year again has done remarkably well. This variety when irrigated shoots at the stem badly after a growth check is experienced.

Pests and Diseases.

Destruction of the crops by pests and diseases is less than in any other Queensland district. Grubs and giant white ants have been responsible for some damage. It is recommended that all dead timber in or surrounding the field affected be removed. The control of this latter pest requires much study, as it is possible that it may find sugar-cane so succulent that it will be preferred to their natural food.

New Crop Prospects.

It was necessary to irrigate most of last year to keep the crop growing, and the increased number of waterings will naturally raise the cost of production. The present crop has had a favourable start and looks promising, though generally it is less advanced than it was this time last year. The area to be harvested for 1930 is said to be greater than last year.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report for the month ended 12th January, from the Assistant Entomologist at Mackay, Mr. A. N. Burns.

Occurrence of Chrysomelid or Leaf-Eating Beetle (*Rhyparida lin batipennis* Jac.) at Oakenden.

Last month whilst visiting several farms in the Oakenden district with reference to damage caused by grubs of the black stem gouger beetle (*Pentodon australis* Blkb.), attention was drawn to the numerous dead shoots in many of the stools. Large shoots were not affected, but in some stools as many as four or five of the small shoots were quite dead. Opening up the basal portions of some of the partially dead ones revealed the presence of numbers of small, whitish-curved grubs, which, when later bred through at the laboratory, turned out to be the above species. Some of these grubs were also found in the ground around the stools, as well as several pupae.

Nature of Injury.

The young larvae enter the basal portions of the shoots below the ground level and eat out the whole of the interiors for the length of an inch or more; this causes the aerial portions of the shoots to die. One of these grubs is evidently capable of being able to destroy several shoots, because grubs of all sizes were found in shoots which had only been attacked for a short period before inspection. This was evident because only small holes were eaten into the sides of these shoots, and the young grubs were in these holes. In the same stools there were dead shoots with their bases eaten out and quite rotten.

Larva.

Length when fully grown (in curved position) about ¼ inch (7 mm.) Colour, dirty creamy white. Head pale yellowish brown, mandibles black, labrum or upper lip (plate-like between mandibles) grey-black. The first body segment behind the head bears a large yellowish dorsal marking. Legs pale yellowish, faintly tipped brown. If viewed under a magnifying glass the sides of the body will be seen to have a thin row of fine whitish hairs—two or three to each segment.

Pupa.

Length slightly less than ¼ inch (about 6 mm.), pale yellowish white but becoming dark brownish black just before emergence. The head and eyes are the first to darken, and that usually takes place about eight days after the change from larva to pupa. The posterior end of the anal segment carries two brown spines, slightly curved outwards, and fairly widely separated at their bases.

Beetle.

The adult beetle is brownish yellow in colour with the posterior ends of the femors (thigh joints) of the legs darker. The eyes are large and prominent, black. The antennæ or feelers are long, eleven jointed, light brown in colour, and have the last five joints darker than the others. The surface of the thorax and elytra are minutely punctate, the punctations on the elytra forming definite longitudinal rows. On each elytron are two dark-brown streaks and a small dark spot; the longest and more noticeable of the two streaks is nearest the inner edge of each elytron and is situated at about two-thirds from the thorax, the other and shorter streak is near the outer edge of each elytron and is about half way from the thorax. The brown spot is situated on the "shoulder" of each elytron, laterally, and where the slope commences towards the dorsal surface of the elytron. This insect is rounded in appearance but is longer than broad. It measures just less than ¼ inch in length (7 mm.) by almost 2/10-inch in width (4 mm.).

This beetle is regarded as being a minor pest of sugar-cane only, and it is doubtful if the extent of damage caused by it calls for artificial control measures. Plenteous working of young cane is very helpful in keeping down insect enemies of this nature; many are thus exposed to the surface and are therefore destroyed by ants and insectivorous birds. Should, however, a great number of shoots be attacked, the cutting out as low down as possible of those which are just commencing to wither will remove a good many of the grubs. The grubs will have forsaken the dead shoots, therefore it is useless to remove these.

Emergence of Cane Beetles.

Following the welcome rains that commenced on the 28th December, 1929, a general emergence of cane beetles and associated species occurred. It is evident that the long and continued dry spell prior to these rains has been responsible for many beetles perishing in their cells. Even at the time of writing though there has been a total of well over 7 inches of rain, it has not penetrated to a depth of more than about 15 inches in some places. In view of this it is likely that fresh beetles will still be emerging from day to day, so that the complete emergence will be spread over a period of from two to three weeks. Greybacks (*L. albohirtum* Waterh.) are flying freely each evening and large numbers are being collected daily from the feeding trees, especially along the river from Rocklea to Dumbleton (near Mackay). Other receiving centres are also getting large numbers daily.

The flight of frenchi beetles (*L. frenchi* Blkb.) in the vicinity of the Experiment Station is considerably less than it was last year, and the beetles only appeared in appreciable numbers for the first few evenings during the first week of rain. Collectors near the Station reported getting several pounds each evening from fences, shrubs, &c., and in the same areas are now finding it difficult to collect 1 lb. during an evening. This would appear to indicate that the long dry season has accounted for many of these beetles, because last year they were numerous for at least three weeks after the rains commenced.

The numbers of the "Anomala" or small blue-bronze beetle (*A. australasiae* Blkb.), which may be seen at dusk collected on fence posts and lantana and franjipanni flowers, appears to be in about the same force as last year. This species would not probably suffer so much from the effects of the dry spell as other species because it does not pupate very deep, consequently the beetles would have a better chance of escape when the rains came. About a month ago at Peri, 5 miles from Mackay, a small local emergence of these beetles took place after a thunderstorm which yielded about half an inch of rain. No other cane beetles were noted there at that particular time.

The Christmas Beetle (*A. boisduvali* Boisd.) and Allied Christmas Beetle (*A. porosus* Dal.) are fairly plentiful on their feeding trees which are chiefly guava bushes and blue gum trees (*E. tereticornis*). They do not appear, however, to be in such great numbers as they were last season, because trees which were then almost completely defoliated are so far scarcely showing any signs of their ravages. Collectors near the Station report that they are not getting as many of these beetles as they usually do. This, of course, may not apply to all localities around Mackay.

The Golden Beetle (*C. mastersi* Macleay) appear to be in about the same numbers as last year; the writer visited some of its feeding trees (the prickly cork tree, *E. verspatilio*) last week, and the beetles were equally as plentiful as they were there last year, except that last season they appeared fully three weeks earlier, in the middle of December.

The large blue-green beetle (*R. aeneus* Fab.), which is usually fairly plentiful on Moreton Bay Ash trees (*E. tesselaris*), appears to be scarcer this season. Two examples only have so far been collected by the writer whilst collecting beetles, and collectors report that this species is scarce this season.

The green beetle (*C. rayneri* Macleay), usually found fairly freely on Bloodwood trees (*E. corymbosa*), is being collected in numbers from the paper bark tea-trees (*Melaleuca leucadendron*) growing along the river banks. This species was not so plentiful last year as it is at present.

It can therefore be fairly reliably estimated that the beetles' flight in general is not so large as it was last season. In some isolated areas where earlier storms occurred, and, as was the case, the flight may be of usual magnitude, but the above estimation applied chiefly to the country round the Experiment Station and Racecourse mill. Owing to the long dry season a natural check has resulted, but this does not necessarily mean that grubs will be scarce during the coming season.

Mr. R. W. Mungomery, Assistant Entomologist at Bundaberg, has furnished to the Director of Sugar Experiment Stations, Mr. H. T. Easterby, the following notes for publication, these having a bearing on grub damaged farms, which can now be seen in a few parts of the Bundaberg district:—

Notes on Grubs.

Grub damage during the past few months has been of a severe nature, several portions of the Bundaberg district having suffered through these pests. This is, no doubt, due in a large measure to the dry weather which prevailed during early spring, when grubs resumed feeding after a period either of inactivity or of lessened aggressiveness during the winter.

In winter grubs are located at deeper depths in the soil, and after their return to the upper soil levels, they begin feeding on the roots and underground portions of the stool, these serving as sources of food and moisture, both of which are necessary for their development. Consequently the cane, being in an enfeebled condition on account of the dry weather and being deprived of its roots, was doubly handicapped and the stools soon began to wilt, turn yellow, and finally die.

Q. 813 was the variety found to be most affected, and growers are advised not to plant this variety when their farms lie within the zone in which they are likely to suffer grub damage. In all cases it is preferable to substitute a deeper rooting variety, and Black Innis is one which might be grown more extensively since this cane stands up fairly well to a variety of harsh conditions.

When to Plough Out.

Ploughing out grub-infested cane should be done as soon as possible—i.e., during the hot summer months, when grubs are feeding near the surface, and all are within the reach of the plough. Their numbers are considerably lessened by the cutting and crushing effects of the discs, by sun injury, by insectivorous birds, and finally if those remaining be hand picked and destroyed the farm will be rid of a serious potential source of infestation for future years.

If this latter precaution is neglected or the block allowed to remain for some months, the grubs commence to retreat into the deeper subsoil, out of reach of the plough, and there they later change into pupae and beetles, the latter being the stage in which reproduction takes place, and so the vicious cycle commences anew.

Excessive wet conditions and cold weather both tend to send grubs downwards, and the object of the farmer should be to get these grub-eaten blocks cleaned up immediately, otherwise unfavourable weather conditions might prevent this being done.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report, dated 29th January, 1930, from the Sugar Pathologist, Mr. A. F. Bell:—

FIJI DISEASE.

Bundaberg District.

A fresh outbreak of this serious cane disease was discovered recently on the properties of six suppliers to the Bingera mill. In each case the infected cane was rogued or ploughed out as soon as the discovery was made, and the fields will be kept under observation by the Pathologist to the Bureau of Sugar Experiment Stations, stationed in the district.

It is well known that a cane plant may contract the disease, but on the other hand, may not show any signs of the disease for some months. For this reason it is possible that the disease exists on other farms but in a stage which could not

be detected by our Pathologist, and the outbreak may be more extensive than is now supposed. All farmers in the Bingera district are warned that they should keep a continuous watch for Fiji disease, and they should be particularly careful if buying cane for plants. The varieties to be suspected are 1900 Seedling, D. 1135, New Guinea 16, and Garvan's Black. Any suspected canes should be reported at once to the Sugar Experiment Station, Bundaberg, or the Director, Bureau of Sugar Experiment Stations, Brisbane.

Moreton District.

Fiji disease was first reported from this district in 1927-28, when it was found on four farms in the Bli Bli area, in the variety H. 227. During recent inspections no sign of the disease could be found on three farms, but on the fourth the owners have neglected to carry out the simple methods of control and the disease has persisted, and is a source of danger to neighbouring farms. Two fresh outbreaks have occurred, involving two farms at Landsborough and four comparatively isolated farms at Coolum, the variety affected being D. 1135. Growers should be on the alert and watch for this disease, and any suspicious symptoms should be reported to the Director, Bureau of Sugar Experiment Stations, Brisbane.

In particular, the varieties D. 1135 and H. 227 should not be planted without a careful inspection.

Symptoms.

The main symptoms are as follows:—

1. Usually, the first symptom is the fan-like appearance of the top caused by the young leaves failing to develop properly and being short and blunt and curled inwards. The margins of these leaves often have a scalded appearance.

2. In the later stages all leaves are affected in this manner, and the stalk bears only a few stiff dwarfed leaves.

3. The short, blunt leaves are a darker green than normal healthy leaves.

4. On the back of these leaves, running along the veins, may be found small light coloured swellings or galls. These generally range from ¼ to 2 inches in length, and are usually about 1/20-inch wide. It is necessary to find these galls before one can be certain that Fiji disease is present.

Control.

1. In the first instance, care should be taken to plant cane from fields in which the disease has never been observed.

2. Uproot all diseased stools in fields in which the infection is less than, say, 5 per cent.

3. Fields in which more than 5 per cent. of the stools are infected should be ploughed out immediately after harvesting.

An account of the symptoms of the disease, together with photographs, may be found in Bulletin No. 2 of the Division of Pathology of the Bureau of Sugar Experiment Stations, which bulletin is available on application.

Fiji disease is one of the most serious diseases of sugar-cane, and twenty years ago threatened the very existence of the Fijian sugar industry.

THE FARMER AN EDUCATED MAN.

The idea that the farmer should be trained in agriculture, and little or nothing else, is part of the stupidity of the purely vocational conception of education. It might just as well be contended that the plumber should learn nothing but plumbing and the bootmaker nothing but bootmaking. Farmers need a full training of mind and character for their battle, and the relative isolation of their lives makes it especially important that they should have been taught to employ their leisure wisely. The headmaster of Christ's College makes a similar plea for an all-round foundational education for the farmer. More benefit would be derived from learning one basic scientific subject like chemistry really well than by cramming any amount of information, undigested and half-understood, on the subject of soils. But, while it is possible to do more to interest the boy in the land, it is in the main true that, as Mr. Crosse says, the chief obstacle to boys going on the land is economic. For most boys the prospects seem unpromising, and no amount of educational "bias" will overcome such reluctance.—"Auckland Star."

FIELD NOTES ON THE BANANA FRUIT-EATING CATERPILLAR (*Tiracola plagiata* Walk.).

BY J. A. WEDDELL, Assistant Entomologist.

Introductory.

During the month of March, 1927, considerable damage to cultivated bananas, maize, and other crops was occasioned by the larvae of a noctuid moth in the Southern Coastal districts of Queensland from Brisbane to Gympie, the badly affected areas including also the Kilcoy district, portion of the Brisbane Valley line, the Dayboro' district, and to a less extent the Kandanga-Amamoor area. As a result of the reports received, the writer was deputed early in March by the Chief Entomologist to investigate the outbreak in the field, and Miss Temperley to take charge in the laboratory of the living material which was collected. The information contained herein is the result of the field observations, and a subsequent article by Miss Temperley will describe the work carried out by her in the laboratory. In Miss Temperley's article will be found the descriptions of the insect's life-cycle stages and information regarding its life-history.

The insect concerned was provisionally identified from the larval characters as being *Tiracola plagiata* Walk., and this identification was subsequently confirmed by Dr. A. Jeffries Turner when specimens reared in the laboratory had reached the imaginal stage.

The attack under consideration was characterised by the fact that the insect was present in widely separated centres and was concentrated to plague dimensions in each locality, generally in and near patches of scrub or areas under weeds. Plantations or farms adjacent to such patches suffered severe damage; in a few of the banana plantations all fruit was damaged, and numbers of banana-growers lost approximately one-third to one-half of the season's crop. Maize and pumpkins particularly, and other crops growing in the affected areas also were badly damaged.

Synonymy.

The moth is now known as *Tiracola plagiata* Walk., but records of its occurrence have been made under the following names which are regarded as synonyms. *Arcilasisa plagiata* Walk., *Agrotis plagifera* Walk., *A. spectabilis* Walk., *A. plagiata* Walk., *A. grandirena* Herr Schäff. In searching the literature it was found that the generic name *Arcilasisa* has also been variously spelt *Arcilasia* and *Arcilisia*.

Previous History of the Insect in Queensland.

The insect has previously been associated with the banana plant as an occasional fruit pest; the records of the Entomological Branch show that it was received from Currumbin (4th June, 1916, and 7th August, 1917), Gympie (17th June, 1919), Montville (29th Oct., 1926), and Buderim (11th November, 1926), with bananas in each case the principal host; also the adult was reared from a caterpillar collected by Mr. Henry Tryon in a Stanthorpe orchard in 1895 or 1896. Tryon[17] also recorded the insect as a leaf-eating caterpillar on mulberry at Brisbane during the Departmental year 1914-1915.

The records further show that the specimens received from Gympie (17th June, 1919) were sent to illustrate an outbreak that was comparable, apparently, in both the amount of damage and the extent of

area affected, with that now under consideration. On that occasion the whole of the Gympie area—Brooloo, Kandanga, Amamoor, Lagoon Pocket, Corella, Chatsworth, and Traveston—was reported to be badly infested by the late Mr. James Mitchell, Assistant Instructor in Fruit Culture. Banana-growers in the area suffered serious losses, and Mr. Mitchell stated that the caterpillars were feeding also on maize, papaws, garden peas, bush shrubs, trees, grass, *Sida retusa*, and pigweed, and he referred to "this destructive pest which is attacking everything green, foliage and fruit."

Mr. J. L. Froggatt has recorded in Departmental Reports the presence of the insect on bananas at Cardwell (September, 1925), Babinda (September, 1925), Innisfail (October, 1926, September and October, 1927), and Byfield (October, 1927).

Occurrence in Other Countries.

The insect was recorded by Hampson[11] as having been collected in Mexico, Cuba, Paraguay, Western China, Sikhim, Bombay, Canara, Ceylon, Singapore, Borneo, Java, New Guinea, Queensland, New South Wales (Sydney), Tahiti, Marquesas (Nuka-Hiva).

A summary is given in Table I. of such host plant records of overseas occurrence as it was possible for the writer to discover. It is interesting to find that Corbett[3] stated that the insect is a pest of cassava, coffee, and rubber in Malaya, and that it migrates from waste lands. Palm[14] also recorded that the insect defoliated "woods" of *Trema amboinensis* and then attacked seed beds and newly-planted tobacco.

De Bussy[4] mentioned in 1915 that the noctuid *Arcilisia plagiata* seemed to have almost disappeared in recent years; it is interesting to note the parallel in Queensland during the intervening years from 1919 to 1927.

In Mededeelingen van het Deli Proefstation[13] it was mentioned that the chalcidid egg parasite, *Trichogramma pretiosa* Riley, had been found infesting the eggs of *Tiracola plagiata* Walk., among other species, which were all spoken of as being well known pests of local crops.

De Jong[5] reported that in one plantation the caterpillars of *Tiracola* (*Arcilasisa*) *plagiata* Walk. severely injured the leaves and bark of young *Hevea*, the infestation being due to the normal food-plant, *Ballota*, being completely defoliated.

Cultivated Host Plants in Queensland.

A list of the cultivated plants that were found to be attacked during the 1927 outbreak is given in Table II. Rather full notes of the nature of the injury to three of these—banana, maize, and pumpkin—that suffered most severely are given in following paragraphs. It might, however, be noted here that the fruit as well as the foliage of the tomato was attacked; also that the record of the pear being attacked referred to one small tree.

It must be understood that the three principal hosts probably were so because of the comparatively large area of each. In places the other plants listed in the table were practically defoliated, and it would appear that a large area also of any of them would have been badly attacked had such an area been available.

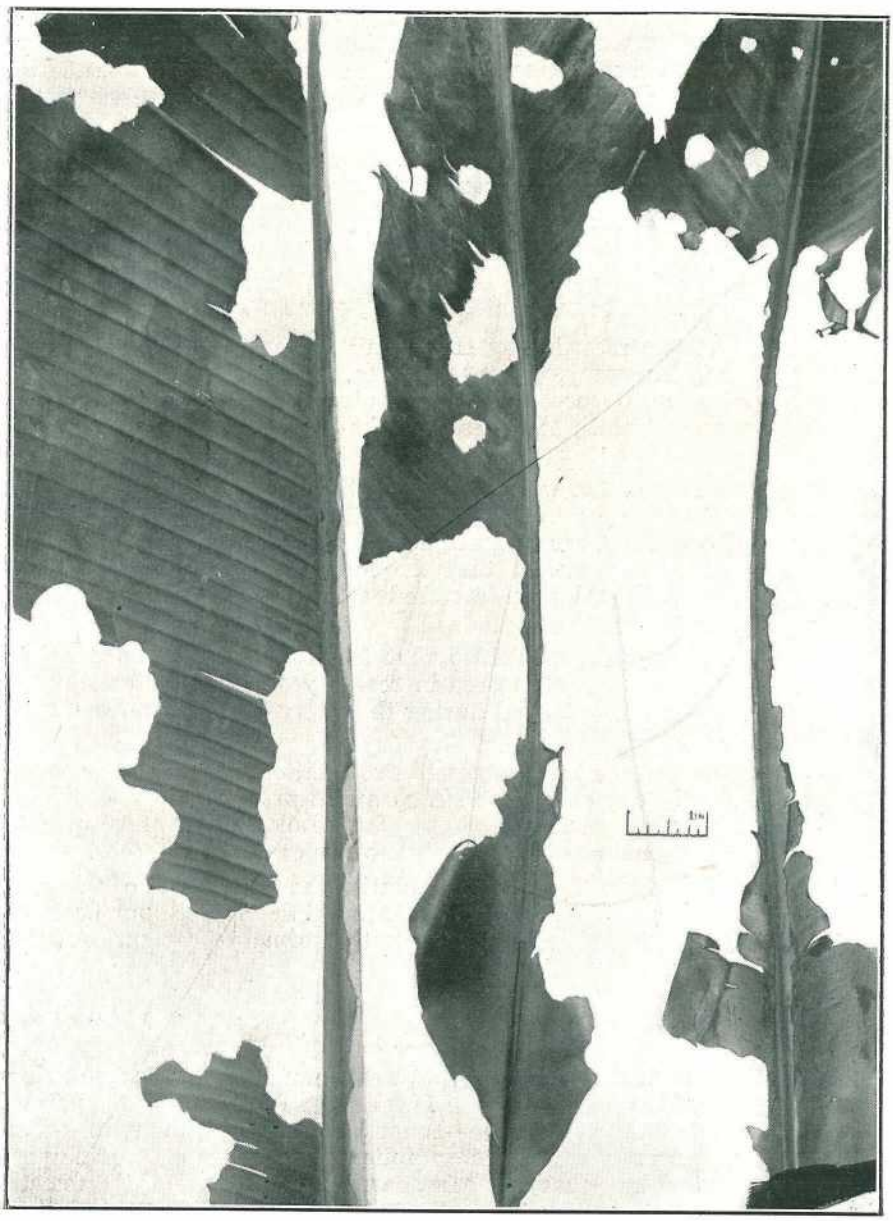

PLATE 62.—YOUNG LEAVES DAMAGED BY BANANA FRUIT-EATING CATERPILLARS (*Tiracola plagiata* Walk.).

Injury on the Banana.

The larvæ fed on both the foliage and the fruit of the banana, but the damage to the foliage, even where most common, was of little economic importance. The injury was of three types: (*a*) Feeding on the surface of either the leaves or the fruit by the young larvæ; (*b*) eating holes in the leaves by all except the very young larvæ; (*c*) burrowing into the pulp of the fruit by the more mature larvæ.

The damage to the epidermis of the leaves was caused by the young larvæ not more than half an inch in length, and it took place along the edges of the midrib on either the upper or the lower surface. When older the larvæ were able to eat holes in the leaves, and in extreme cases they left very little more than the midribs of young leaves (see Plate 62). Apparently the larvæ either continued to feed on the foliage or crawled by chance to a bunch of fruit to feed there.

The primary, and actually the most extensive, damage that the larvæ caused to the fruit was the eating or eroding of the skin, one larva being able to render unsightly quite a number of the fruit on a bunch; the affected area at first appeared a paler green, but it quickly darkened and became a brown scar (see Plate 63). It was this type of damage that occasioned most of the losses, for, although the other type of damage to the fruit is perhaps more striking, there is the advantage that when a larva burrows through the skin it is satisfied then with the pulp of perhaps only one fruit.

Banana fruit in all stages of development from the time when the bracts lifted right up to the ripening stage was liable to injury to the surface skin by the younger larvæ, but the more mature larvæ burrowed into the pulp only when the fruit was well filled (see Plate 64).

It was particularly noticeable that the larvæ preferred to work in a bright light, for the upper and outward portions of the fingers were those that were first and most severely affected, and many bunches were seen in which the only fingers free from damage were those on the shaded portion of the bunch.

Injury on Maize.

One area of maize, 50 acres in extent, was examined near Kilcoy, and this proved to be fairly uniformly and badly infested by the insect. Larvæ were present on all parts of the plants, and they had damaged both the foliage and the grain. Practically every cob was affected; the silks of the cobs were eaten, and the larvæ had both followed down into the grain, and also apparently eaten through the bracts. In this way, besides the actually damaged grain, there was the possibility of further loss due to rotting consequent on the partial exposure of the developing seed.

Injury on Pumpkin.

Pumpkin vines were growing between the rows of the maize mentioned above. The vines were practically defoliated, and all the fruit was very badly damaged. Inconceivable as it may appear, the larvæ had eaten large patches of the tough rind of the pumpkin, and then had burrowed into the pulp. The least damaged of the pumpkins present had lost approximately one-half of the rind, and in the extreme cases only a heap of frass served to indicate where a fruit had been, even the seeds having been eaten.

PLATE 63.—YOUNG FRUIT SHOWING SKIN EROSION BY BANANA FRUIT-EATING CATERPILLARS (*Tiracola plagiata* Walk.).

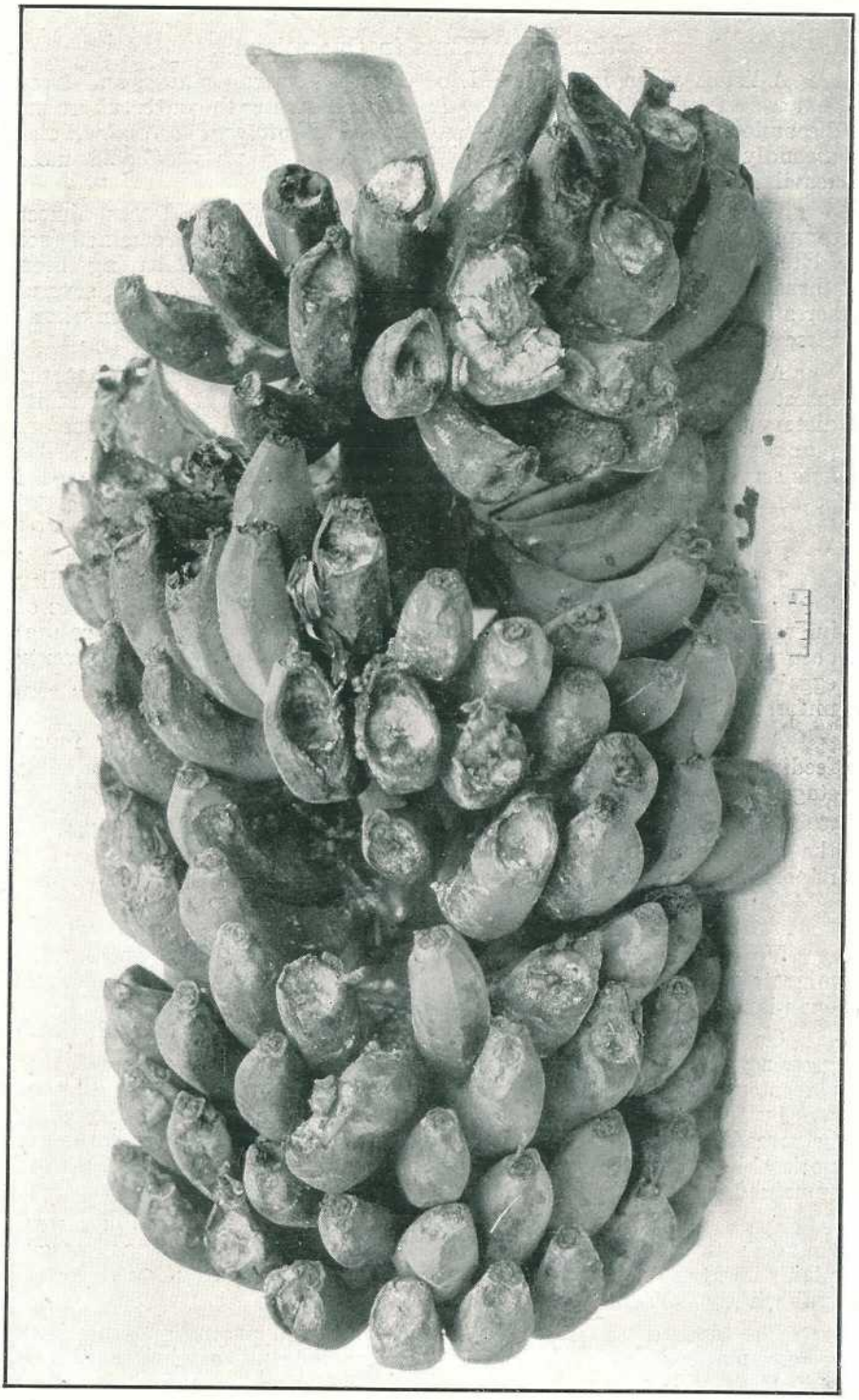

Plate 64.—Bunch showing damage by Mature Banana Fruit-eating Caterpillars (*Tiracola plagiata* Walk.).

Other Host Plants in Queensland.

A list is given in Table III. of the weeds, scrub plants, and trees that were found to be attacked by *T. plagiata* during the outbreak under discussion. Of these, firstly the inkweed *Phytolacca octandra*, and secondly the white passionfruit *Passiflora alba* were affected most heavily.

Where the insect occurred in numbers the inkweed was almost completely eaten down, only bare stalks about 12 in. long remained (see Plate 65), and the patches had the appearance of having been "brushed" recently. At one place also a large area of lantana, several acres in extent, had in turn been overgrown by the white passion vines; these vines were found to be almost defoliated.

A glance through this and the previous lists will show that the insect has a surprisingly wide range of food-plants. It includes in its dietary representatives of many natural orders, and among them are plants such as the Scotch thistle, lantana, and the poison peach. The lists serve to show that practically no cultivated plant can be regarded as being safe from attack.

Sites of Oviposition in the Field.

Eggs of the insect were found in the field at Harlin, Brisbane Valley line, in May, 1927. They were found generally singly on the leaves of inkweed, the upper and under surfaces being equally favoured; one case occurred where one egg was superimposed on another. A total of twenty eggs was found, and in the laboratory fourteen of these hatched, but, unfortunately, the larvæ died in the first instar.

A number of very young larvæ of *T. plagiata* were also found feeding on the inkweed, and these were subsequently reared to the adult stage.

It cannot be stated that eggs are not laid on the banana, but from the above and other information it is probable that inkweed is the important primary host.

Migratory Habit of the Caterpillars.

Very little definite information could be obtained regarding the migratory habit of the caterpillars, but they certainly wandered from one plant to another.

One farmer first noticed the insect feeding on some inkweed growing adjacent to his bananas. A few days later he discovered that the caterpillars were infesting several rows of bananas, and the inkweed was by then almost non-existent. Later the caterpillars were found to be spread thickly over a large area of the plantation, and elsewhere were noticeable in smaller numbers, but the bananas nearest to the inkweed remained the most severely infested.

In areas where the insect occurred in numbers caterpillars were found on the ground, on the trunks of trees, on the stems of herbaceous plants, feeding on the foliage, and also moving or resting on the posts and wires of fences.

The caterpillars retained a grip on smooth surfaces by laying down a very fine webbing. The younger larvæ made use of their ability to spin to provide safety lines when they fell or were disturbed; numbers of young larvæ could be seen at times suspended from silk threads a foot or two in length.

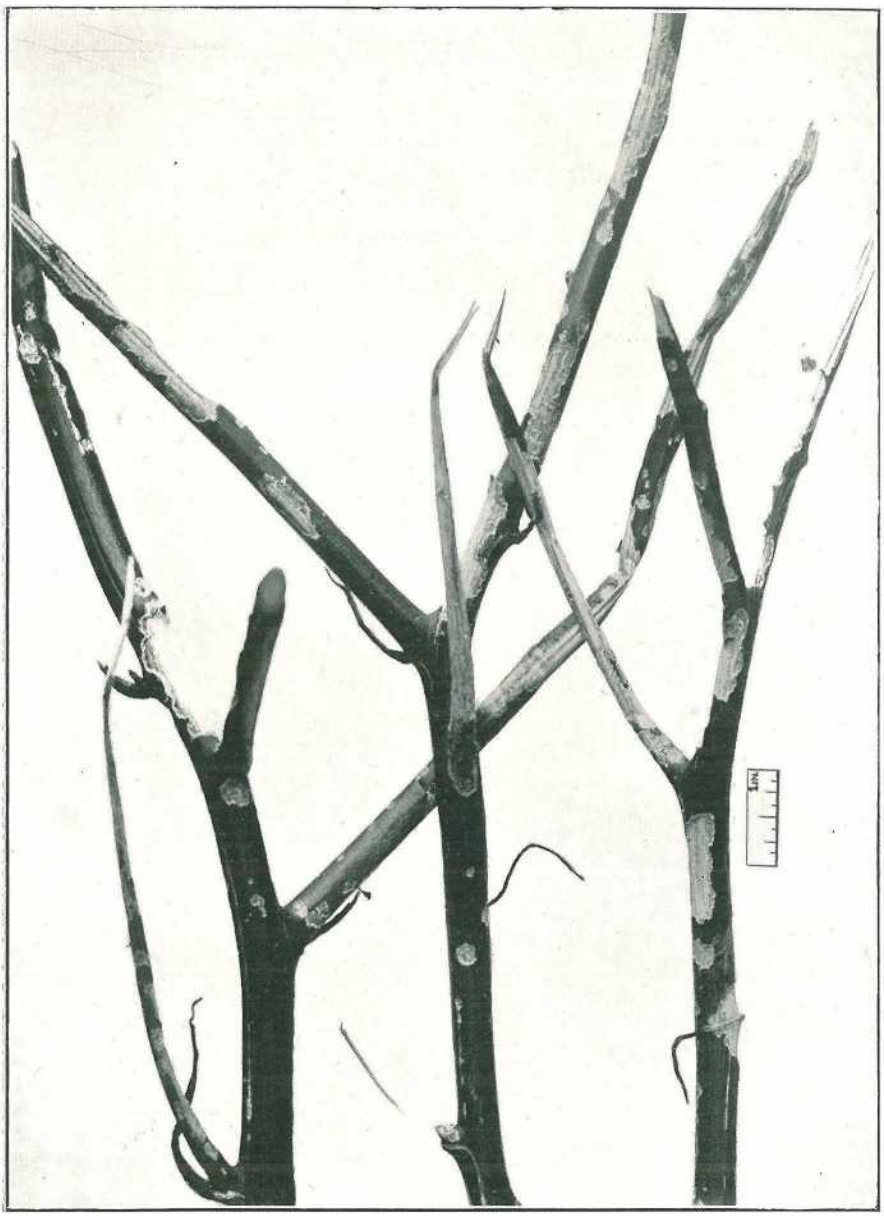

Plate 65.—Inkweed (*Phytolacca octandra*) damaged by Banana Fruit-eating Caterpillars (*Tiracola plagiata* Walk.).

Pupae and Adults in the Field.

In the field the pupæ were invariably encased in earthen cocoons, and were found an inch or two below the surface of the soil, often also partly sheltered by a loose stone, stick, or log. At no time during the investigations was the adult moth seen in the field by the writer.

Natural Control.

In the maize crop abovementioned, a number of ichneumonid wasps were seen flying, and at times they darted towards groups of larvæ either on the ground or on the plants, but no record was made of an actual attempt to parasitise.

However, a number of hymenopterous larvæ and pupæ were found 1 or 2 in. under the soil in the same situations as the pupæ of *T. plagiata*, and in some instances actually encased in the typical earthen cocoon of the moth. These were forwarded to Brisbane, where among other species a number of individuals of *Paniscus testaceous* Grav. reached the adult stage.

A factor of natural control must be responsible for holding the pest in check during those years in which it does not appear in large numbers. Just what this factor is it is at this stage impossible to state, but there is the possibility that egg parasites may be the cause. If then conditions, climatic and other, were to become unsuitable for the egg parasites, the host might be enabled to breed up to pest proportions for the time being.

Artificial Control.

Several possible methods of artificial control suggested themselves, and of these, three methods were given preliminary trials. Unfortunately, these trials could not be followed by the larger and more detailed experiments, such as are necessary before control measures can be recommended with certainty, owing to the rapidity with which the pest manifested itself and then disappeared, and also because of inclement weather during the period. Still, as will be seen below, a certain measure of success was obtained, and the results mentioned will serve as a basis for further experiments when the opportunity offers. The methods of control tried were dusting, baiting, and covering the bunches.

Dusting.

It was found to be practically impossible to dust the foliage effectively on account of the smooth nature of the surface; the dust lay on any fairly horizontal upper surface, but acutely inclined leaves and the under surface of all the foliage retained little poison. Most of the dust cloud, indeed, was carried away and dispersed by the wind, and it must be remembered that a considerable movement of air is usually associated with slopes such as are used for banana cultivation in Southern Queensland. To compensate for all of these adverse factors a heavier dusting was given than should otherwise have been necessary.

The dusting was carried out on a young plantation, the foliage of which was fairly heavily infested considering the size of the plants. Two dusts were used, both being applied with a small hand dust gun.

Eight young plants containing a total of fifty-three caterpillars at the beginning of the experiment were dusted with a mixture of one part of arsenate of lead and five parts of hydrate of lime on 14th March, 1927. On 16th March the plants were examined, and three to five living caterpillars were found on each; the foliage showed fresh damage, both

where the poison dust had fallen and also where the surface appeared clean. No dead caterpillars were found actually on the plants, but a total of sixteen dead and four living caterpillars were found on the ground.

On 17th March the plants were again examined, and from three to five larvæ were still present alive on the plants, eleven dead, and four living caterpillars were found on the ground. (For details see Table V.)

It will be seen that on 17th March thirty-seven caterpillars remained alive and a total of twenty-seven dead had been found, making a total of at least sixty-four caterpillars known to have been in the area during the test. The kill represents 42 per cent., but owing to the migration of the caterpillars this percentage is only very approximate.

Eight young plants containing caterpillars were dusted on 14th March with "Killdust." The subsequent condition of the area was much the same as with the arsenate of lead mixture. The details are given in Table VI., where it will be seen that twenty-one caterpillars were killed out of an accountable population of sixty-one—that is, 34 per cent. Here again the percentage kill is unreliable, for just as fresh caterpillars entered the area during the experiment a number quite probably crawled away elsewhere to die.

Baiting.

A Paris green bait was used for this experiment, made up in the following proportions:—

Paris green	1 lb.
Bran	50 lb.
Molasses or treacle	1 qt.
Juice from	2 oranges.
Water, about	2 gallons.

The Paris green and bran were mixed together dry; the molasses, orange juice and a quantity of the water were then mixed, and stirred into the bran. More water as required was then added to bring the whole to a moist but still loose consistency.

Sufficient bran was obtainable at the time to treat only a few stools, and ten stools were baited on 16th March. These stools, which were in full bearing, were very heavily infested by the pest, there being an estimated total of from sixty to one hundred caterpillars to each stool.

The bran was applied by scattering broadcast, about three handfuls being thrown on the ground surrounding each stool, and one to two handfuls were scattered sharply into the foliage. Distributed in this way the full mixture mentioned above should cover about half an acre.

A number of caterpillars were noticed to be attracted immediately to the bait, leaving the portion of leaf on which they were feeding and moving to pieces of bait that had fallen nearby. Some that were migrating over the ground appeared to deviate in order to feed on chance pieces of bait.

Examination of the patch on 17th March revealed that a large number of larvæ had been killed, estimated at 66 per cent. of the population, and these were present on the ground, in the foliage, and on the bunches. Those on the ground were generally grouped in sheltered spots, and the others were usually hanging limply by their

caudal prolegs from a rough edge such as a torn patch of leaf or the flower end of a fruit. The population of one stool was counted, and the results are given in Table VII.

Half a dozen larvæ from half to full grown were confined in tubes with some of the poison bran bait at 2 p.m. 16th March; at 10 p.m. they were still alive, but less active than at 2 p.m.; by 7.0 a.m. 17th March all were dead.

Covering the Bunches.

This method, strictly speaking, is not a means of control of the insect, but it should prove useful from the point of view of reducing the amount of damage by directly protecting the fruit. The material used was a kind of cheesecloth woven in tubular form, known as "Joycenet," being manufactured by Joyce Bros., Brisbane. It may be purchased in 100-yard lengths and cut up as required, or at a little increased cost it is obtainable cut into lengths with the bottom sewn up, being then known as "Joycenet envelopes."

In using the cloth from a roll it is only necessary to pull the material up over the bunch and to tie it with string around the stalk above and below the fruit, and to cut off the remaining material from below; the fruit in this way is completely encased.

The point needing testing in this particular instance was whether or not the caterpillars would penetrate the material. Two bunches, after being examined to ensure that they were free from caterpillars, were covered with "Joycenet," and in each instance twelve caterpillars, representing as nearly as possible all stages of development, were placed on the outside. They made no attempt to penetrate, and merely walked over the covering. Examination on the following morning revealed the fact that no larvæ remained on one cover, and only one larva was on the other, with two larvæ on the exposed end of the bunch stalk. There were no marks of attempted penetration, and no larvæ were found within the covers.

The cost of the material is not high; it is understood to be about 25s. per 100 yards—i.e., 3d. per yard.

About five minutes was taken to examine and cover each bunch, but with practice this time could be reduced.

	d.
1⅓ yards at 3d. per yard	4
5 minutes at 2s. per hour	2
	6d. per bunch.

It seems reasonable to advise that in the event of another outbreak of this pest being noticed in time, the banana-growers should immediately cover at least the "special" and "choice" bunches in the plantations, and possibly extend the operation to include all the bunches that up to that stage have not been attacked.

Provisional Recommendations for Control.

As it seems evident that the outbreak commenced and increased in and near scrub areas, and in particular in the inkweed, it is recommended that a strip of ground be kept clean between the planted areas and nearby scrub, and, of course, that the areas themselves should be cleanly cultivated.

The farmer should examine the scrub at times, paying attention to any inkweed that may be nearby, as he may thus be forewarned against another attack. If the caterpillars should be seen to be at all prevalent, then the farmer should immediately scatter poison bran bait along the cleared strip mentioned, and also over at least several adjacent rows of bananas. Should the caterpillars spread into the farm, it would then be as well to bait the whole area, scattering the bran more thickly near the scrub. Consideration might also be given to the covering of the bunches as described.

The use of dusting is not recommended at this stage owing to the difficulties of application previously mentioned.

Acknowledgements.

The writer desires to express thanks to those farmers in various localities who allowed him access to their plantations and farms, and in particular to Mr. C. R. Nunn, Winya, Kilcoy line, for information and help, and on whose property a large amount of the foregoing work was done. Thanks are also due to Mr. C. T. White, Government Botanist, for the identification of certain of the plant material, thus making possible the compilation of the list of native hosts.

TABLE I.

OVERSEAS RECORDS OF OCCURRENCE OF *Tiracola plagiata* Walk.

Country.	Host Plant.		Recorded by
	Common Name.	Botanical Name.	
Ceylon	Brinjal or Egg Plant	*Solanum melongena* Linn.	Hutson[12]
	Tea	*Camellia theifera* Dyer	Department of Agriculture, Ceylon[2]
		Erythrina lithosperma Bl.	
	Plantain	*Musa* sp.	
	Lima Bean	*Phaseolus lunatus* Linn.	
	French or Kidney Bean	*Phaseolus vulgaris* Linn.	
Malaya	Castor Oil	*Ricinus communis* Linn.	Department of Agriculture, Malaya[6]
	Castor Oil	*Ricinus communis* Linn.	Gater[8]
	Castor Oil	*Ricinus communis* Linn.	Susainathan[16]
	Lime	*Citrus Medica* Linn., var. *acida*	Gater[8]
	Tapioca	*Manihot utilissima* Pohl.	
	Para-rubber	*Hevea brasiliensis* Muell.-Arg.	
	Banana	*Musa* spp.	
		Melastroma polyanthum	
	Cassava	*Manihot* spp.	Corbett[3]
	Coffee	*Coffea arabica* Linn.	
	Rubber	*Hevea brasiliensis* Muell.-Arg.	
Dutch East Indies		*Ballota* sp.	de Jong[5]
	Tobacco	*Nicotiana* sp.	van Hall[9]
	Tobacco	*Nicotiana* sp.	Palm[14]
		Trema amboinensis	
India		*Emilia* sp.	Hampson[10]
	Tea	*Camellia theifera* Dyer	Andrews[1]
Formosa	Tea	*Camellia theifera* Dyer	Shiraki[15]

TABLE II.

CULTIVATED HOST PLANTS OF *Tiracola plagiata* Walk. IN QUEENSLAND DURING THE 1927 OUTBREAK.

Family.	Genus and Species.	Common Name.
Musaceæ ..	*Musa* spp.	Banana
Gramineæ ..	*Zea mais* Linn.	Maize
Cucurbitaceæ ..	*Cucurbita Pepo* Linn.	Pumpkin
Cucurbitaceæ ..	*Citrullus vulgaris* Schrad.	Watermelon
Cruciferæ ..	*Brassica oleracea* Linn.	Cabbage
Cruciferæ ..	*Brassica oleracea* Linn. var.	Cauliflower
Solanaceæ ..	*Lycopersicum esculentum* Mill.	Tomato
Solanaceæ ..	*Physalis peruviana* Linn.	Cape Gooseberry
Passifloraceæ ..	*Passiflora edulis* Sims.	Passion Fruit
Chenopodiaceæ	*Beta vulgaris* Linn.	Beetroot
Leguminosæ ..	*Phaseolis vulgaris* Linn.	French Bean
Caricaceæ ..	*Carica papaya* Linn.	Papaw
Rosaceæ ..	*Pyrus communis* Linn.	Pear

TABLE III.

WEEDS, SCRUB PLANTS, AND TREES THAT WREE DAMAGED BY *Tiracola plagiata* Walk. IN QUEENSLAND DURING THE 1927 OUTBREAK.

Family.	Genus and Species.	Common Name.
Portulaceæ ..	*Portulaca oleracea* Linn.	Pigweed
Tiliaceæ ..	*Sloanea australis* F.v.M.	..
Rhamneæ ..	*Alphitonia excelsa* Reissek.	Red Ash
Sapindaceæ ..	*Harpullia pendula* Planch	Tulipwood
Myrtaceæ ..	*Eucalyptus* sp.	..
Passifloreæ ..	*Passiflora alba* L. & O.	White Passion Fruit
Cucurbitaceæ ..	*Bryonia laciniosa* Linn.	Native Bryony
Compositæ ..	*Bidens pilosa* Linn.	Cobbler's Pegs
Compositæ ..	*Tagetes glandulifera* Sch.	Stinking Rodger
Compositæ ..	*Sonchus oleraceus* Linn.	Milk Thistle
Compositæ ..	*Cnicus lanceolatus* Hoffm.	Scotch Thistle
Solanaceæ ..	*Solanum nigrum* Linn.	Black Currant
Solanaceæ ..	*Solanum auriculatum* Ait.	A " Wild Tobacco "
Solanaceæ ..	*Solanum verbascifolium* Ait.	" Wild Tobacco "
Solanaceæ ..	*Physalis minima* Linn.	Wild Gooseberry
Solanaceæ ..	*Nicotiana suaveolens* Lehm.	A " Wild Tobacco "
Verbenaceæ ..	*Lantana camara* Linn.	Lantana
Amarantaceæ ..	*Amarantus viridis* Linn.	..
Phytolaccaceæ ..	*Phytolacca octandra* Linn.	Inkweed
Monimiaceæ ..	*Kibara macrophylla* Benth.	..
Euphorbiaceæ ..	*Mallotus philippinensis* Muell.-Arg.	Kamela Tree
Urticaceæ ..	*Trema aspera* Bl.	Peach-leafed Poison Bush, or Poison Peach
Urticaceæ ..	*Pseudomorus Brunoniana* Bur.	..
Commelinaceæ ..	*Pollia macrophylla* Benth.	..
Aroideæ ..	*Alocasia macrorrhiza* Sch.	Cunjevoi.

TABLE IV.

SYNOPSIS OF HOST-PLANT RECORDS.

	Species.
Recorded Overseas (Table I)	18
Cultivated Host-Plants in Queensland recorded in 1927 (Table II.) ..	13
Other Host-Plants in Queensland recorded in 1927 (Table III.)	25
Cultivated Host-Plants in Queensland previously recorded (not included in Table II.)*	1
Other Host-Plants in Queensland previously recorded (not included in Table III.)§	1
	58
Number of instances in which overlapping occurred between Tables I. and II. (Bananas and French Beans)	2
Total number of Host-Plants recorded	56

* Mulberry, *Morus* sp., fam. Moraceæ, recorded by Tryon.[17]

§ *Sida rhombifolia* Linn. (= *retusa*) fam. Malvaceæ, recorded by Mitchell (see p. 187).

TABLE V.

RESULTS OF DUSTING WITH THE FOLLOWING MIXTURE:—ONE-PART ARSENATE OF LEAD, FIVE-PARTS HYDRATE OF LIME.

Plant.	Number of Caterpillars found on—		
	14th March, 1927.	16th March, 1927.	17th March, 1927.
A	4	3	3
B	6	5	4
C	8	5	5
D	6	5	5
E	6	4	5
F	9	5	4
G	6	4	4
H	8	4	3
Total alive on Plants	53	35	33
Alive on Ground	*	4	4
Total alive in the Area	..	39	37
Dead on Ground	*	16	11
		27	

* Not observed.

The nearest approximation to the number of larvæ that came under the influence of the test is found by adding the total number alive on 17th March to the total number found dead—i.e., 37 + 27 = 64. Therefore, 27 out of 64 died—i.e., a kill of 42 per cent. This result must be understood to be only very approximate owing to the wandering of the larvæ, both into and away from the experimental area.

TABLE VI.

RESULTS OF DUSTING WITH "KILLDUST."

Plant.	Number of Caterpillars found on—		
	14th March, 1927.	16th March, 1927.	17th March, 1927.
I	6	5	5
J	6	6	5
K	5	4	3
L	7	4	4
M	6	3	2
N	6	4	3
O	7	6	5
P	8	5	6
Total alive on Plants	51	37	33
Alive on Ground	*	8	7
Total alive in Area	..	45	40
Dead on Ground	*	11	10
		21	

* Not observed.

As in the previous table, the total number of insects under consideration will be taken as the sum of those alive on 17th March, + total found dead—i.e., 40 + 21 = 61. Therefore, 21 died out of 61—i.e., 34 per cent. This result similarly is only very approximate.

TABLE VII.

LARVAL POPULATION OF ONE BANANA STOOL TWENTY-FOUR HOURS AFTER USING PARIS GREEN BRAN BAIT.

Situation.	Alive.	Dead.
On the Ground	5	17
In the Foliage	9	26
On the Fruit	13	3
Totals	27	46
	73	

Forty-six dead from a total of seventy-three represents 63 per cent.

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ECONOMY AND COMMON SENSE.

Any honest doctor, finding that his treatment had harmful instead of beneficial effects, and seeing that his patient became worse instead of better, would not hesitate for a moment to reconsider his original interpretation of symptoms. Neither would he be content merely to maintain strength, or temporarily to heal sores. Rather would he aim at a proper understanding of causes in order that he might, by removing these, pave the way to complete recovery. Similar procedure should be adopted where disease is economic and affects the body politic instead of the body physical, especially so when it prejudicially affects the whole nation.

The economic practitioner has to deal with psychological obsessions which, originating in the individual, frequently flame into mass demands of varying and sometimes questionable utility and possibility. His problem, too, is complicated by the fact that in democratic countries political power lies with those who are easily encouraged to demand but who have little apprehension of the eventual consequences of unwise exaction.

The task of the economist, and for all of us, particularly for those in the trade union movement, is not to waste time in apportioning blame, but to devote time and talents to ascertaining causes and providing remedies which at least replace the wealth expended upon their provision. The practice of giving money for nothing, whether in the form of subsidies or uncovenanted benefits, and of undertaking relief works of which the ultimate value is less than the current expenditure, must leave the community progressively poorer, and involve an eventual poverty which none may contemplate without terror.—Mr. W. A. Appleton, secretary of the General Federation of Trade Unions, in his quarterly report with reference to unemployment.

RURAL LIFE IN OTHER LANDS—X.

By the EDITOR.*

BYWAYS IN BELGIUM.

In our hurried journey through Holland we got back to the province of Limburg and its highly aromatic cheese, and where specialised agriculture is supplanted by secondary industries for which local extensive coal measures are largely drawn upon.

Talking of specialised farming one is reminded that, like France and Denmark, Holland's present position as a primary producing country is due to a serious agricultural crisis that developed at the time when her markets were swamped with grain from newer wheat-growing countries oversea. Facing the facts as they were, the Dutch farmer, like his Danish neighbours, realised that to hold his own in world competition he had to develop a system of intensive culture of special crops, based on modern scientific and technical principles. So he studied his country's possibilities and peculiarities, and shaped his plans accordingly. In some districts he concentrated on grazing—cattle raising, not for the butcher, but for the production of butter and cheese. In other provinces he bent his efforts towards cropping for special products, which involved no particular perishable risk, and for which he had ready markets. He knew, for instance, that the limitations of his land were against successful competition in grain production with farmers on the Australian plain lands or the Canadian prairies. The results of his long-headedness are evident in the stability of his specialised industries to-day. They also supply a moral for farmers in other countries.

A Great People.

In marketing the Dutch farmer is wide awake, and he enjoys the advantage of a highly-organised system. Co-operation is well established. Economic time-saving systems have been evolved, and generally, under their auction sales system, it takes no more than about five minutes to sell a barge load of produce.

Benevolent paternalism is evident in all Government activities, but it is doubtful if the Queensland farmer, with his intenser individualism, would submit to the same degree of regimentation.

Education is widespread, and the social status of the teacher is on a high plane. Rural social life is centred in picturesque villages. In the towns industry is well regulated, and comprehensive laws relating to housing, factory management, and juvenile labour are in force.

Altogether, Holland is a prosperous and progressive country, even if, from an Australian point of view, like other old world lands, she is overweighted with custom, tradition, and puzzling social anachronisms.

The Dutch are a great people, as their history shows, and between Holland and Australia there is a direct relationship—distance-dimmed and shadowy, perhaps, yet quite evident as the map of Australia reveals with physical features, from the Gulf of Carpentaria in the North, Dirk Hartog and Rottnest in the West, and Tasmania in the South, named by early Dutch navigators—Tasman, who discovered Tasmania (he called it Van Diemen's Land) and gave his name to the Tasman Sea, and others of almost equal note.

Back to Belgium.

Returning across the German frontier on the road to Aix-la-Chapelle—the Germans call it Aachen—one was not without regret for not being able to see more of Holland, more of its people, of its systems of rural organisation, its remarkable monuments to human engineering genius and character, its quaint mediæval cities from Groningen down to Maestricht, and its bewildering maze of barge-burdened waterways with their long, straight lines of sheltering poplars "marching against the sky."

Recrossing the Belgian border we were in familiar country again along a road that saw the passing of the invading German army in 1914. Halting at historic Liege with its beautiful bridge, the Pont de Fragnee, its frowning citadel, its old church of St. Martin, and its bisecting ribbon of dull beaten silver—the beautiful river Meuse—we paid tribute to the memory of its heroic defenders.

*In a Radio Address from 4QG.

Taking a roundabout course we passed through Quatre Bras and across the field of Waterloo, with its pyramidal memorial mound—the head of its surmounting lion now turned towards Germany—on the road to Brussels. Flush with the tree-lined road was the farm of La Belle Alliance which you will remember was the centre of the French line on the day of the historic battle. Surveying the peaceful scene from the crest of the mound with the white walls of La Belle Alliance marking the way we had come, we looked across fields of waving grain and furrrowed soil to La Haye Sainte and to other historic landmarks which became immortal on that June day more than a century ago. Recent memories had dissipated all desire to delay too long on battlefields, ancient or modern, but looking out over cultivated fields that once had trembled to the thunder of the guns, down along cobbled roads that once had echoed and re-echoed to the tread of marching armies, and visualising the tragedy of it all, it was hard to resist moralising on the effective artistry of Nature in camouflaging so completely all the ugliness of war.

Where Man has Beaten Nature.

Belgium is another interesting country. In other lands man has been changed by Nature; in Belgium, as in Holland, man has beaten Nature. One's first impression of Belgium in peace time is that of a human meat-ant's nest. No other country in the world, perhaps, is populated so densely, more so even than China. Its 11,000 square miles—the size of a North Australian cattle station—carry just on 8,000,000 of people, and there is scarcely a variety of occupation they do not engage in. About half of the people live by farming and related activities.

Industrial production is equally intensive, and round about Charleroi, which is a coal-mining centre well remembered by men of the A.I.F., one was to see the extraordinary sight of women and girls working as miners on a daily wage. One had got used to women in farm field work, but to see them working coal skips was a new experience.

Charleroi is the centre of a canal system connected directly with the similar systems of Germany, Holland, and Northern France, and it is no uncommon sight to see whole families yoked up in harness towing deeply-laden barges along the waterways.

Dog Power an Economic Factor.

Talking of man power in transport reminds one of the use of dog power in Flanders and neighbouring territories. On the farm dog power is quite an economic factor; and it is utilised to turn separators, operate sewing machines, butter churns, chaff cutters, and other mechanical contrivances.

The principle employed is similar to that of a treadmill. A wheel with treads is mounted on a shafting, from which various gears, belt-driven, connect with the machine to be worked. The dog, which is well-broken to the job, hops into the boxed-in wheel and goes for the lick of his life on a seemingly never-ending Marathon. He remains, of course, in the one spot, his energy turning the wheel, which in turn propels the belt which operates the machine. The dog goes on tirelessly, and one's first thought is of its cruelty. That is not so apparent, however, when you learn that the job is done in shifts. Usually two dogs are employed. Each seems to know to the second when his shift is ended. When that happens the hound starts to yelp and howl, back-pedalling all the time, and then, so to speak, sits down in the breeching, holds a stopwork meeting with himself, cheeks with his weight the turning of the wheel, and then goes on strike. When the wheel stops he hops out, and his mate takes his place to repeat the same performance until the service is no longer required by the farmer.

Dogs are also used as draught animals, particularly in milk distribution. Sometimes the dog is yoked up in shafts, and sometimes he is harnessed to the axle, the vendor holding the shafts while the dog does the pulling. At times the dogs would feel the call of the wild or enter into the spirit of the chase with a cat as a fleeting objective, and then there would be a scatter of milk and cream cans and much vehement language from the driver. I remember once at a place called Abeele when in the railway yard a mob of dogcarts came in with their loads of milk for delivery. A kindly Digger tossed half a tin of bully beef in amongst the "mongs." The mixup and spilt milk that followed nearly led to international complications, and only the timely arrival of a town picket saved a declaration of another little war on the spot.

These dogs, which are often of no particular ancestry, are very intelligent, and, like the pack camel, know exactly what is a fair thing. If a dog is overloaded or worked beyond his set time he promptly holds a stopwork meeting and "declares his attitude" in his loudest yelps.

Community Service.

A growing practice I noticed among village communities in Belgium—it was an outgrowth of war-time conditions, I believe—was evident in a sort of general community service. When crops were to be harvested all the people of the village turned out. Each crop in turn was harvested by all hands until the whole district produce had been gathered into the barns. No wages were paid, but each farmer supplied food, refreshment, and entertainment to the field workers while they were engaged on his holding. No one was exempt from this community service. When each crop was harvested, all hands moved on to the next, and so on until the harvesting was finished.

The village wood—there is a sort of timber reserve near each centre—is, as a rule, municipally controlled, and each family in the community is apportioned an allotment of the woods sufficient in area to supply its needs for firewood and winter fuelling and otherwise. This illustrates the extent to which, in a very densely peopled country, community service must be organised.

Hard Toil of the Small Farmer.

The whole of the country has been improved out of all recognition by the hard, patient toil of the small farm holder. It has been said that if the test of a country's prosperity is to enable the largest possible population to live on the smallest possible area, then Belgium may justly be considered one of the most prosperous countries of the world.

PLANTING AND DE-SUCKERING BANANAS.

By GEO. WILLIAMS, Director of Fruit Culture.

Among banana-growers generally the mode of planting is by suckers, which are allowed to develop from the original crown, and varying opinions are freely expressed as to the stage which suckers should have reached before removal. The bottle-shaped specimens with a heavy base, and which have not developed foliage or that beyond the initial sword leaves are mostly favoured.

As a result of experiments conducted in different banana-producing countries it has been proved that (as with other plants of this nature) strong suckers from vigorous plants show no advantage over small and what may be called miserable specimens, even those usually called bulbs, nor over plants grown from a single eye or bud removed from a butt with but a small section (1¼-inch diameter and about ¼-inch thickness attached). Planting the large sucker in its natural state will lead to a slightly earlier first bunch being produced if it survives the attack of beetle borer; but instances, if any, are extremely rare where a well developed sucker will produce a bunch equal to that grown on its first follower. Where the central or crown growth is eliminated, two or three plants may be allowed to develop each producing a better bunch than the original. Selecting butts and splitting these into sections according to the number of eyes showing is also much preferable to using suckers as now planted. In each system recommended, the "sets" should be planted beneath at least 4 inches of soil; this eliminates the possibility of the plants being eaten out by weevil borer before they become established. It should be noted that "bits" are planted with the buds or uncut surface facing downward.

From the inception of the plantation in tropical districts where rainfall is plentiful and reliable, careful attention to desuckering can so regulate the season of maturity of the fruit that complaints about transport at this time of the year (when heavy rains and floods are to be expected) may be entirely obviated. The uncertainty of growth owing to the climatic conditions of the Southern and Central districts do not as a rule admit of reasonable anticipation, but no sound reason can be advanced as to why it is not given effect to in the North. It is admitted that the weight of fruit produced in a stool of three stems almost simultaneously will not quite equal that where the production is spread over a lengthy season (this has been noted at Cardwell by Instructor Stephens, also in the Central and Southern districts), though 72 dozen choice fruit were observed on one stool in the Central district, each bunch maturing at the same time. In the Northern district the season may be extended from May to December, and allowing from ten to fourteen months with Cavendish variety, and eleven to fifteen in the Gros Michel (a very wide margin) from the time of sword leaf stage to the cutting of the fruit, no appreciable difference would be present in the weight of the crop. The influence of wet season on transport, also the reduction of attack by fruit fly, will more than repay any little extra trouble which may be entailed. Systematic de-suckering of plantations is considered the most important practice conducive to success in a banana plantation.

STRAWBERRY CULTURE.

The subjoined notes on Strawberry Culture have been supplied by the Fruit Branch, Department of Agriculture and Stock:—

Although the strawberry is commonly considered to be better adapted to the climate of the temperate zones than to that of the semi-tropics, it is, nevertheless, the one berry fruit which can be grown to perfection in this State. Excellent fruit is produced in our Southern coastal districts and even under tropical conditions such as those existing at Townsville, when the plants are grown on alluvial soil and are well irrigated, very good fruit is produced. This shows that the strawberry has a wide range in this State and that it can be grown successfully over the greater portion of our Eastern coastline and the tableland country adjacent thereto, provided there is either an adequate rainfall or, failing that, a supply of water for irrigation.

The commercial cultivation of the strawberry is, however, confined mainly to those districts possessing a regular rainfall, and extends from the Redlands Area in the South to Bundaberg in the North. When grown under suitable conditions in this district, the strawberry has proved itself to be an early and prolific bearer, able to stand a fair amount of hardship, in the shape of dry weather, and to resist the attack of insect and fungus pests to a greater or less extent.

There is a good demand for the fruit, either for immediate consumption in this and the Southern States or for conversion into jam, and, as few crops yield a quicker return, it frequently enables a beginner to make a living whilst more slowly maturing fruit crops are coming into bearing. Many a pioneer fruitgrower has to thank the strawberry for his start, as it enabled him to make a living where he would, in all probability, have failed otherwise, and what applied in the case of our pioneers still holds good with the beginners of to-day.

Our strawberries are of excellent quality and carry well, so that they reach their destination in the Southern States in good order when carefully handled and packed, provided the weather is not excessively warm or the fruit over soft on account of excessive rainfall. The fruit is very suitable for jam, and the product of some of our local factories is not excelled elsewhere in the Commonwealth; further, the demand for strawberry jam exceeds the supply, so much so indeed that, for a considerable period of the year, it is not procurable. There is therefore room for the extension of the industry as the price realised for good strawberry jam in the Commonwealth should enable both producers and manufacturers to obtain a satisfactory return.

Soils for Strawberries.

Given suitable climatic conditions, strawberries will thrive in most soils, but the ideal soil for this fruit is a rich loam of medium texture, well supplied with humus, possessing perfect natural drainage, and capable of retaining moisture during dry spells—and the nearer one can get the soil to this ideal the better the results. Heavy, cold, badly-drained soils are not suitable, but any good loam or sandy loam, whether of scrub or forest origin, can be made to produce good berries if properly treated.

Preparation of the Soil.

There is only one way to prepare soil for strawberry culture, and that is, *thoroughly*. Nothing else will do. In the case of virgin scrub or forest land, which is, as a rule, fairly rich in humus, the land, after it is cleared, should be broken up deeply and brought into a state of as nearly perfect tilth as possible. On virgin soil, except it is of the poorest nature, it is not necessary to apply any manure for the first crop, as there is usually an ample supply of available plant-food and humus present in such soil, but for subsequent crops, or old land, systematic manuring is very important. Old land that is at all deficient in humus should have that deficiency made good, either by the application of a heavy dressing of farmyard or stable manure, such as a load to every 4 perches, or if this cannot be obtained, then by growing a green crop such as cowpeas or other legume which has been well manured with phosphatic and potassic manures and ploughing it in. The green crop so ploughed in should be allowed to rot and, when rotten, the land should be reploughed and worked down fine. If the green crop has received a generous dressing of phosphatic and potassic manure, then there will be no need to apply any further fertilising material to the land, as a complete manuring has been given; but if not, then the soil should be treated as recommended later on.

The surface of the land should be kept as even and level as possible, and, as already stated, it should be worked down fine, so that when the young plants are set out they will take hold of the soil at once and become firmly established.

Planting strawberries on raw land, sour land, or land that has been indifferently prepared, is only courting failure, whereas, when the planting is carried out as advised, there is every chance of success.

Selection of Plants.

Always obtain strong runners from healthy, prolific plants. The first runners next to the parent plants are to be preferred, as they are usually the most vigorous and best rooted, and, further, they come into bearing earlier; but, failing these, any well-rooted, strong, well-grown runners can be used, and although they will not fruit as soon as the first runners they will give a good yield later on, and frequently continue to bear when the earlier fruiting plants have ceased.

Planting.

Having secured suitable plants, trim the straggling roots with a sharp knife; take care not to let them dry out, and plant as shown in the illustrations herewith,

No. 1.

No. 2.

No 3.

No. 4.

which are self-explanatory. Careless planting is responsible for many failures, especially too deep planting, as no strawberry will thrive if its crown is buried under the soil.

The distance at which to set out the plants varies somewhat in different districts, but it is not advisable in any case to overcrowd the plants, but to allow plenty of room. Personally, we favour planting strong plants at from 20 in. to 2 ft. apart each way, so that when planted the land can be worked all round the plant; or if row planting is desired, then the rows should be about 30 in. apart and plants set out at from 15 to 18 in. apart in the row. The illustration of a strawberry garden at Mooloolah, taken some years since, shows the manner of planting adopted by one of the most successful growers of his day, and it will be noted that the plants have plenty of room and are in no way overcrowded.

Cultivation.

Strawberry plants must only be surface-worked whilst growing or bearing fruit. The object is to keep down weed growth and to prevent the surface of the soil caking; but the cultivation must never be so deep that it will injure the roots. The best implement to use is the Planet Junior hand cultivator or similar machine; or, failing that, a good Dutch hoe of any type that may be preferred.

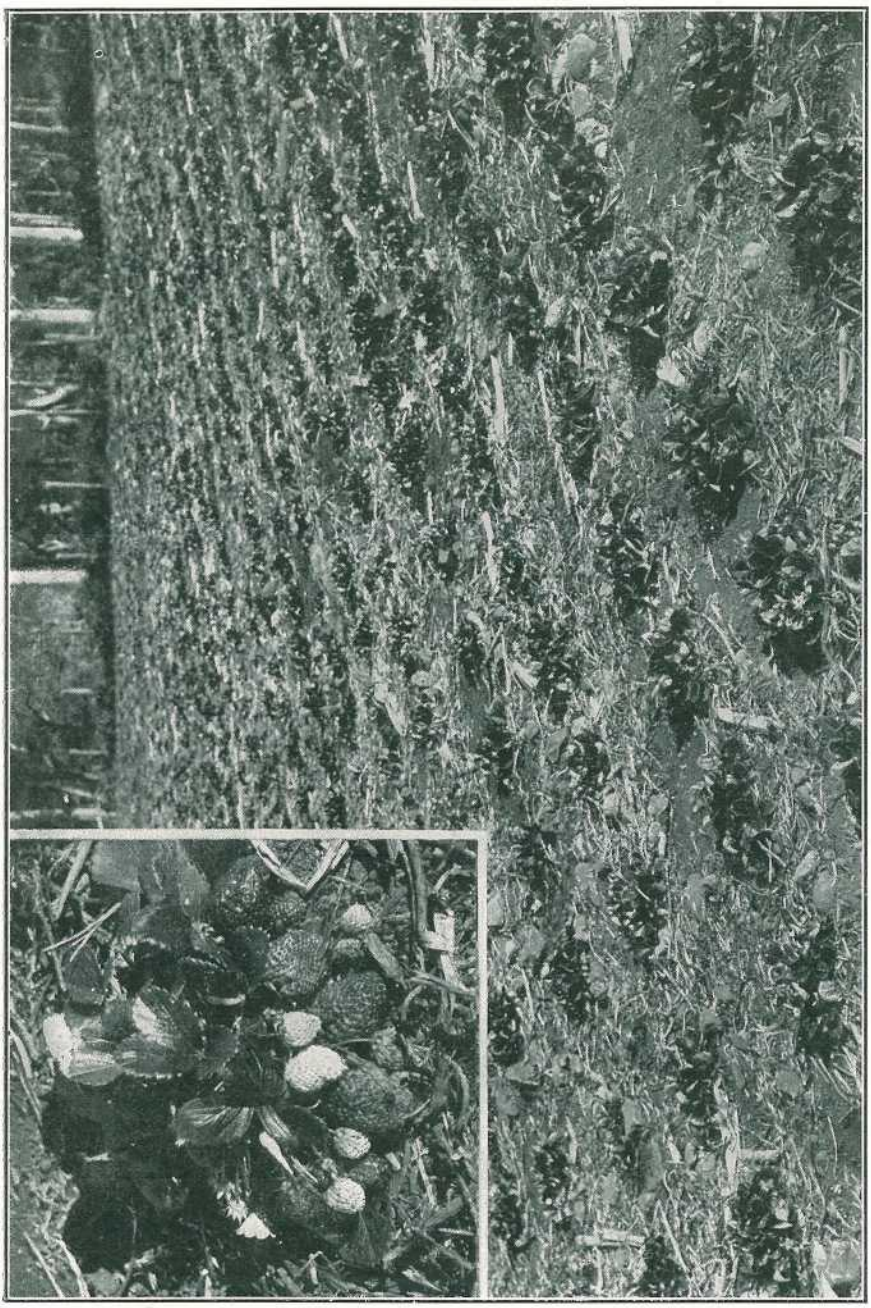

Plate 66.—A Strawberry Garden at Mooloolah.

Weed growth must be kept down and the surface of the soil must not be allowed to become hard and set, as if it does the evaporation of moisture from the soil will be greatly increased, and it will dry out rapidly.

If the plants are to be kept over for a second or third year, then the whole of the runners, other than those required to make good any losses in the original plants, must be removed, and the ground between the original plants must be well broken up and manured in late summer or early autumn, so that the plants will be in good nick for producing a crop of fruit the following season.

If the plants have been badly attacked by leaf blight it is a good plan to cut off all the leaves and burn them prior to working and manuring the land, as numerous fungus spores are destroyed thereby. The burning off is best done by scattering a little loose dry straw over the plants when the leaves have been cut off and have dried, and then setting fire to the lot. A light burning does not injure the plants, but is decidedly beneficial.

Mulching.

Mulching is seldom practised in this State, probably owing to the fact that a really good material for mulching is not readily obtainable, and therefore a light soil mulch produced by the surface working of the soil by means of a Dutch hoe, Planet Junior, or similar hand cultivator is all that is necessary. The use of a paper mulch has, however, much to recommend it, as it would certainly keep down weed growth and tend to maintain even soil conditions. A strip of paper mulch 18 inches wide would be all that is necessary, and the plants should be set through the paper at from 15 to 18 inches apart in the row. A further advantage to be derived by the use of paper mulch is that the fruit would be kept much cleaner as it would not be so liable to be covered with dirt as frequently happens if heavy rain falls or the watering is not very carefully applied.

Irrigation.

Where water is obtainable it should always be available for the plants' use during dry weather, as the ability to maintain an adequate supply of moisture in the soil at all times and thus maintain an even growth will result in larger and better fruit, and a heavy increase in yield. Strawberries pay well for intensive culture, and the money expended in providing a good system of overhead or other method of spray irrigation will be found to be a very profitable investment. A combination of paper mulching and spray irrigation will enable a grower to maintain a regular supply throughout the season of first class table fruit for which there is always a ready market.

Manuring.

The strawberry is a fruit that requires an abundance of readily available plant-food, and one that pays well for systematic and judicious manuring. In the 1924 edition of his pamphlet, "Complete Fertilisers for Farm and Orchard," the Agricultural Chemist to this Department gives the following advice, which it will pay to follow:—

"Some of our coastal country, between the 26th and 28th degrees south latitude, is particularly suitable for strawberry culture, frequently producing quite phenomenal crops. Some of our rich loamy soils found in our coastal scrub lands give the best results. In poorer sandy soils the improvement effected by artificial fertilisers, particularly such containing potash, is very marked, and a light dressing of 5 to 10 tons of stable manure per acre is very beneficial.

"A complete fertiliser for strawberries of the formula 4-8-10 should be used at the rate of 5 to 9 cwt. per acre.

"The following fertiliser mixture may be found useful:—

1 to 1½ cwt. sulphate of ammonia, or nitrate of soda
3 to 5 cwt. basic or ordinary superphosphate
1½ to 2 cwt. sulphate of potash
} per acre;

or,

1½ to 2 cwt. nitrate of soda
1 cwt. fine bonemeal
4 cwt. superphosphate or Nauru phosphate
2 cwt. sulphate of potash
} per acre;

The latter applied by two or three top-dressings, at the rate of 1 cwt. per acre, when fruit is first forming, and thereafter at intervals of two weeks."

Green Crop Manuring.

When dealing with the preparation of the soil, the importance of providing an adequate supply of humus was referred to, and the statement made that where a sufficient quantity of farmyard manure was not available to supply this essential ingredient to the soil, green crop manuring should be used to make good the deficiency. Humus plays a very important part in the composition of soils, and especially so in those devoted to strawberry culture, as its presence in the soil enables it to retain a much larger percentage of moisture than it would do were it deficient in humus. The power to retain moisture is of the greatest importance in a soil devoted to strawberry culture, as the strawberry is a shallow-rooted plant that soon suffers when there is any lack of moisture.

Moisture in the soil also enables the artificial fertilisers applied to become available, as they are of no use whatever to the crop unless their plant-food is capable of being dissolved by the soil moisture, and can thus be obtained therefrom by the roots of plants. When leguminous crops are grown as a green manure they should be manured with a fertiliser containing lime, citrate-soluble phosphoric acid, and potash; such as a mixture of finely-ground island phosphate and a potash salt, used in the proportion of four of the former to one of the latter. No nitrogen need be applied, as the plants will obtain their own from the atmosphere; and when they are ploughed into the soil it will not only be enriched by the plant foods contained in the fertiliser applied to the soil to produce the green crop, but also by the nitrogen that has been produced by the green crop itself; the whole forming a complete fertiliser, as it contains all the essential plant-foods in an available form. Green crop manuring is the cheapest way in which to apply nitrogen to the soil, so that, taking into consideration its value as a supplier of humus, it is of the greatest value when intensive cultivation is intended; and as the strawberry is a crop that demands intensive cultivation, its importance cannot be over-estimated, especially in soils that are deficient in humus. Cowpeas, vetch beans, small Mauritius beans, and the large black Mauritius beans are the best legumes for summer growth and vetches or tares and the grey or partridge field pea for winter.

Marketing.

Fruit for immediate consumption should be gathered whilst still quite firm. It should be carefully handled, graded for size and colour, and packed in boxes or trays containing a single layer of fruit. The use of punnets is not so satisfactory, as the fruit is more likely to be bruised, and it is doubtful if the methods of marketing the fruit in single layers can well be improved upon. Fruit for factory use is stemmed, placed in casks or other suitable receptacles, and forwarded as quickly as possible to the factory. Care in handling, picking, grading, or packing, always pays.

Diseases.

The most serious diseases of the strawberry in this State are those of fungus origin—viz., leaf blight and mildew.

The former can be controlled by the use of Bordeaux or Burgundy mixture applied as a spray, combined with the burning off of affected leaves, as previously mentioned; and the latter can be kept in check by means of precipitated sulphur applied with a light Feeney dust gun provided with an extended tube outlet. The ordinary sulphur generally used in dusting grapes is not efficacious. Insect pests seldom do any very serious injury, but when leaf-eating beetles or other leaf-eating insects are present they can easily be destroyed by spraying with arsenate of lead; or in the case of cut-worms these insects can be kept in check by the use of poisoned baits.

Varieties.

Although most of the standard varieties of strawberries have been grown in Queensland at one time or another, experience has shown that no one variety has proved permanent, but that it has been necessary to either raise new kinds from seed or to introduce them from elsewhere. Varieties producing perfect flowers have proved more profitable than pistillate sorts and are therefore most commonly met with.

After being grown in this State for a few years most varieties become weaker in growth, more liable to disease, and less prolific, so that they have to be discarded. The introduction of new sorts is thus essential, and there is no better way of doing this than by raising local seedlings. Some of the best sorts ever grown in the State have been locally raised seedlings, of which the Aurie, Anetta, and Phenomenal are good examples, and there is no reason why sorts equal or even superior to these should not be produced. Of the well-known standard varieties, such as Marguerite, Trollop's Victoria, British Queen, Pink's Prolific, Federation, Melba, and Edith, and

several others that have been grown from time to time in this State, few are now planted. Phenomenal (a Gympie raised seedling) and Aurie, another variety of local origin, are now the varieties most commonly met with; other new varieties are being tested and some of them may prove to be adapted to our local conditions. The type of strawberry best suited to this State is a vigorous healthy grower—that is, a good bearer and producer of good coloured fruit of good, firm texture and fine flavour; a fruit that keeps and carries well, and that meets the requirements of both the fresh fruit trade and of the jam maker.

As strawberry seed is freely produced and readily germinates, raising seedling plants, which usually fruit the following season is recommended. By careful selection there is reasonable possibility of effecting improvement on existing varieties. Seed should not be collected indiscriminately but from fruit freely produced on plants showing marked vigour.

CARE OF THE COW AFTER CALVING.

By J. A. RUDD, L.V.Sc., Department of Agriculture and Stock.

CARE of the cow is more important than food at this very critical period of a cow's life. As calving occurs every year and with a healthy animal is a normal function on which so much after value as a dairy cow depends, it is necessary that her health and comfort should be studied if she is to continue as a profitable producer.

The First Thing to Do.

Assuming all is well and the cow has calved in good condition and is clean —i.e., voided her placenta or foetal membranes—the very next step is to clip the hair right off from below the vulva or external genital organs, under the tail, between the legs, right over the udder and teats and as far forward as the navel and milk veins showing under the abdomen. Clip likewise the tail down to the top of the brush, and wash this part thoroughly and give the udder and all parts which have been clipped a good soap lather, preferably with ordinary common soap. The object of this is to fill the pores which are now so stretched in the skin, so that no deleterious or disease spreading bacteria can enter the udder and pendulous parts of the body from outside for at least twenty-four hours or even more. The cow when lying down rests her udder on her hind feet, and if the udder is inflamed she puts on body pressure in order to relieve pain. As the udder lies between the body and hind legs, it is therefore essential that the hind feet should be kept clean and free from mud and filth.

Other Measures for After Care.

The next step is to make certain that the uterus, which is now about 8 feet long with thickened walls, due to a very big blood supply, should be encouraged to contract normally and rapidly so that all fluid contents which are harmful to the cow's health may be expelled as quickly as possible. The fact that this uterus is in a very pathological condition from the time the calf is born until it contracts to normal should not be lost sight of, for so much depends on the healthy state of this organ as to whether the cow conceives again normally, and gives of her best at the bucket. A cow with a diseased or septic uterus does not milk up to her full capacity. Pain which is constant, plus the fact that her constitutional vitality, which includes her digestion, is impaired as the result of an endeavour on the part of certain vital organs having extra work to neutralise the toxins from a pathological condition of the uterus, leave her open to attack in other parts of the body, such as the udder, and it can be definitely stated that an unhealthy uterus is one of the chief causes of a first class dairy cow otherwise healthy contracting mastitis from some unknown source. The conditions favourable to such a state must exist before a cow can become infected with mastitis, or any other disease of a contagious type; the natural resistance of every animal to disease is very great provided the vitality has not been lowered by a preventible ailment. The question arises how can one assist the rapid contraction of the uterus. Nature has provided for this very important function by making the sucking action of the calf the main factor in bringing not only a rapid contraction of the uterus, but also the expulsion of uterine fluids which, if left, will cause a great deal of trouble later on. The action on the part of the sucking calf cannot be explained, but it is known as a physiological action of great importance. The idea is fairly widespread that a calf should not be allowed to suck its mother at any time because it is supposed to prevent the cow from doing her best in the bail.

However much this opinion might have been or still is of value in dealing with ordinary mongrel bred cattle not of true dairy type, it is to-day a fallacy and in fact is a potent factor in not only spoiling a good cow, but also of destroying her splendid offspring, for the calf must suck and obtain the first milk from its dam in order that its bowels may be cleansed and its body may load up antibodies or preventives against disease. The only way that this important function can be performed is by the calf imbibing a sufficient quantity of the colostrum or beastings from its dam. It takes at least forty-eight hours for the calf to get sufficient from his mother to be of any practical value to him in his after life, and it is in this forty-eight hours that the cow derives her greatest benefit from its initial nourishment of her calf, as her uterus contracts from 8 feet with grossly thickened walls down to 2 feet with thinned walls and almost its normal size in this limited time. If the calf is left with its mother for four days this association between mother and offspring should be sufficient to place both on the high road to perfect health. There will be less milk fever, less mastitis, and less misery for both dam and offspring if this is carried out systematically and with the deliberation that is so essential in dealing with the improved modern type of dairy cow, in which mammary gland and other organs proportionately have been forced in order to obtain maximum production at the pail. If we get away from nature in this way by high production we must return to nature in other ways in order to compensate for such qualities as have been destroyed by artificial methods, and so preserve the balance which has been to a certain extent strained, if not destroyed, and assist the animal to regain the normal state.

A Matter of Common Sense.

The maximum amount of benefit accrues to the cow and her calf by adopting this simple method, which is one born of common sense and experience in the treatment of ailments which are common to dairy cows of the modern type, and which make then unfit permanently for the work which is ahead of them. A dairy cow is at her best, if she has been properly handled, at ten years of age and will continue so up to fifteen years of age, gradually waning as years pass on. I have known of dairy cows producing 18 lb. of butter for a week at twenty years of age, but these are exceptional cases only cited to show how it is quite possible even with maximum production to have longevity.

Care of the Calf.

The calf when taken away at the end of two or even four days should be left to fast at least twenty-four hours in order to give his overtaxed digestion a much needed rest, and also to make him anxious to drink out of the bucket of his own accord. It may be necessary to allow him to fast for even thirty-six hours, but longer than this is not advisable and a certain amount of persuasion may be necessary in order to induce him to start drinking from the pail. The cow is relieved of high tension when the calf is running with her, and when the calf is taken away she will, after twelve hours, give her milk freely.

It is not advisable to drain too much milk from an over distended udder at one milking and then not to empty the udder completely at any time for the first fourteen days—i.e., milk out but do not strip. Stripping with finger and thumb is a fruitful cause of what is commonly called Pea in the teat, which is only a warty growth in the passage or duct, due to extreme irritation of the highly sensitive mucous membrane of the teat duct. Once or twice all round with full hand on the teat is all that is necessary in order to empty the mammary gland without prejudicially affecting its productivity until the cow freshens on or about the twenty-eighth day after calving.

The calf does not actually feed on grass for twenty-eight days after birth but may peck at a few stems of hay, but if allowed to run at large before that time he is apt to pick bits of bark, paper, or rags, or even chips of wood, which may block somewhere about the region of the oesophogeal groove and cause endless trouble. A simple method of dealing with such a perverse animal is to tie him up for twenty-eight days and feed him on a fair amount of his dam's fresh milk for that period if possible; or even a small ration of it with skim milk and a little linseed oil—one teaspoonful of the latter to every three quarts of the mixed milk —i.e., separated milk and the whole milk of his dam. When the calf finally goes on to skim milk he is thus quite accustomed to his ration of linseed oil, which does not upset him, due to sudden change of diet, and he carries on without a check so that on the arrival of winter with the first snap of cold weather he is not found wanting; and no parasites, such as stomach worms, which are by far the greatest enemy of the poorly reared young calf, can find a lodgment in the viscera. In other words he is in a fit state to repel all parasites and bacterial invasion within

certain limits, which, of course, are in direct ratio to the first-hand methods employed in the very early stages of its career. What is the use of rearing calves in the early spring or summer only to die in the following winter, and unquestionably this is the state of a great many young calves which are reared annually on skim, separated milk alone without the addition of fat of any kind in place of that removed in the process of cream separation.

Dish skimming is quite another proposition, and good calves can be reared if the milk so treated is sweet and wholesome, even at the end of twenty-four hours' standing in shallow pans.

The branding, earmarking, and castration of bull calves may be carried out at nine months, when the calf is on good grass and well over his weaning period, but if calves are put out of their natural run into a back paddock they should be taken to water daily at least once in twenty-four hours, and this should be clean and wholesome, preferably water from a well or good running creek. Ordinary waterholes are often highly infected with the eggs of parasites which find lodgment in the stomachs of calves, which may be half empty, due to young animals being worried by their fresh surroundings and anxiety to get back to their natural beat where they were first reared or born. Waterholes that are merely the reservoirs of paddock drainage are positively the riskiest method, from a health standpoint, of watering all classes of stock of all ages that is practised at present. They should be fenced off if they must be used, and the water pumped into troughs; this would obviate the risks of parasitical disease to some extent.

THE FARM TRACTOR.

ENGINE FAULTS EASILY REMEDIED.

By E. T. BROWN.*

The constant movement of the valve in its guide tends in course of time to wear the latter. In the case of an inlet valve this causes a leak; therefore, the ingoing charge is diluted. It is possible to buy a gland for a leaking valve guide, but it is generally better to replace the guide with a new one. In the vast majority of instances, the guide is a driving fit in the cylinder casting. It is, therefore, rather difficult to remove. It does not do to tap the lower end with a hammer, as this burrs it and prevents it passing through the hole in the casting. A stubborn guide can, however, be removed in a simple manner with a home-made gadget.

A long, thin bolt should be taken, thin enough to pass through the hole in the casting and long enough to project above the top of the cylinder. A washer should be put on, the bolt inserted in the casting from the bottom, and a large washer and the nut put on the end. By tightening the nut the guide is withdrawn gently, but surely, from the casting.

In isolated cases the guide is integral with the casting. If the guide be worn it must be bushed. The same plan can be adopted for drawing the bush into position. This is, however, a rather delicate job, and extreme care must be taken with the long, thin bush; otherwise it will be knocked out of shape.

An Engine Assembly Tip.

When the cylinder block is being returned to position two of the four pistons should be at the top of their stroke with the remaining two at the bottom of their stroke. The pistons pass into the cylinders easily, but the piston rings are apt to foul the bottom of the block. This is due, of course, to their natural springiness. Force must not be used, as the rings are extremely brittle. Special clamps can be obtained for holding the rings in position, but it is possible to make a gadget at home that will answer the purpose equally well. A piece of hoop iron, 1½-in. to 2-in. wide and 18-in. to 24-in. long, according to the size of the piston, should be taken and bent around the piston. A third of an inch from where the two ends come together the ends should be bent out at right angles. This means that they are parallel, but slightly apart. A clip should then be made and slipped over the two ends, this being tight enough to bring them together. By moving the clip towards the piston the band is tightened. This compresses the rings, but the band is loose enough to slide down the piston as it is being inserted. For a four-cylinder engine two clamps should be made, these being used first for the two top pistons and later for the lower ones.

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* In the "Farmer and Settler."

Exhaust Pipe Heat.

If the exhaust pipe comes anywhere near the driver's feet the heat tends to be oppresive. No floor boards are fitted, as a general rule; hence there is no protection. The heat can be eliminated to a very great extent by wrapping asbestos cord round the pipe. Asbestos is a perfect insulator, and is used largely for steam pipes with a view to reducing the loss of heat. In some cases it is possible to arrange for additional protection by fixing a piece of asbestos sheet above the exhaust pipe.

If coil ignition be the system adopted on the farm tractor, the operator should understand how to detect faults as they arise. If the engine will not fire and no conclusion can be arrived at regarding the cause the engine should be run with the starting motor, after switching on the ignition, and the ammeter watched. If it be seen that the reading rises and falls it may be taken that the low-tension wiring is in order. If the reading is steady the make-and-break mechanism should be examined, and if found all right there is probably a shortening in the low-tension circuit.

If no reading be obtained, it indicates either that the accumulator is exhausted or that there is a loose connection or a broken wire in the low-tension wiring. The fault should be looked for in the cables running from the junction-rod or switch to the coil, or from the coil to the distributor, and the terminals on the accumulator should also be looked to. To test the coil, apart from the distributor, the engine should be turned by hand with the ignition switched on, and a cable removed from the central distributor terminal and held half an inch away from any metal part of the chassis. If the coil be in order, a strong, regular spark is obtained.

Radiator Water Level.

The water level in the cooling system must be maintained if the engine is to function normally. The conditions under which the farm tractor works are such that rapid evaporation is usually the rule. When the water is cold it should be 2 inches to 3 inches below the overflow pipe; the system will be full when the water expands when the engine is hot. So long as the water comes above the inlet pipe there is no call to add more, but on no account should it be allowed to fall below this.

THE WHEELS OF THE CAR.

VARIOUS TYPES COMPARED.

By RADIATOR.*

History has no record as to who was the inventor of the wheel as an assistance to transport, but certainly wheels have always been a most vital portion of vehicles of transport, and probably there exists to-day no better examples of what can be done with wheels than in the motor car. The service that must be done by a car wheel is greater than that of any other vehicle, even the railway train. The wheels of the latter may run at high speed, but they do not encounter the road bumps of a car's wheels.

In the days before motor cars the wheels of nearly all motor vehicles were made of wood, with an iron tyre. Because of the use of those wheels on gun carriages by the army, the wheels were sometimes known as artillery wheels. It was not unnatural that the first cars were fitted with wooden wheels, and these wheels applied to cars became generally known as artillery wheels.

The wire wheel works on a fundamentally different principle from that of the wooden wheel. In the latter case the weight of the axle rests on the lower spokes so that the spokes at the bottom are in compression. The wire wheels on the other hand are so arranged that the hub hangs from the top of the rim; that is, the upper spokes are in tension. The wire wheel is remarkably strong and has the great virtue for high speed work that although it is possible to buckle it, it is practically impossible to completely smash it. The chief objection to the wire wheel is the fact that it is very difficult to clean. This objection has been overcome in the case of certain high priced cars by covering the spokes with light sheet metal discs.

A more modern type of wheel is the steel artillery wheel (often known as the Sankey wheel). This wheel consists of two sections of pressed steel welded together to form an all-steel wheel with tubular spokes. This type of wheel is becoming increasingly popular. The reason why the wheel was not developed years ago is that the electric welding process used in joining the two halves of the wheel is only a comparatively recent innovation in the steel-making industry. This wheel has not the resiliency of the wire wheel, but it is otherwise quite a good job.

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* In the "Farmer and Settler."

Another type of wheel that was very popular a couple of years ago is the disc wheel. The disc wheel consists of a pressing of mild steel to which the rim is riveted. The disc wheel has the great advantage that it can be cleaned in a very short time, but there is the objection that it behaves somewhat like a drum and so adds to the noisiness of the car.

From the point of view of the Australian country driver, the artillery (either wood or steel) wheel has a great advantage over other types inasmuch as it is possible to coil a rope or chain around the tyre and rim should the car become bogged. This trick is impossible with disc wheels, and is liable to damage the very light spokes in a wire wheel.

Virtues of each Wheel.

It is difficult to decide which is the best type of wheel and much depends on the taste of the owner. The wire wheel is, if anything, the best wheel for riding comfort, and also gives slightly the longest tyre life. However, it is the most expensive as to first cost and takes a wealth of trouble to keep it clean. The disc wheel, although easy to keep clean, is noisy and rigid. The wooden artillery wheel is rigid and tends to develop squeaks when the wood shrinks and thereby loosens the joints. The steel artillery wheel is rigid and although a good job is a little unsightly in the opinion of the writer. A rigid wheel means that the tyre life is not quite so long as with a resilient wheel.

Detachable Wheels.

Practically all cars on the road to-day have either detachable wheels or detachable rims, so that in the event of a puncture the motorist can replace the whole wheel or rim without the bother of mending the puncture on the road.

The detachable rim is much more popular on American cars than on British vehicles, also the wooden artillery wheel is essentially an American fashion.

Disc, wire, and steel artillery wheels have for many years been detachable, but it is only quite recently that the wooden detachable wheel has made its appearance, and a very smart looking job it is.

The detachable wheel is secured in position by various means. In all cases a hub is mounted on the axle end and over this hub is pushed the hub sleeve, which carries the wheel spokes. In many cases the hub sleeve is held to the hub by a number of capped bolts, while in other cases the hub has a special wheel cap screwing on to the hub, which holds the wheel in place. Most of these latter type have a special locking device which the owner should always check to see that it works when a wheel is replaced.

Where the wheel is held on by a number of bolts, they should be occasionally checked to see that all are tight. A little grease on the shanks of these bolts will often remove unpleasant wheel squeaks.

Where detachable rims are used, the motorist should, when replacing tighten all bolts equally so that the rim will be symmetrical on the wheel. Nothing wears tyres so rapidly as a rim set a little askew.

The tyre and tube on the rim of the wheel serve to insulate the chassis from all minor road irregularities, while the springs insulate the car from the major bumps.

Tyres.

Years ago the fabric tyre was the only type; this tyre was built up from layers of canvas and rubber. To-day, however, the cord tyre has completely superseded the fabric tyre. The cord tyre carcass is built up of cotton cords impregnated with rubber and surrounded by rubber. To this carcass is vulcanised a thick rubber tread. The cord tyre is capable of standing far more flexing than the fabric without the walls breaking. Because of this fact the introduction of the cord tyre was followed by the introduction of the low-pressure or balloon tyre. In the fabric tyre days, the pressures used in tyres varied from 50 lb. to 80 lb. to the square inch, whereas, to-day, the pressure varies from 20 lb. to 35 lb. to the square inch, depending upon the size of tyre and weight of vehicles.

The makers of tyres recommend pressures to be used for various wheel loads on any size of tyre. This pressure recommended is always the lowest pressure consistent with long life in the tyre, so that the owner may have the maximum comfort due to a soft tyre, but yet not destroy the tyre due to under-inflation. The reader would be well advised always to adhere to the tyre manufacturers' recommendations, and to purchase a pressure gauge with which to check the pressure.

CLIMATOLOGICAL TABLE—JANUARY, 1930.

SUPPLIED BY THE COMMONWEALTH OF AUSTRALIA METEOROLOGICAL BUREAU, BRISBANE.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·72	88	76	96	15	73	9, 10, 11, 20	3,080	18
Herberton	..	79	66	87	13, 14	57	13	1,746	25
Rockhampton	29·80	85	72	98	14	68	12 30,31	2,659	23
Brisbane	29·92	83	69	95	20	64	29, 30	994	23
Darling Downs.									
Dalby	29·88	86	65	100	19	58	11	386	14
Stanthorpe	..	79	61	97	19	51	11	208	14
Toowoomba	..	78	61	93	20	56	3, 6, 7	649	18
Mid-interior.									
Georgetown	29·69	90	74	98	1	70	31	714	22
Longreach	29·73	98	75	108	13	68, 69	29	399	10
Mitchell	29·83	90	69	103	19	58	1	228	6
Western.									
Burketown	29·68	93	78	102	3	65	7	871	12
Boulia	29·72	101	75	109	19	67	1, 2	18	1
Thargomindah	29·80	95	75	105	11, 12	63	4	127	3

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JANUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING JANUARY 1930 AND 1929, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Jan.	No. of Years' Records.	Jan., 1930.	Jan., 1929.		Jan.	No. of Years' Records.	Jan., 1930.	Jan., 1929.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	11·64	29	23·99	17·03	Nambour	9·91	34	19·18	9·46
Cairns	16·24	48	33·06	26·99	Nanango	4·75	48	3·92	9·51
Cardwell	16·46	58	38·64	28·01	Rockhampton ..	8·34	43	26·59	3·89
Cooktown	14·21	54	30·80	24·27	Woodford	7·95	43	15·15	13·22
Herberton	9·62	43	17·46	14·40					
Ingham	15·94	38	25·42	31·09					
Innisfail	20·03	49	34·56	35·58					
Mossman	15·08	17	42·93	36·38	*Darling Downs.*				
Townsville	11·29	59	17·58	15·96					
					Dalby	3·32	60	3·86	1·81
Central Coast.					Emu Vale	3·31	34	1·32	2·48
					Jimbour	3·65	42	2·31	1·53
Ayr	11·44	43	14·36	25·38	Miles	3·78	45	2·45	1·28
Bowen	10·20	59	20·46	33·32	Stanthorpe	3·62	57	2·08	1·73
Charters Towers ..	5·54	48	11·19	3·15	Toowoomba ..	5·03	58	6·49	5·00
Mackay	14·22	59	30·70	16·64	Warwick	3·58	65	2·03	2·43
Proserpine	16·14	27	28·53	39·62					
St. Lawrence	9·62	59	17·47	8·14	*Maranoa.*				
					Roma	3·26	56	1·53	1·24
South Coast.									
					State Farms, &c.				
Biggenden	5·37	31	9·66	5·65					
Bundaberg	9·06	47	15·92	4·21	Bungeworgorai ..	1·98	16	2·16	0·80
Brisbane	6·52	79	9·94	4·60	Gatton College ..	4·14	31	5·95	2·46
Caboolture	7·77	43	11·17	6·62	Gindie	3·74	31	6·88	1·30
Childers	7·82	35	14·02	6·37	Hermitage	3·31	24	..	3·23
Crohamhurst ..	12·74	37	22·91	12·37	Kairi	8·60	16	..	21·97
Esk	5·84	43	7·71	10·74	Mackay Sugar Experiment Station ..	14·34	33	28·94	16·33
Gayndah	4·72	59	9·29	10·53	Warren	5·22	15	..	0·44
Gympie	6·75	60	12·11	9·34					
Kilkivan	5·64	51	10·57	13·43					
Maryborough ..	7·54	58	11·34	4·18					

GEORGE G. BOND, Divisional Meteorologist

Answers to Correspondents.

BOTANY.

The following answers have been selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.:—

Melia as a Febrifuge.

F.P.D. (Kuranda, North Queensland)—

We have no definite information as to use of Melia as febrifuge, though probably it is used in some places, for Melia trees are largely planted throughout the tropics and subtropics of the world, and the Australian one is generally put down as a variety of *M. azedarach* widely spread, wild or cultivated, over the tropics. The inner bark, especially that of the root, has been used as a remedy for intestinal worms. It is cathartic and emetic, and has been used for cholera. The fact of its being used for this purpose is due to its bitter nature, so it is quite likely that it has been used to mitigate fevers in some parts of the world. The berries, as you know, are poisonous, and every year we generally receive specimens for identification with a report that they have been the cause of the death of pigs, the plants growing over pigsties having been left for shade. Birds, however, seem to eat them with impunity. We have heard of a decoction being prepared from them and sprinkled on plants to protect them from attacks of insects.

Horse Mushroom.

W.T.N. (Buderim Mountain)—

There is little doubt that the mushroom described by you represents the Horse Mushroom, *Agaricus arvensis*. This is edible and only differs from the common field mushroom, *Agaricus campestris*, in being larger and coarser in all its parts. There is no definite way of telling edible from poisonous mushrooms. The change of colour of the flesh, the floating or sinking in water, the discoloration of a silver spoon, and other tests cannot be relied on at all. The only way is to actually know the mushrooms with which you are dealing. A rule always to follow is this—that where you see a mushroom with white gills, a ring round the stem, and a volva or bag at the base of the stalk, these are always to be avoided. Some mushrooms are poisonous to some and harmless to others. It is a safe rule with mushrooms never to take a hearty meal until they have been tried in small quantities on account of the individual differences of people. First cook in small quantities and taste discreetly.

Fairy Floss—Native Flora.

S.A.S. (Thulimbah)—

Helichrysum diosmifolium is very common in Southern Queensland, and is generally known to the children as Fairy Floss, and Pills Plant is another local name we have heard given to it. It grows with two forms, one with white, the other with pink flowers. The pink is common, we think, in the granite belt. It is distinguished by the little flower heads, and the leaves are small and rather strongly scented. *Choretrum candollei* is a leafless shrub with long, slender, wiry branches, bearing in spring time a profusion of very small white flowers. The boronia is probably either *Boronia granitica* or *Boronia repanda*. Most likely they are both growing in the granite belt. The flowers of this little shrub vary from a pale pink to a very deep pink, almost carmine.

If you wish to know the names of the wild flowers of your district it would be as well to send to us next season small pieces a few inches in length pressed flat between sheets of paper before sending; number each specimen, and names will be advised according to their numerical order.

Quinine Berry—Emu Apple.

J.D.R. (Yeulba)—

Your specimen is *Petalostigma quadriloculare*, commonly known in Queensland as the Quinine Berry, though we have also heard it called Emu Apple and the tree referred to as Bitter Bark or Native Cinchona Tree, though these latter names more strictly belong to another tree, *Alstonia constricta*, fairly common in Queensland, and the bark of which has some value as a tonic. The Quinine Berry or Petalostigma is very common in parts of Queensland, and in some places, particularly in parts of the West and Central Queensland, makes a very nice, shapely, shade tree. The berries or fruits are very bitter, but are not known to have any values as a tonic or medicinal virtues.

Thorn Apple *(Datura stramonium).*

T.J.T. (Beaudesert)—

Your specimen is *Datura stramonium*, the Stramonium or Thorn Apple. It is one of the worst weeds we have, and as the seeds are supposed to be the most poisonous part of the plant there is no doubt at all, we should say, that the weed was responsible for the death of the pigs. It is a plant of rather nauseating taste, and as a general rule stock do not eat it unless it it chaffed up by mistake with other fodders.

Nut Grass Eradication.

R.B. (Wondai)—

Poisonous sprays have always proved of little or no value in eradication, but experience both here and abroad has shown that small patches can be eradicated by the application of cheap grade salt—such as waste salt from butchers' stores or hide stores—at the rate of ½ lb. per sq. ft., either dry or in the form of brine. It is practically impossible to entirely eradicate Nut Grass where the weed covers extensive areas, but it can be kept in check by proper handling, particularly where the land is used for large crops such as cotton and maize. The rows between the standing crops should be regularly cultivated so that the green shoots are cut off below the surface of the ground. At first the cultivation should be carried out at least once a week, gradually extending the interval as the weed becomes less aggressive. We must not forget that the Nut Grass tuber is a store-house of nutriment for the young shoots. So long as no shoots are being sent up the tuber remains dormant, but in cultivated land the food material stored in the tuber is being used up in the formation of the young shoot. Cut these off regularly and the tuber eventually becomes exhausted. Another point is that the formation of fresh tubers is absolutely dependent upon the leaves, and if these are not allowed to grow fresh tubers cannot be formed, and the old ones must die of exhaustion. This method means a great deal of work, but it is either continuity of the work of eradication or leaving the Nut Grass entirely alone; there is no half-way method.

Ornamental Trees.

H. McC. (Millaa Millaa)—

Quick-growing ornamental trees which might succeed at Millaa Millaa are:—Coral Tree (*Erythrina* spp.); Poinciana (*Poinciana regia*); Jacaranda (*Jacaranda mimosaefolia*); Silky Oak (*Grevillea robusta*); Cape Chestnut (*Callodendron capense*); Flame Tree (*Sterculia acerifolia*); Candle Nut (*Aleurites moluccana*); Rain Tree (*Pithecolobium dulce*); Cypress Pines and Ordinary Pines (any varieties obtainable in North Queensland).

Young plants should be obtainable through any nurseryman at either Charters Towers or Townsville or you could write to the Director, Botanic Gardens, Townsville, who could put you in touch with supplies. Mr. H. Wright, City Gardener, Cairns might know some local nurseryman there who could supply your wants.

Wild Tobacco.

R. H. (Chinchilla)—

Your specimen is the Wild Tobacco, one of the varieties of *Nicotiana suaveolens*. The plant is very common in various parts of Queensland and sometimes coming very thickly on the edge of the dry scrubs of the Western Downs. It contains the alkaloid nicotine, and is poisonous to stock, though at times the stock seem to eat it without ill effects following.

YOUTH AND THE JOB.

"As youth faces its great task to-day," said Lord Moynihan in a Burnley speech reported in the "Yorkshire Post," "let it remember that there is something more in the task than the completion of it. When I listen to my friends who engage in business of any kind, whether they are masters or workmen, I hear of almost nothing but 'hours of labour,' 'rates of pay,' 'new distributions of authority,' and 'management and direction.' All are very necessary, but I confess to a great longing to hear of the spiritual side of labour, of men's purpose and pride in their efforts. I am eager to hear of the value of the professional spirit of men thinking less of what they get out of their job than of what they put into it."

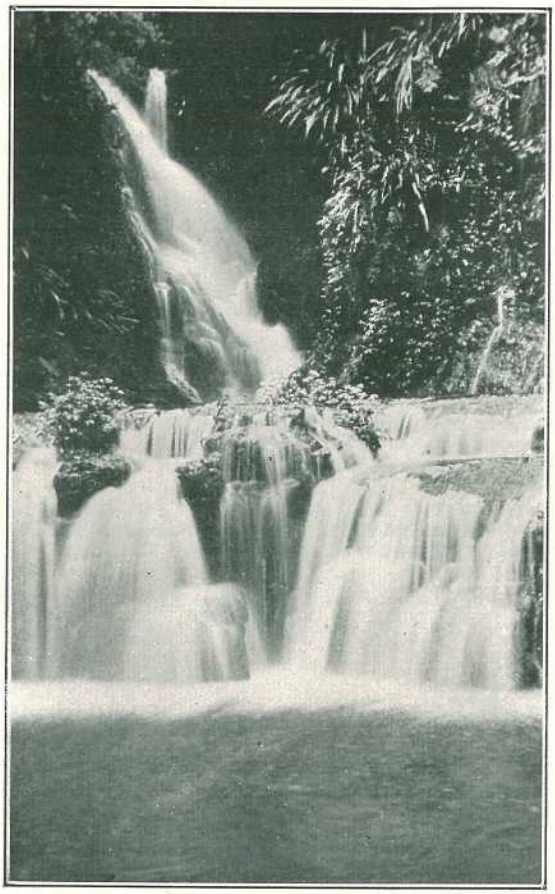

Photo.: E. Rye.]

PLATE 67.—CANUNGRA CREEK FALLS.

WHAT WE HAVE LOST.

There was never before, perhaps, a period in which work had less spiritual value for most people than it has to-day. The worker himself has been lost in the complicated machinery of production, and in our worship of efficiency the machinery has come to be considered somehow such a desirable good in itself as to warrant any sacrifice in its name. Social intercourse in the same way has succumbed to the machinery ostensibly provided for it. Clubs and organisations of all sorts for bringing people together are legion, but conversation has almost as completely disappeared as has letter writing between friends. We are so busy and wearied in rushing from one meeting to another that our minds have almost entirely ceased to meet. We have lost the power to see life steadily and see it whole. We see only parts, the physical part, the machinery part, and have failed to see the end of all these things, the full rounded life of the spirit for the growth of which alone these other things have any validity or value. Of what possible use is a machine, whether it is a dynamo or a university, unless it is to produce something of essential value for human life?—James Truslow Adams, an American thinker and philosopher.

Photo.: E. Rye.]
Plate 68.—Sunshine Falls—above Canungra Creek.

THE LESSON OF THE BOY SCOUT MOVEMENT.

"There are still worthy people who, being ignorant of physiology, live in an unreal world, and are even yet unaware that unless and until you cultivate and develop the body and brain of the child all attempts at intellectual instruction will prove futile. They are the witnesses of the triumphant contribution of the Boy Scout Movement, and render it a lip service of praise, but they decline to learn from it. Yet its lesson is profoundly true and full of meaning to all educationalists in this generation. It is a lesson of physical discipline, of educational adventure, of youthful training and glad obedience; it is one of the wise interpretations of that service which is perfect freedom; it educates by equipping the body first and drawing out its faculties and senses; it both harnesses and develops the boy and leads him of his own interest and desire into the path of manual work and the arts and crafts; it trains men not for the classrooms or the pedagogue but for life."—Sir George Newman, Chief Medical Officer of the Board of Education, in his report for 1928 on "The Health of the School Child."

General Notes.

Staff Changes and Appointments.

Mr. J. E. N. Bell has been reappointed Government Representative on the Dawson Dingo Board.

Mr. Charles Queale, Inspector of Stock, at present attached to Brisbane, has been transferred to Dalby.

Mr. H. J. Walker has been appointed Temporary Inspector of Slaughter-houses for the period from 6th January to 29th April, 1930.

Mr. H. Afford, of Birdsville, has been reappointed Government Representative on the Diamantina Dingo Board; and Mr. C. C. Morton, of Boulia, has been appointed a member of that Board.

Messrs. R. G. C. Fraser, S. R. Trundle, A. Marshall, and G. E. V. Wort, Councillors of the Cleveland Shire Council, have been appointed Honorary Rangers under the Animals and Birds Acts.

Constable D. P. O'Sullivan, of Tara, has been appointed an Inspector of Slaughterhouses; and Mr. P. J. Short has been appointed a temporary Inspector of Stock and Slaughterhouses for the period from 21st December, 1929, to 4th March, 1930.

The services of Mr. F. C. Shaw, Temporary Inspector of Slaughter-houses, have been continued for the period from 5th February to 17th May, 1930, in order to relieve Mr. J. R. Collier, Inspector of Slaughter-houses, Cairns, who will be on leave for that period.

Mr. F. H. S. Roberts, M.Sc., of the Prickly-pear Station, Gogango, via Rockhampton, has been appointed an Entomologist on probation, Department of Agriculture and Stock; and Mr. Robert Veitch has been appointed Chief Entomologist, Department of Agriculture and Stock.

Sugar-cane Prices Board.

An Order in Council has been passed removing all members of Local Sugar Cane Prices Boards throughout Queensland who were appointed by notices dated 23rd March, 4th May, 8th June, and 31st August, 1929. These members were appointed for the 1929 cane-crushing season only. As this season is now finished, these members have been removed from the Boards to which they were appointed so that new members may be appointd for the 1930 season.

Honey Board to Control Honey and Beeswax.

Nominations will be received by the Returning Officer, Department of Agriculture and Stock, Brisbane, until 5 p.m. on the 3rd March, 1930, for election as growers' representatives on the Honey Board.

Four such representatives are to be elected by persons who subsequent to the 10th April, 1929, owned at least five hives of bees in movable frames and market the honey and beeswax therefrom. Each nomination is to be signed by at least seven persons owning bees as described.

Canary Seed Board.

An Order in Council has been passed giving notice of intention to extend the duration of the Canary Seed Board for a further three years. The present Pool expires on the 28th February, 1930, and this Order in Council gives notice of intention to extend the pool until 28th February, 1933. The notice contains an invitation to demand a poll to decide the question of continuance or otherwise. This petition must be signed by not less than 10 per cent. of canary seed growers. If it is received a referendum will be held, and a simple majority will decide the extension or otherwise. If no petition is received the Pool will be automatically extended.

Fruit Marketing Organisation—Statutory Extension.

On the 26th September, 1929, an Order in Council was passed giving notice of intention to extend the operation of the Fruit Marketing Organisation Acts for a further five years as from 1st January, 1930, and calling for a petition of 500 fruitgrowers for a referendum to decide whether or not the Acts should be extended as suggested. A petition was received, and a vote taken on the question. As the vote was in favour of the continuance of the Acts, an Order in Council has now been passed continuing the operation of "*The Fruit Marketing Organisation Acts, 1923 to 1928*," for a further five years as from 1st January, 1930; that is, until 31st December, 1934.

Too Young at Eighteen.

Whether a youth of eighteen years is too young to drive a heavy motor lorry was one of the questions discussed at the recent commercial motor show in London. The general opinion seemed to be in agreement with Major-General S. S. Long, a director of Lever Brothers, Limited, who raised the question. For a lad of eighteen to drive a heavy motor vehicle was to ask for trouble, he said. The lad might have a lot of road sense, but there was a lot of dare-devil in him. He could not have the road sense of a man of forty.

Not too Old at Sixty.

To-day's limitations on the commercial value of a man have nothing at all to do with the number of years lived. There is a place for everyone who is willing to work, and to try to go forward, says Mr. Henry Ford in the course of an interview published in the "Ladies' Home Journal." "After having employed hundreds of thousands of people at the Ford works," he continued, "we have come to think not at all of age, but only of experience and the capacity to learn. In point of fact, we should prefer, if we could make the choice, to have all of our people between thirty-five and sixty years old, for then we should have a stable and experienced force. We should not care how much over sixty the men were so long as they could do their work. In no circumstances would we have a force made up solely of young men."

Fur-bearing Rabbits.

An Order in Council has been issued bringing fur-bearing rabbits under the provisions of the Animals and Birds Acts, and additional Regulations have been promulgated under those Acts specifying the conditions under which Angora, Chinchilla, and hutch fur-bearing rabbits may now be kept in Queensland. Every person who wishes to keep these rabbits must obtain a license from the Under Secretary, Department of Agriculture and Stock, Brisbane, the fee being according to the number of rabbits held. The license to keep up to 25 is 10s., and the fee proportionally increases with the number of rabbits until it reaches £2 for anyone keeping from 201 to 400 rabbits. For each 100 animals or part thereof a further 10s. is then charged. Licenses are not transferable. The rabbits must at all times be maintained in a rabbit-proof enclosure, constructed according to specifications supplied by the Department. It must be kept padlocked at night and at all other times when not under direct personal supervision. The rabbits must be kept in hutches within the enclosure, and these hutches must also be kept padlocked. The carcasses of all rabbits that die from disease and all excreta must be destroyed by fire. No rabbits can be removed from the enclosure without the permission of the Department of Agriculture and Stock. It must be distinctly understood that the only rabbits that can be kept are purebred Angoras and Chinchillas or other approved fur-bearing rabbits.

Licenses will only be issued in the following pastoral districts:—The Darling Downs, Moreton, Wide Bay, Burnett, Port Curtis, South Kennedy east of the 148th meridian, North Kennedy, Atherton, Cairns, Innisfail, and Herberton.

Obituary.

The late Mr. Lawrence P. Doyle, Inspector of Stock, Mount Isa, who was accidentally drowned on the 4th instant while attempting to cross Lagoon Creek, near Mount Isa, was a very promising officer of the Department of Agriculture and Stock. After passing the examination for Stock Inspectors, the late Inspector Doyle was appointed to the Kingaroy district in January, 1926, and was later stationed at Cooyar, Cloncurry, Julia Creek, Camooweal, and had only recently taken up his duties at Mount Isa.

During his regrettably short term of service Mr. Doyle became very popular with his fellow officers, and the manner in which he carried out his duties was fully appreciated by the Department and the stockowners generally, for he displayed keenness and exceptional ability in his work. Much sympathy is felt for his parents, Mr. and Mrs. T. Doyle, Ashgrove, in the loss of their son, who was only twenty-six years of age at the time of his death.

Proposed Barley Pool.

A notice of intention to create a Barley Pool has been passed by the Executive Council. The notice will stand for thirty days, and within that time any thirty barley growers can petition for a referendum to decide whether or not such pool shall be established. If a referendum is held a majority of 60 per cent. will create a pool. If no petition is received the pool will be created automatically.

The pool applies to all barley produced in Queensland, and will last for seven years. The Board will consist of two elected members and the Director of Marketing. The Board will be a marketing board, and all barley will become the property of the Board.

For the referendum (if any), any person who grew barley for sale within the last three years shall have a vote.

Subduing Tuberculosis.

Much evidence can be cited (says an American report) from breeders' experience in America to show how erroneous is the reasoning of those who would let bovine tuberculosis run its course. In many States tuberculosis is on the decrease, and, notwithstanding the imperfection of the tuberculin test, real progress is being made in subduing this cattle disease. A recent report from the Michigan Department of Agriculture states that, in Ogemaw county, nearly 12,000 cattle were tested and only nine reactors found. In another county, where 32,000 cows were tested, only 212 reactors were found, when on the first test there were nearly 1,500. In other words, the percentage of infection in this county on the first was 4.78 per cent., while on the second test it was only 0.66 per cent. "We can hear some say that the tuberculin test does not reveal the diseased animals," adds the report. "To this it can be stated that the animals slaughtered from these sections show a marked decrease in tuberculosis. In fact, in some sections scarcely any diseased animals are found upon slaughter at the packing houses."

World Congress of Poultry Breeders—Proposed Queensland Representation.

Next year a world congress of poultry breeders and poultry fanciers will be held at the Crystal Palace, London. The United Poultry Club and the National Poultry Breeders' Association are anxious that Queensland should be represented at that conference, so that the industry might benefit as the result of the observations of a delegate from this State. With that object in view a deputation representing the organisations concerned waited on the Minister of Agriculture and Stock (Mr. H. F. Walker) and urged that Mr. P. Rumball (Government Poultry Expert) should be sent by the Government and those engaged in the industry in Queensland to represent the State. The members of the deputation stated that so earnest were those engaged in the industry that they would be willing to contribute a quota of the expenses involved.

Mr. Walker stated that the Government would be quite unable to finance such a project, no matter how desirable it was, but if the organisations concerned could place before him a concrete proposal to cover the expenses of the expert abroad the Government would be prepared to pay his salary.

The deputation comprised Messrs. J. F. Haynes (United Poultry Club) and A. Cousner, and S. Lloyd (National Poultry Breeders' Association).

Mr. Haynes declared that the poultry breeders were agreed that Mr. Rumball was the man most fitted to represent the State. If the Government would make his services available those engaged in the industry would co-operate with the Government in every possible way.

Mr. Cousner said that the poultry industry was more valuable than the wheat industry, and was well worthy of the expenditure of a few hundred pounds.

Mr. Lloyd pointed out that in addition to studying the scientific side of poultry breeding, the representative of the State could also gather much useful information relating to the marketing of products.

In reply the Minister stated that at a recent conference of Ministers of Agriculture he had proposed that the Commonwealth should send an expert to the congress, the expense to be borne jointly by the States. That proposal, however, was not agreed to. Due to the finances of the State the Government was unable to foot the bill of sending an expert overseas. The cost would not be a mere £200 or £300, as the members of the deputation suggested. If, however, those engaged in the poultry industry raised the money necessary to cover expenses he would agree to the services of Mr. Rumball being made available.

The members of the deputation stated that they would take steps to organise on the lines suggested before the end of February, by which time it should be possible to get in touch with poultry breeders in all parts of the State.—"Brisbane Courier."

An Economic Blunder.

Economically and in every other respect a nation can only thrive if it is composed of citizens sound in mind and body, and any taxation that makes the middle class sterile is a bad economic blunder.—Hartley Withers in "Our Money in the State."

Milk-Rot and a Remedy.

A Toowoomba subscriber writes:—"I never heard of a serious case of milk-rot until I got my hand bad with it recently. Since then, quite a number of people have told me of bad cases and the great danger of its spreading up the arm. My right hand midfinger is in a bad way . . . It seems to me right and fair to offer you these few lines on the subject in case you think well of inserting a warning note in your Journal. I would suggest the wisdom of milkers always washing their hands well after milking each cow, or as often as convenient at milking time. In case of any sign of milk-rot appearing I recommend bathing the hand in a hot boracic lotion and then applying iodine freely. I am suffering a good deal of pain and inconvenience for having neglected this precaution at the early stage of the trouble . . ."

Early Importations of Pigs.

Writing from his home at Koorama, Marlborough, Queensland, Mr. Albert Rake advises in connection with early importation of pigs into Australia that on looking up old records he has ascertained that his father, the late Charles Rake, of Enfield, South Australia, imported his first Middle Yorkshire pigs from England in the year 1889. At about the same time he secured some Improved Berkshires and Poland-Chinas from Sydney. The latter breed he secured from Mr. Woodhead, of Sydney, in 1881, these being, he understood, from imported American stock. Mr. Charles Rake also imported Ligurian or Italian bees for his apiary at Enfield, the one swarm he secured acting as foundation stock in South Australia. Of the Middle Yorkshire pigs Mr. Rake writes that they did a great business in these right up to 1905, when the family partnership was dissolved. Sales were made to breeders in all States, in Tasmania, and New Zealand. The price in those days, 4 guineas per head, was considered exceptionally good. The Yorkshires imported from England were bred by the late Mr. Sanders Spencer, two sows and an unrelated boar forming one of the early shipments. These pigs cost 60 guineas landed in Adelaide—also record figures of that period.

Points in Dairying.

The milking-shed and bails must be substantial and well built. Drainage, light, ventilation, protection of the persons milking and the cows from the prevailing winds, ease of cleansing, and good facilities for handling the cows are the main considerations. Fortunately, these can be accomplished at a much less expense than is usually believed. Concrete floors and gutters with ample fall are recognised as essential to a well-ordered milkshed and bails. Not only do these assist in securing good sanitary conditions, but they make it possible to effectively save all the fertility in the manure, as well as contributing to the comfort of those carrying out the work of milking.

Some dairymen feed their cows in the bails, but the ideal is to have independent and separate feeding stalls.

The use of odourless disinfectants in the milk-sheds at frequent intervals is desirable, as it is unreasonable to expect that the broom alone will keep the milk-shed as clean as is necessary.

The periodic use of lime wash is essential as a disinfectant, both to present and maintain a cleanly appearance throughout the shed. Unslacked lime sprinkled on the floor is most advantageous. The whole of the milking routine should be so planned that all operations that tend to raise dust take place after the actual milking of the cows is completed.

Milk yield must, however, always be considered in relation to environment. If a cow is pampered its yield goes up. The fact that a cow has given 1,200 gallons in a well-managed valley herd does not mean that it will be suitable for milk production on an upland farm. Hardiness must also be taken into consideration. Economy of production must never be lost sight of; that is to say, whether the cow is an economical converter of food. It has been shown that large food consumption does not necessarily mean increased yield. With some cows it does, but this is not invariably the rule. While on this point the maximum yield desirable might be considered. The 2,000-gallon cow is not an economic proposition for some breeders. Every breeder must judge for himself where his economic limit is in this respect.

Queensland Pig Industry Committee.

At the last meeting of the Queensland Pig Industry Committee, Miss Joan Mackay was appointed secretary in succession to Mr. E. J. Shelton, who has acted as chairman, secretary, and treasurer for a period of two years. Miss Mackay is also Secretary of the Queensland branch of the Australian Stud Pig Breeders' Society.

Work Does Not Kill.

Well-regulated work does not kill, it rather conduces to longevity. I have before me, while I write, the statistical bulletin of the Metropolitan Insurance Company of New York for January, 1929, and from which I extract data in support of the views I have advanced of the value of work as an agent making for longevity. We are familiar with the fact that in Britain the mortality rate of unoccupied persons is higher than that of those occupied. This experience is not confined to that country. Between 1911 and 1927 the death rate of both United States and Canadian wage earners and their dependents declined 33 per cent., while that of the general population dropped only 16 per cent. Consider for a moment what this decline in the death rate means. It means a considerable saving of the industrial life of these countries, in other words the life span has been extended. In 1927 the expectation of life among the wage earning classes was 56·42 years at birth, whereas sixteen years ago it was 46·63 years. The addition of nine years to the life expectancy of the industrial population of the United States, and of Canada, is a great acquisition, for, while this has taken place among the working classes, the gain in the life expectancy of the general population is only 6·06 years. Work is thus not a curse but a blessing to mankind.—Sir Thomas Oliver, Vice-Chancellor, University of Durham.

The Pig Section, Brisbane Exhibition, 1930.

The secretary of the Royal National Agricultural Association (Mr. H. W. Watson) has recently sent a circular letter to probable exhibitors at this year's Brisbane Exhibition that certain alterations and additions to the Pig Schedule have been decided on. These include several important alterations of which likely exhibitors should make careful note pending the issue of the complete schedule. They are: No quarantine restrictions at present operate between Victoria and Queensland, and it is hoped that prior to the date of entry the quarantine restrictions between Queensland and New South Wales will have been lifted:—

1. Not more than three entries may be made by any exhibitor in any one class.

2. In all classes for which there are eight or more entries a third prize will be paid, the amount to be one-half of the second prize in that particular case.

3. The Pig Pavilion will not be open to the public after 7 o'clock each evening of the Show.

4. All Stud Pigs, four months old and over, must be registered in the Australian Stud Pig Herd Book, &c.

5. Any sow entered in the Sow and Litter Class shall, if not farrowed on judging day, be allowed to compete in a "dry" class, and vice versa.

6. The sow in the Sow and Litter Class shall be eligible for entry in the open classes, and if successful will be allowed to compete for the Championships.

The general classification of ages in the Berkshires, Tamworths, Poland-Chinas, Duroc-Jerseys, and Gloucester Old Spots will run as follows:—

Boar, 2 years old and under 5 years.
Boar, 18 months old and under 2 years.
Boar, 12 months old and under 18 months.
Boar, 8 months old and under 12 months.
Boar, 4 months old and under 8 months.
Boar, under 4 months.
Boar and his progeny, progeny of any age, sex optional, to number three head, to be bred and owned by the exhibitor of the sire.

The classification for Sows in these breeds will be similar, with the addition of a Sow and Litter Class.

In Yorkshires, Large Blacks, and Chester Whites, the classification will be—

Boar, 12 months old and over.
Boar, under 12 months.

And similar age classification in the Sow Classes.

The schedule will contain a Litter Weight Contest, Porker, Pig, and Bacon Classes.

A Remedy for Sore Teats.

A Toowoomba reader writes:—"As a remedy for sore teats in cows, I have found fresh beef dripping the quickest healing thing."

Parental Authority.

My remarks upon "Natural Capacity and Health" in relation to careers would be incomplete if I ignored the claims of youth to settle its own affairs. This leads me to the subject of parental authority, giving—or not giving—way to the demands of the expanding intellect and the conscience of youth. A parent's decision should never be so inflexible that it remains to the bitter end; it should, for example, never thwart a son's career in a matter of conscience.

When the youth has reached the age of discretion a parent should not consider himself to be the sole arbiter of a son's conscience. In matters of faith a father may suggest and direct, but he cannot compel obedience. To make a career successful, there are other things to be considered than natural capacity and health, and these are personal choice and determination.—Sir Thomas Oliver.

What a Farmer Is.

A farmer is described as—

A capitalist that labours.

A man that works eight hours a day twice a day.

A man who has every element of Nature to combat every day of the year.

A man who is a biologist, an economist, and a lot more ists.

Who gives more and asks less than any other human being.

Who takes unto himself for his own sustenance and that of his family those of his own products that other people will not utilise.

Who gives more and asks less than big cities to infuse red blood into society that is constantly decadent and whose own salvation is the virility that it draws from the rural sections.

Who sells his products for what the other fellow cares to pay for them, and who buys the other fellow's products at what the other fellow cares to charge for them.

Start the Young Farmer Right.

Mr. I. F. Brown, buyer for Armour and Co., has been offering American calf club members some good advice:—

"One can never produce a good calf without good breeding. This does not refer alone to the amount of pure blood in the animal, but also to the indications of quick fattening and growth, as well as proper carcase proportions. I have seen some pure-bred beef animals which were quick, easy finishers that would make top carcases, and others in the same breed with just as much pure blood that were slow-maturing, long-legged, and rough-framed. One cannot select quality on breeding alone, but must look to the actual characteristics of the animal as well.

"Perhaps the greatest criticism that I find in the hundreds of club calves which I see and buy every year is the high proportion of this undesirable type of pure-breds. No matter what the club exhibitors may have paid for these calves when they were young, the high value does not exist in them when they reach me. A firm, smooth finish, with high carcase yield, is the essential, and the calf that excels in these particulars is the one that should always win."

Mr. J. H. Boyle, buyer for Swift and Co., speaks in a similar vein. He says:—

"I would like to emphasise this fact to you boys and girls. Start with a good quality calf, follow carefully and faithfully the handling and feeding of your calf so you can show a finished product when ready for market. By doing this you would be practically assured of prices above the average, and, if finished, you will have market toppers."

What these men say has been remarked and commented upon many times in our calf-club shows, remarks the "American Hereford Journal." Too many club members are equipped with poor calves to start with, and are expected to accomplish the impossible, which is to make prize-winners and market-toppers of them. There are still a good many people who believe that a pure-bred calf is a pure-bred calf, and that all that is necessary to give a boy or girl a running start for a club championship is to furnish them with a pure-bred calf. But there are many kinds of pure-bred calves, and if we are to get these boys and girls started off on the right track as feeders and breeders of beef cattle, we must get them to understand and recognise the right kind and the wrong kind .

Pig Feeding in Rhyme.

Mr. A. N. Duckham, during his association with the Cambridge Pig Recording Scheme, has issued between twenty and thirty "circulars" for the guidance of his members. They are bright and cleverly edited. The following extracts from a recent circular are typical:—

A FEW NOTES ON FEEDING.

Meal to water; one to three
Will with pigs and you agree.
More water in another trough
Makes sure your pigs will have enough.

The cost of the ration is what it produces, *not* the price per ton.

Two grains of common sense are worth 20 lb. of balanced rations.

Don't underfeed or overcrowd; one slum problem is enough. *But* overfeeding pigs underfeeds you.

It is an offence to add water to milk. It is almost a crime to dilute well-balanced proprietary or home-mixed meals with poor quality feeds or home-grown cereals.

Overfat and overweight pigs are market misfits. Water is the cheapest feed. The fatter and heavier the pig the less water it contains.

MEAL REQUIREMENTS.

Half the pounds per pig per day
Is stones per pig per week, we say.

If you want to make mistakes, mix the meal just before feeding. If not, mix at a quieter time of day. Half a ton at a time is a useful unit to mix on small farms where there are not many "bins" or men available.

DRY OR WET FEEDING.

Which is the best depends on conditions on your farm. Both give equally good results. Extra labour of wet feeding balances losses due to wind and rats in dry feeding and cost of water carting. Dry feeding of a good mixture properly rationed *plus* freely available water is almost foolproof. Cubes worth about 10s. per ton more than meal in saving labour and wastage. For dry feeding outside on windy days, damp the meal slightly. In wet feeding always soak meal; this prevents swallowing or choking over lumps.

A FEW NOTES ON BREEDING.

Good feeding and sound management won't make silk purses out of "dud" sows' ears.

Don't prejudice a sow or a gilt. Let her have at least two or three chances of breaking her own record.

Select and weigh gilts for breeding at bacon weight. But only if they look like baconers and they come from sows with consistently good litter records.

Don't serve gilts too young. Nine to ten months is soon enough.

After four litters a sow's at her best.
Let her have eight; then a well-earned rest.

A good boar is half the herd. A bad one is three-quarters.

A "scrub" boar is the herald of misfortune; but a pedigree boar with a good record may be the dawn of an £ s. day.

Feed pigs by weight rather than age. Time and money spent on weighing is well repaid in small feed bills. Keep a check on pigs' feed consumption and rate of live weight gain. One pig-weighing machine is a better investment than several tons of pig condiments. Weighing makes trouble to-day, but saves money to-morrow.—"Live Stock Journal" (England).

THE JOURNAL APPRECIATED.

A Toowoomba reader writes (21*st January*, 1930):—"*I find the 'Queensland Agricultural Journal' most interesting and helpful . . .*"

Broom Millet—A Reminder.

With the crop nearing maturity, growers of broom millet may be reminded of the wisdom of field selection of seed.

Unfortunately, many farmers still rely on the "scoop shovel" method of obtaining their seed from the heap after hackling—a method which leads to great deterioration both in the yield and quality., The best growers select their seed in the field from the best heads. The number of heads required to sow a few acres is comparatively small, and the selection of seed in this way is justified by the improvement effected in the yield and the quality of the brush.

The most important points to look for in selecting seed heads are as follows:—

1. Fine, long, straight, round, abundant, uniform fibre with absence of thickened central stem.
2. Seed compactly situated mostly at the end of the brush (to facilitate hackling), the brush arising compactly in a close whorl from the stem and well exserted from the leaf sheath.
3. Freedom from disease such as red stain (on the brush and in the stem) and smut.
4. Good, plump, well-developed seed of light colour.

It is a good plan to have a special seed plot of broom millet where a few of the very best heads can be sown and in which improvement can be more quickly effected, as owing to the cross fertilisation which occurs plants with good brush may be cross fertilised by plants in the vicinity bearing poor brush, and with a smaller seed plot the selection may be made more rigorously with less chance of including the poorer types. Then sufficient seed can be selected each year to sow both the seed plot and the field area, keeping a few of the very best heads for the seed plot.

In the seed plot the heads can be left until they are properly matured before harvesting, though they may require protection in the field from birds, which can be given by covering them with a light muslin bag. After harvesting, the heads are thoroughly dried, hackled, and the seed cleaned and put away. Fumigation with carbon bisulphide and storage with naphthaline is recommended to secure the seed against weevils and grain moth.

The Modern Farmer—Science Sees Him Through.

The steady decrease in farm population in many countries gives the average man a sense of uneasiness about agriculture. Many farmers are actually ceasing to farm, and are moving to swell the ranks of city workers and eaters. Yet it would seem that, as the nation's mouths increase in number, the farm population should also increase. Something must be out of joint.

The new-type farmer is the joker in the logic. This farmer has learned to increase his wheat and butter without increasing the number of hands to do the work. He "knows how"—which is to say, he is scientific.

The work of the new-type farmer has been gradually revolutionising the farm, and even remodelling the man behind the plough and the herd. The new-type farmer struck up a very friendly acquaintance with the soils of his farm; he "jollied" the sour ones with lime, jacked up others with salts, fed them legumes, and then egged his perked-up soils on to his corn, wheat, and potatoes. He fashioned a better kernel on the cob and a better ear on the stalk. He learned what made winter wheat good, and at the last moment threw a double dose of protein into the head. He hit upon a standard family size potato that the housewife liked. He went after bugs, beetles, and borers with poison and gas. He serumed his pigs and shaped them for the selling scales. He turned eyes and testing tubes on his dairy herd, slashed it here, petted it there, fed it according to formula, and then watched the butter fat roll up.

In fine, whatever the crop, whatever the animal, this new type of farmer knows how to breed it, feed it, and sell it. His theory is that neither luck, tradition, nor old wives' tales can take the place of knowing how to farm. No wonder, then, that he discards hand tools and puts in the machine—the tractor, the combine, the milking machine, and so on. Moreover, the more he knows his job, the better he likes it. Getting close to his problem stirs his brain power into action, and the farm job takes on all the aspects of a challenging business.

Now it is nothing new that science is thus striking out into farming. But not everyone has yet realised the meaning of this movement—that the old "farming with ordinary skill" will soon be passing into history as a tale that is told. This is no discredit to the old farmer; he was a fine type of man. But one of these

newer farmers knows how to produce twice as much as the old farmer. Moreover, he has the ingenuity to improve his products, making them more desirable to the buyers. The "ordinary skill" farmer produces only mediocrity.

Will the farm population, then, continue to decline? Undoubtedly it will continue to decline to a point where the effective scientific machine farming will produce all that is needed. Is this the end of the story? By no means.

The recent revolution in farming has concerned itself with crops. But the progressive farmer is convinced that the same scientific methods he has learned to apply to running his farm can be used in conquering his other difficulties. The farmer's living conditions, for instance—community institutions, social status, opportunity for enjoying life in equal measure with persons in other occupations—have always had points of serious deficiency. Another revolution may occur here.

Science will penetrate and ramify through every phase of farm life. The new-type farmer is learning that men make their own living conditions, and that human elements can be combined to make needed institutions. He is not going to listen to the people who tell him that farmers can't get social amelioration. Does the farmer want facilities within reach for the health of his family? Yes, and he is going to change the health organisation of his section and have doctors and a hospital. Whatever he wants that average town communities enjoy he will learn to get.

When science was put into the hand of this new kind of farmer he was given a far-reaching talisman. And, if anyone thinks that the farmer will confine his Aladdin's lamp to wheat, cotton, and milk, he will be gravely disappointed, for the men who are coming to dominate farming are bound to know how public business is managed, how sound economic institutions are built, how living is made better—in fine, how things are done by human beings to bring welfare into being for themselves. He is looking to science to see him through, and, for one, I believe, not in vain.—C. J. Galpin, in "The Country Gentleman."

Correct Functioning of Tractors.—Traction and Wheel Slip.

One factor in tractor operation which gets but little consideration from the tractor owner, and which, in fact, we hear little about at any time, is the question of transmission of the power generated by the motor to the draw-bar.

Under stationary conditions a tractor engine develops a certain definite horse-power, but, when the travel of the machine itself is taken into consideration, this is considerably lessened by the effort required to move the machine over the ground. In this respect the wheels, their weight, their shape, their size, and the type of lug used is a big consideration.

It is generally considered that when working in soft ground the longer the lug the less slipping is experienced, but this is not always the case. If the top-soil is soft and the sub-soil is hard, then it is necessary to have a long wheel lug in order to get through the soft soil and get a grip on the hard soil beneath. Should a long lug be used in hard ground, however, very considerable effort is required to lift the weight of the tractor on to the lugs, which means considerable waste of the power being generated by the motor. Endeavour to always use the shortest lug possible, according to the class of land being worked and the load being pulled.

Slipping is a most common cause of waste of power, and the general reason for it is the overloading of the machine. When wheel slipping is experienced, particular care should be taken to see that the right type of lug is introduced in order to obviate it. In sticky ground, the best types of lugs are those which have the sharpest angle, and will allow themselves to be cleared. The wheel that fills up with dirt between the lugs simply increases its own diameter, thereby increasing the speed of the tractor, and decreasing the power of the motor, on account of the extra pull required with the bigger diameter wheel.

It can be seen from this that the wheels are closely related to the engine, and, if particular care is not given to the type and placing of the lugs, considerable power is lost with the resultant uneconomical working.

An overloaded motor is a quick-wearing one, which rapidly depreciates and becomes costly in upkeep. If you must overload your motor, then see to it that you are using a fuel which will give you the best results under the circumstances. There is no doubt that the premier tractor fuel to-day, which can be depended on, not only to give greatest power and economy, but also to give those essentials of good idling and easy starting under bad weather conditions, with a minimum of crankcase dilution, is the new Cross kerosene. This new fuel is a departure from any kerosene previously manufactured by the Shell Company, and is specially prepared to meet every requirement and every class of work carried out by the tractor owner to-day.

"Agricultural Bias"—Trying out the Lads.

Boys may have the makings of successful farmers, but in the first place they require the opportunity to learn whether they are suited to the work, and whether the work is likely to make a permanent appeal to them. To this end, it is desirable that the boys should have first-hand experience, and a week or so on a farm, although short, would be to better purpose than any quantity of talk. The Canterbury Rural Vocational League appreciates this, and the camp that has been arranged by the league for Christchurch boys is the first practical step that has been taken. This opportunity will enable a few perhaps to decide whether they have a natural "agricultural bias."—Christchurch "Sun."

None but the Best.

It is, in the end, to the maker of the best butter, either Danish or New Zealand, that the public will turn, and in the same way it is to the reliable worker, willing to do rather more than his fair share of the labour—who gives of his best—that the rewards of industry will be accorded. "None but the best" would be a powerful slogan to ally with New Zealand produce for the overseas market if it were substantiated in fair season and in foul by the proof that it is no idle boast, and "nothing but the best" might be applied with equal force as the motto of the worker in the wool-shed, the factory, or the office chair, who is aware of his duty to himself, no less than to his employer and the State, to do his work well at all times, no matter how irksome the task may be.—"Otago Daily Times."

What Rationalisation Means.

This definition of rationalisation, a new term of commercial jargon of the day, is interesting:—"Rationalisation to me means an honest reasonableness and foresight in the conduct of the business which I, with my fellow workers, am engaged in," says Mr. Launcelot E. Smith, C.B.E., in "Modern Transport." "A workman who has to waste time in hunting for his tools, or a workman whose tools are inefficient or out of date, is sheer waste. Taking this simple case as an analogy, and applying it to the business as a whole, it follows that a rationalised business means that kind of a business in which throughout the greatest orderliness prevails, handiness in every department and in every sense from top to bottom, and a carefully reasoned anticipation of coming changes, with the courage of conviction to prepare for them."

A Blessing on Wheels.

"Difficulties of housing and social contentment are being solved by the car. The charabanc, to which many people have taken such violent exception, has been the instrument of more industrial goodwill, more education, and more happiness than all the lectures, soup kitchens, and free legal advice ever afforded to a long-suffering public. Let us encourage comfort and avoid waste of physical energy by every means known to science. The motor-car is the best of all weapons for this purpose. Does anyone grudge the educational possibilities of the motor tour to young people, who have far more to learn than their grand-parents in a much shorter space of time? The motor-car is the poor man's yacht, magic carpet, Riviera, and school all rolled into one at the cost of a little monthly economy to the benefit of a highly successful British industry."—Professor A. M. Low, in the "Sunday Dispatch."

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

The Home and the Garden.

MOTHER AND CHILD.

DAME JANET CAMPBELL'S REPORT.

The protection of motherhood and the safeguarding of the infant and the little child is of the first importance to every country, but especially to Australia with her scattered population and wide distances.

The protection of maternity and infancy is a relatively new branch of public health and social service, but its importance is being rapidly realised.

In reviewing the maternal and child welfare work in Australia, the impression is gained that the time has arrived when effective development depends upon securing an agreed policy and direction with a view to economy of effort, time and money, together with special attention to certain aspects of training, organisation and education, in order that the work as a whole may be rendered fully efficient, more scientific, and not unduly dependent upon the goodwill, enthusiasm and generosity of individuals, and, perhaps most important of all, that it shall take its proper place in organic relationship with all other branches of established public health work.—Dame Janet Campbell.

THE report on maternal and child welfare in Australia by Dame Janet Campbell, D.B.E., M.D., M.Sc., (Senior Medical Officer for Maternity and Child Welfare, Ministry of Health, London) who last year visited Australia, has been issued by the Commonwealth Department of Health. Dame Janet says, inter alia:—

For Australia as a whole the total maternal death rate in 1928 was 5.98, that is, approximately six mothers died for every thousand babies born alive; this is not only a rate which is excessive in itself, but it is the highest rate on record during the period under review. The lowest figure reached was 4.27 in 1915, which was not a normal year, and since 1922 the death rate shows a steady and almost uninterrupted rise—a circumstance which must cause considerable anxiety and disquietude.

Of the causes of death at the time of childbirth, puerperal sepsis, which should be to a great extent preventable, is the most important. It accounts for 2.335—nearly one-third of the deaths in Australia—and 11,569 deaths in England and Wales, which represents a rather higher proportion.

Nature Aids.

The visitor to Australia forms a very favourable impression of the domestic and social circumstances of the people from the point of view of health and hygiene. The climate is, on the whole, excellent and such as to encourage a wholesome open-air life; there is abundance of sunlight, and, if the heat is excessive during the summer months, there is little of the unpleasant cold, damp weather which is apt to be so productive of illness, and there is still less of continued cold or frost even in the southern areas. There are ample opportunities for open-air exercise, games, and sports; the housing is good; there are no tenements and no slums in the English sense of the term, though housing conditions may not be wholly satisfactory in certain districts in the large cities. The average standard of living is high, and there is little evidence of poverty, although at the present time there is, temporarily, considerable unemployment. There are few, if any, congested areas of population. All of which make for healthy infancy as well as healthy adult life.

Improved Education.

The safety of the mother and infant must ultimately depend upon the skill and knowledge of the professional attendant, whether doctor or midwife. It is generally agreed that the education of the medical student and pupil midwife should equip them adequately for all duties which they may be called upon to undertake; much has been done to ensure this, but even yet the training is not wholly satisfactory

and stands in urgent need of further improvement. The action of the Universities of Sydney and Melbourne in creating Professorships of Obstetrics indicates the increased importance attached to midwifery, and is the first step towards much needed reforms in the curriculum. Some experience of domiciliary midwifery is a valuable and indeed a necessary part of the training, but it should come after an effective grounding in hospital practice and should be under the direct control of the teachers responsible for the midwifery course.

It is also most desirable that careful attention should be given to the care and hygiene of the new-born infant, including the management of breast feeding and the initial difficulties which may need to be overcome in regard to this; also in the care of the premature or weakly infant, &c. Although the midwifery nurse will undertake the actual handling of the infant, it is desirable that this shall not be left wholly to her knowledge and discretion as has too often happened in the past, but that the doctor shall assume ultimate responsibility and shall be properly equipped by his own training for so doing.

Training in Mothercraft.

It is most desirable that training in mothercraft shall receive full official recognition and support. In order to secure a uniformly high tradition and standard of instruction and to prevent the setting up of a number of small training schools, which cannot offer full teaching facilities, general regulations might well be made to which all approved mothercraft schools should be expected to conform; for example, as regards the accommodation, equipment, facilities for teaching, qualifications and experience of the staff, length of the training period, admission of trainees, &c., while the whole of the course should be under medical direction and control; but due latitude should be left to those responsible for the course in each institution to modify or vary the detailed methods taught.

Diversity of medical opinion and practice in regard to infant feeding in Australia and elsewhere indicates that there can be no one stereotyped or standard method applicable to every infant under all circumstances, and suggests that the ordinary baby is tolerant of, and can even thrive upon, comparatively widely different dietaries. Moreover, differences in local conditions, customs, climate, &c., in themselves make some modification necessary. Therefore, while the general organisation of the mothercraft school should be such as to ensure adequate training, room should be left for individual difference of opinion in the detail of instruction.

Effective Supervision.

A maternity service comprising arrangements by which any woman can obtain such necessary facilities as she requires for the satisfactory conduct of a normal or a difficult confinement when she is unable to provide all or any of these facilities for herself is the ideal to be aimed at in every district.

The establishment of public pre-natal (ante-natal) clinics is needed to which patients may come for advice and to which doctors may be able to refer their patients for consultation or a second opinion.

The obvious nucleus for such clinics is the service already established at the maternity hospitals. Although all of these are not as yet equipped and staffed to meet the full requirements of the pre-natal clinic, it should not be difficult to enlarge and extend their scope sufficiently to do so. They have the great advantage of being under the control of a specialist medical staff assisted by trained midwifery nurses, and their professional status is such that they can properly be used for consultative purposes; they are not in a position to meet the needs of women living at some distance who do not wish to engage the services of the hospital for the confinement, but there seems no reason why branch clinics based on the hospital should not be established where necessary with the assistance of the Health Department.

The alternative would seem to be the establishment of independent pre-natal clinics at the infant welfare centres as part of the maternity and child welfare organisation; but if this were done, although the centre premises and the services of the nurses might appropriately be made use of, there would probably be great advantage in arranging for the maternity hospital to be responsible for the medical consultations so that the high quality of the advice given might be ensured and also close association with an institution to which an abnormal case could be referred when necessary for treatment.

There are certain disadvantages in the ad hoc pre-natal clinic. For example, there is often difficulty in securing the medical service of practitioners fully conversant with ante-natal methods and able to give sound obstetric advice; there is the further disadvantage that the medical officer of such a clinic is necessarily in a somewhat

detached position and rarely sees the termination of the pregnancy or is able to control accurately the conclusions which he has formed, as, although interchange of opinion between the clinic medical officer and the attendant at the confinement should be full and free, it is not always easy to maintain this in practice. Association between the hospital on the one hand and the centre on the other with its facilities for home visiting and education in hygiene and mothercraft would seem likely to yield the best results.

Community and Intermediate Hospitals.

There is already an evident desire on the part of patients who are not eligible for the maternity wards of the public hospital for a share in the advantages obtainable in a large and well-managed maternity hospital. The establishment of wards for "intermediate" patients would seem to be eminently desirable and would enable many women, able to pay reasonable medical and nursing fees, to have their babies under fully satisfactory conditions, instead of risking infection or other dangers in an ill-equipped private hospital.

Friendly inquiry at the ante-natal clinic or by a visiting nurse may bring to light various ways in which an expectant mother may need assistance—the provision of domestic help, for example, or the addition of fresh milk or vegetables to an unduly limited dietary, or convalescent or after-care treatment. Many voluntary associations are in a position to supply such needs and an endeavour should be made to put the woman in touch with the appropriate agency, either directly or through the almoner's department of the hospital when this exists.

Voluntary Societies.

Although the circumstances in Australia are not altogether parallel with those in England, it is difficult to escape the conclusion that sooner or later the work of the voluntary societies will come to a much greater extent under the supervision of an official authority which will be responsible for the general policy followed and for much of the cost of maintenance; and, while leaving reasonable freedom to the organisations to carry on and even extend the work of centres which they have founded, will establish new centres in areas where voluntary effort has not made itself evident, and provide such facilities as are practicable in districts too thinly populated to be served by centres in the ordinary way.

This would have the further advantage of encouraging greater co-operation among voluntary workers than exists at present. One cannot fail to be deeply impressed with the large number of voluntary societies which are in existence and which represent an immense volume of willing and devoted service, self-sacrifice, and generosity; but many of these societies are concerned with slightly different aspects of the same large issue, and independent effort involves unavoidable overlapping of work; there may even be two active societies doing similar work in the same district in a somewhat competitive spirit which not only does not make for the best results but is confusing to the general public, and may thus tend to damage the cause which all societies have so much at heart. Greater co-operation and unity of effort could not fail to be productive of economy of time and money and would enable the work to be done more effectively and successfully.

In Australia the local authority is often too small or the district too thinly populated to be entrusted suitably with much, if any, special maternal and child welfare work, and it is necessary for the State not only to decide upon the policy to be followed but also very largely to carry it out. This situation would seem to make it even more necessary to establish in each State a properly organised Division of Maternal, Infant, and Child Welfare as a branch of the Health Department in charge of a whole-time medical director responsible to the Chief Medical Officer of Health, before any general scheme or policy could become practicable.

Influence of Women's Organisations.

In order to carry through successfully any comprehensive scheme for social and health reform it is necessary to secure the active support of an informed public opinion. Questions relating to maternal and child welfare are of peculiar importance to women, who, after all, are in a position to appreciate most directly the disabilities, suffering, and even hardships which may be associated with maternity. Therefore, if the interest of the women of the country can be aroused one may look to them to produce the splendid driving force which is inherent in a sound and enlightened public opinion.

Women are still perhaps too patient and forbearing, and they do not as a whole fully appreciate as yet how much might be done to relieve the housewife of some of her burdens or to protect her physical health, but it is to women's organisations that we may look with confidence, not only to show every woman what might be done, but to persuade the community in general of the wisdom and practicability of the course they advocate, and so create that intelligent backing which is necessary to translate theories into action. Women's organisations have already done much to call attention to this matter—both those which are primarily concerned therewith, such as the Standing Committee for the Reduction of Maternal and Infant Mortality, and those—such as the National Council of Women—which fully recognise its importance though they are also engaged in considering other problems of social interest.

Research.

The study of maternal mortality and morbidity and of sickness and death during infancy is only in its beginnings, and although we can do much through administrative and medical measures to prevent and reduce the present loss of life and health, further knowledge is essential for satisfactory progress in order that the soundness of our methods may be tested by the results of scientific and organised research.

The measures so far discussed are concerned with maternal and child welfare, mainly in its local and routine aspects; a wider vision is also necessary. It is fully recognised that the organisation suggested for each State is beyond the present resources of some States, and it was no doubt in order to meet difficulties of this kind that the Royal Commission on Health recommended that the Commonwealth Government should assume some degree of active responsibility. Much could be said in favour of this policy; indeed, it is difficult to conceive of any aspect of human interests which is, or should be, the business of the whole nation more than that of Motherhood. The fundamental impulse of sympathy for the woman about to face her hour of trial is universal and needs no emphasis, and it is believed that this concern for the protection and wellbeing of the mother, rather than obvious economic national interests, moved the Fisher Government to pass the Maternity Allowance Act in 1912.

Commonwealth Responsibility.

The Commonwealth Government has thus become committed, and no departure from established policy would seem to be involved in a more definite participation in the common duty. The suggestion that something of this kind should be done would, I am convinced, evoke instant response from the people of all Australia, and, indeed, anything less than a simultaneous impulse throughout the Commonwealth under a united national inspiration would be inadequate to secure the change necessary to put into practice proposals involving the harmonious readjustment of so many administrative and personal relationships. A national centre is essential for the collection of information, for the examination of problems on a national scale, for investigation of work being done by the State authorities and the publication of comparative results, for the encouragement of research, and, should the Commonwealth Government adopt the policy of subsidising activities in this field, for providing expert advice in relation to such subsidies.

IN THE KITCHEN.

Prunes can be used in a variety of forms. The following suggestions are taken from a collection of fifty attractive recipes, supplied by Miss A. E. Millenet to the Fruit Branch of the Department of Agriculture:—

Prune and Tomato Conserve.—One quart tomato pulp, one cup prune pulp, four cups sugar, one lemon cut in small pieces, half-cup chopped walnuts. Cook all ingredients together until thick and clear, put into small glass jars and seal when cold.

Prune and Rhubarb Preserve.—Three pounds rhubarb cut in small pieces, 2 lb. sugar, 1 lb. cooked prunes, three lemons (juice and grated rind). Mix all the ingredients together and cook very slowly until thick, put in glass jars, and seal when cold.

Prune Conserve.—One pound prunes (soak all night in one pint of water), one orange (slice and soak in half-pint of water), one cup brown sugar, one cup seeded raisins, juice of one lemon, half-cup of chopped nuts. Drain the prunes, stone and

return to the water, add the orange, raisins, and lemon juice, and cook very slowly until the fruit is perfectly tender, about half an hour. Add the sugar and nuts, and simmer again until thick.

Prune Chutney.—One and a-half pounds of prunes, 4 oz. sultanas, ¾ lb. onions, 2 oz. brown sugar, 2 pints vinegar, 1½ oz. salt, four tablespoons treacle, half teaspoon each of mace, cinnamon, and spice, a little preserved ginger, a tiny clove of garlic, Worcestershire sauce and cayenne to taste. Mix all together and boil gently until tender.

Prune and Pineapple Pie.—Mix one cup of prune pulp with one cup of shredded pineapple, half-cup sugar, one tablespoon of lemon juice, and a pinch of salt. Bake in a pie plate lined with pastry for twenty minutes in a hot oven, cool, and cover with whipped cream or a meringue made from the whipped whites of two eggs, four tablespoons of sugar, and half a teaspoon of rose water.

Prune Sandwiches.—One oz. walnuts, 1 oz. dates, 4 oz. softened prunes, one tablespoon golden syrup, one tablespoon lemon juice. Stone the fruits and mince finely. Chop the nuts finely and mix with the fruit, add the syrup and lemon juice. Use between slices of plain cake or brown bread and butter.

Banana Puddings and Pastries.

Make a nice short crust of 6 oz. of dripping to 10 oz. of flour, a little salt, a squeeze of lemon juice or vinegar, no baking powder is needed, make to a nice firm dough and roll once only; the more nimble you are at the preparation of this, once you have started, the crisper will be the pastry. The bananas should be peeled ready, with a few drops of lemon juice sprinkled over them or not, as you choose, cut out your pastry, and wrap each whole fruit in a piece, pinch in well at each end, and bake in a good oven for twenty minutes. This may be served with a custard, baked, or boiled, or with cream, or just milk, or may be eaten cold. The children just love them cold for school tucker bag.

Banana Tart.

Method: (1) Peel and cut bananas into rounds. (2) Place in a pie-dish. (3) Add grated rind and juice of lemon. (4) Add sugar and water. (5) Cover with short pastry. (6) Bake in a hot oven for twenty minutes.

Materials.—Six bananas, one lemon, 2 oz. sugar, one teacup water, enough crust to cover the pie-dish.

Banana Trifle.

Six bananas, one orange, half lemon, six sponge cakes, strawberry jam, ½ pint of good custard, ½ pint of cream, ½ oz. of Pistachio nuts. Peel the bananas and cut them into quarters lengthways, slice the cakes thinly, spread each piece with jam. Peel the orange and lemon, cut into small dice, taking out all pips. Grate the lemon rind. Put a layer of the cakes into a glass dish; put on them a spoonful or two of custard, next a layer of bananas and few pieces of orange and lemon and grated rind. Continue this till the dish is full. Put whipped cream on top; shell and shred the nuts and stick them in rows over the cream. Serve as cold as possible.

MARKET GARDENING.

SWEDE TURNIP.

Although considered a farm crop suited to the needs of stock, swede turnips, when taken at the proper stage, form a welcome addition to the list of vegetables that may be considered as profitable to grow.

Turnips thrive under identical conditions of soil and climate, but swedes can safely be thinned out to greater distances, whilst the distances apart of the drills require to be somewhat greater. Swedes lend themselves to storage where such is desired, but this should be undertaken only where a favourable situation is procurable.

Sow in early autumn. The varieties recommended are—Elephant or Monarch; Champion Purple Top; Laing's Garden Swede.

TOMATOES.

A rich friable, or sandy loam is necessary where heavy crops are desired, but at the same time early yields may be obtained from comparatively poor and medium quality land. The preparation of land as previously mentioned for onions may be applied to this crop.

Seed should be sown during early spring and summer in shallow boxes, and covered with a fine sprinkling of loamy soil, which should be kept moderately moist. When the plants are sufficiently strong they may be transplanted out into their permanent positions, care being taken that they be planted slightly deeper in order that the roots may be able to better assimilate soil-moisture. Plants should be placed not less than 2 ft. apart with a space of 4 ft. between the rows.

Special treatment and training are required for the production of large sized fruit.

Where practicable, the vines should be trained to trellises about 5 ft. high. When allowed to spread on the ground a large proportion of the fruit is lost through rotting during rainy weather. Heavy mulching of the surface is of value, particularly in dry districts.

It may be impossible on large areas to erect the necessary trellising, but an effort should be made to keep the vines off the ground and allow sunlight and air free play through the foliage.

Tomato plants are susceptible to various diseases, which are difficult to keep in check. Experience has proved that a moderate and regular supply of water develops less rotten fruit than lightly or heavily watered plants; frequent aeration of the soil by cultivation is necessary during the growing period. Exposure to the sun also tends to increase disease, and methods of growth that will allow the foliage to shade the fruit assist in checking this.

When carrying a heavy crop it is advisable to apply liquid manure occasionally and if possible mulch the plants. Liquid manure is best applied just before the flowering period.

Burn all fruit showing signs of disease.

Varieties recommended are—Chalk's Early Jewel; Burwood Prize: Hurst's Buckeye; Spark's Earliana; Trucker's Favourite.

TURNIPS.

To obtain a good crop of this useful vegetable, it is necessary that rapid growth be made, therefore rich soil and an open situation are of main importance. The seed should be sown thinly in drills and the plants hoed out to the proper distance apart when young. In cool climates sowings may be made nearly the whole year, but in hot, dry districts, late summer and autumn sowings are recommended. Spring sowings should be limited, as the plant soon runs to seed. Turnips are frequently attacked by aphis, which, if not checked, spreads with alarming rapidity and will soon exterminate the whole crop. Kerosene emulsion or a strong solution of tobacco water will usually effectively deal with this pest, if applied in the early stages. Cabbage-fly, which also attacks turnips in warm weather, may be kept in check by an application of a solution of Paris green, care being taken that this remedy is used only on the immature plants.

The varieties most used are—Purple Top Milan, White Milan, White Stone or Snowball, Red American Stone, and Orange Jelly.

(TO BE CONTINUED.)

A VALUABLE JOURNAL.

Renewing his subscription to the Journal, a Yandina farmer writes (14th January, 1930):—". . . . I thank you for the past year's issue and I assure you it's a very valuable journal to me, and I appreciate the amount of work put into it. . . . ."

Orchard Notes for April.

THE COASTAL DISTRICTS.

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

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

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

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

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

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

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

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

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

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

Farm Notes for April.

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

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

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

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

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

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

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

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

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

THE CONTENTED SPIRIT.

If you will secure a contented spirit you must measure your desires by your fortune and condition, not your fortunes by your desire; that is, to be governed by your needs, not by your fancy; by Nature, not by evil customs and ambitious principles. He that would shoot an arrow out of a plough, or hunt a hare with an elephant, is not unfortunate in missing the mark or prey, but he is foolish for choosing such unapt instruments; and so is he that runs after his content with appetites not springing from natural need, but from artificial, phantastical, and violent necessities. These are not to be satisfied; or, if they were, a man hath chosen an evil instrument towards his content: Nature did not intend rest to a man by filling of such desires. Is that beast better that hath two or three mountains to graze on, than a little bee that feeds on dew or manna and lives upon what falls every morning from the storehouse of Heaven, clouds and providence? Can a man quench his thirst better out of a river than a full urn, or drink better from the fountain when it is finely paved with marble, than when it swells over the green turf? Pride and artificial gluttonies do but adulterate Nature, making our diet healthless, our appetites impatient and insatiable, and the taste mixed, phantastical, and meretricious. But that which we miscall poverty is indeed Nature; and its proportions are the just measures of a man, and the best instruments of content. —Jeremy Taylor.

ASTRONOMICAL DATA FOR QUEENSLAND.

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

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	March, 1930.		April, 1930.		MOONRISE Mar., 1930.	April, 1930.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	5.48	6.23	6.5	5.46	5 57	7.34
2	5.48	6.22	6 5	5 45	6 50	8.33
3	5 49	6 21	6.6	5.44	7.46	9.38
4	5.49	6 20	6 6	5.43	8 42	10 41
5	5 50	6.18	6 7	5 42	9.40	11.45
					p.m.	p.m.
6	5.50	6 17	6.7	5 41	10 41	12.47
7	5 51	6.16	6.8	5.40	11 45	1.45
					p.m.	
8	5.51	6.15	6.8	5.39	12 48	2.37
9	5.52	6 14	6 9	5 38	1 51	3 21
10	5 52	6.13	6 10	5.37	2 54	3 58
11	5 53	6.12	6 10	5 36	3 52	4.43
12	5.54	6.10	6 11	5.34	4 43	5.7
13	5 54	6 9	6 11	5 33	5.24	5 39
14	5.55	6.8	6 12	5 32	6 2	6.14
15	5 56	6.7	6.12	5 31	6 36	6.50
16	5 56	6 6	6.13	5.30	7.10	7.30
17	5 57	6 5	6 13	5.29	7 44	8.17
18	5 57	6 4	6.14	5.28	8 18	9.7
19	5 58	6.3	6.14	5 27	8 55	9.59
20	5.58	6 2	6.15	5 26	9.39	10.56
21	5.58	6.1	6.15	5.26	10.27	11.51
22	5 59	6 0	6 16	5.25	11.17	...
						a.m.
23	5.59	5 59	6 16	5.24	...	12.45
					a.m.	
24	6.0	5.58	6.17	5.23	12.11	1.39
25	6 0	5.56	6.17	5 22	1.5	2.34
26	6 1	5.55	6.18	5.21	1 57	3 29
27	6 1	5.54	6 18	5 21	2.54	4.25
28	6.2	5.52	6.19	5.20	3.50	5.23
29	6 2	5.50	6.19	5.19	4.46	6.23
30	6.3	5.48	6.20	5.18	5.40	7.26
31	6.4	5.46	...	...	6.35	...

Phases of the Moon, Occultations, &c.

8 Mar.	☾	First Quarter	2 0 p.m.
15 „	○	Full Moon	4 58 a.m.
22 „	☽	Last Quarter	1 12 p.m.
30 „	●	New Moon	3 46 p.m.

Perigee, 13th March, at 6·24 a.m.
Apogee, 25th March, at 3·24 a.m.

It will be interesting to notice the near approach of Jupiter to the Moon on the 7th, before they set, about 10·15 p.m. The nearest apparent approach in the line of sight will be at midnight, when they are below the horizon.

The occultation of Iota Geminorum (magnitude 3·8) will occur shortly after 6 p.m. on the 10th. It will last longest (about an hour and a-half) at places 33 degrees south, and the star will remain hidden by the Moon longer in the south of Queensland than in the north. The time at Cairns will be reduced to about one-half. Four hours later another star in Gemini (magnitude 4·9) will be occulted for a longer period in northern Queensland.

Mercury will rise at 4·2 a.m. on the 1st, and at 4·45 a.m. on the 15th.

Venus will rise so soon (21 minutes on the 1st and 31 minutes on the 15th) before the Sun, as to be lost in his rays.

Mars will rise at 4·4 a.m. on the 1st, and at 4·27 a.m. on the 15th.

Jupiter will set at 11·28 p.m. on the 1st, and at 10·4 p.m. on the 15th.

Saturn will rise at 1·11 a.m. on the 1st, and at 12·11 a.m. on the 15th of March.

On the 21st, at 10 p.m. the Sun will reach the junction of the ecliptic and the celestial equator—the First Point of Aries—and the point on the horizon at which it sets will be due west.

When the Moon rises on the 28th, it will be seen to have passed to the eastern side of the planet Mars, about three hours earlier.

The occultation of Venus by the Moon on the 31st will, unfortunately, be invisible, on account of their nearness to the Sun.

6 April	☾	First Quarter	9 24 p.m.
13 „	○	Full Moon	3 48 p.m.
21 „	☽	Last Quarter	8 8 a.m.
29 „	●	New Moon	5 8 a.m.

Perigee, 9th April, at 9.12 p.m.
Apogee, 21st April, at 10·54 p.m.

On 1st April Mercury and Uranus, on the far side of their orbits, will be almost in a line with the Sun, but not exactly behind it. They will both be on its southern side, Uranus at a distance of one diameter of the Moon and Mercury at double that distance. Mercury will be passing eastward of the Sun but Uranus will be left on the western side.

The Moon will be passing Jupiter at midday on the 4th when it will be interesting to look for the planet with binoculars at a distance of 4 degrees, or eight times the diameter of the Moon to the southward.

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.