

QUEENSLAND AGRICULTURAL JOURNAL

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PART 5.

THE GERMINATION AND PURITY OF SEEDS SOLD IN MADE UP PACKETS.

By F. F. COLEMAN, Expert under the Pure Seeds Acts.

Under the Pure Seeds Acts, the vendor of all seeds sold in made-up parcels is required to clearly and indelibly mark upon the outside of each packet *the year when the seeds were grown*. The buyer is thus able to make some discrimination in his purchases. It is well to remember that vegetable seeds differ from wine in that they are *not improved by age*.

All vegetable seeds offered for sale as seeds for sowing must comply with the Pure Seeds Acts as regards purity and germination. For the purposes of the Pure Seeds Acts, all impurities come under the definition of "Foreign Ingredients," which includes dead and non-germinable seeds, inert matter (such as dust, stones, or any material other than seeds), and seeds of weeds or seeds of any plant other than seeds of the kind to which the parcel or packet purports to belong. Diseased or insect-infested seeds are prohibited.

The following table gives the amount of dead and non-germinable seeds, inert matter, weed seeds, &c., that may be contained in the seeds mentioned:—

PROPORTION OR AMOUNT OF FOREIGN INGREDIENTS PRESCRIBED FOR
VEGETABLE SEEDS.

Kind of Seeds.	Inert Matter.	Seeds of Weeds or Seeds of any kind other than that to which the sample purports to belong.	Diseased or insect-infested Seeds.	Dead and non-germinable Seeds.
	Per cent.	Per cent.	Per cent.	Per cent.
Asparagus	2	1	Nil	50
Beans	2	1	Nil	25
Beet	2	1	Nil	45*
Cucumber	2	1	Nil	30
Cabbage	2	1	Nil	35
Cauliflower	2	1	Nil	40
Carrot	2	1	Nil	45
Cress	2	1	Nil	40
Celery	2	1	Nil	50
Kohl Rabi	2	1	Nil	35
Lettuce	2	1	Nil	35
Leek	2	1	Nil	50
Marrow	2	1	Nil	30
Melon	2	1	Nil	35
Mustard	2	1	Nil	30
Marjoram	2	1	Nil	50
Onion	2	1	Nil	40
Peas	2	1	Nil	20
Parsnip	2	1	Nil	70
Parsley	2	1	Nil	50
Pumpkin	2	1	Nil	35
Radish	2	1	Nil	40
Swede	2	1	Nil	35
Sweet Corn	2	1	Nil	25
Spinach	2	1	Nil	50
Sage	2	1	Nil	50
Turnip	2	1	Nil	35
Tomato	2	1	Nil	35

INVOICE MUST BE GIVEN BY VENDOR.

On the sale of any seeds of not less value than one shilling the vendor must give to the purchaser an invoice stating that the seeds are for planting or sowing, the kind or kinds of such seeds, and that they contain no greater amount of foreign ingredients than is prescribed.

The actual wording on an invoice should be—

“The seeds mentioned on this invoice are for planting or sowing, and contain no greater proportion or amount of foreign ingredients than is prescribed for such seeds.”

Subtropical and tropical climates are usually associated with high temperatures and excessive moisture, which gives rise to conditions causing rapid deterioration.

Experiments have proved that moisture is the chief factor in loss of germinating power. It is therefore essential that both buyers and sellers should store all seeds under the driest and coolest possible conditions.

Before putting any seeds up in pockets, it is advisable to dry them for a few days at a slightly higher temperature than that to which they will be submitted during subsequent storage. If this is not done, any rise in temperature above that of the place where the seeds were packed will liberate moisture within the packet and cause deterioration.

Although the life of a seed is undoubtedly dependent on many causes, the most important factor governing the storage of seeds without excessive loss of vitality is dryness.

Should the vendor of any seeds have a complaint regarding their purity or germination, it is advisable to at once send samples of the seeds in question to the Department of Agriculture. Three unopened packets of vegetable seeds is the quantity required for a sample of seeds in made-up parcels. The vendors' fee for analysis is 2s. 6d. per sample. A vendor is—

“Any person who sells, or offers or exposes for sale, or contracts or agrees to sell or deliver any seeds.”

FREE ANALYSIS.

No charge is made to persons sending in samples of any vegetable seeds purchased by them for their own sowing, providing the following particulars are plainly written on each sample:—

Vendor's name and address.

Name of seed.

Quantity purchased.

Date of delivery.

Locality where seed is to be sown.

Name and address of purchaser.

All samples with *covering letter*, should be addressed to—

The Under Secretary,

Department of Agriculture and Stock,
Brisbane.

COMBAT AND CONTROL OF CANE PESTS.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report, dated 9th March, 1922, from the Entomologist (Mr. E. Jarvis):—

“Intense heat during the month of February, accompanied by abundant rain at intervals, has somewhat interfered with outside work; but, on the whole, laboratory experiments give promise of success in the field later on. As already pointed out in 1915 (“Queensland Agricultural Journal,” vol. iii., p. 220), one of the best forms of control against the grub stage consists (in the writer's opinion) of the application to cane sets or furrows, at planting time, of some inexpensive deterrent sufficiently obnoxious and durable to protect a limited area containing the main roots from invasion during most of the growing period.

“Another promising remedy is fumigation of the soil with some gas that, while deadly to animal life, is harmless to cane plants, and possesses, if possible, a manurial value.

“Fumigation with carbon bisulphide, for instance, would come under the latter remedial method, and therefore some attention has been given during the last couple of months to field experimentation with this well-known fumigant. With regard to the former method of control by means of obnoxious repellants, this matter is being closely studied, several chemical preparations having been tested up to the present

with varying measures of success. We are working towards the discovery of a substance possessing an odour of such durability as to allow of its influence being exercised in the soil throughout a period of three months or longer. If put into the drills along with cane sets when planting, say in September, a substance of this nature would have time to render the soil around cane-stools sufficiently disagreeable to probably act as a repellant to beetles entering the field to oviposit during November or December.

"One of the preparations being tested here at present, and consisting of a combination of certain chemicals, is not only repellant, but possesses the additional advantage of being fatal to animal life. Grubs confined in cages holding about 40 cub. in. of soil that had been treated with a small injection of this chemical substance were found to be semi-paralysed after forty-eight hours, and died in from three to five days. Under field conditions, however, we must expect to meet with many obstacles in the way of success, some of which, if found to be insurmountable, might necessitate a modification or even the abandonment of a particular line of research.

"POISON BAITS FOR CANE-GRUBS.

"Now that grubs are becoming plentiful, we intend to further investigate the possibilities ahead of this phase of cane-grub control. The only previous attempt in a similar direction was made in 1916, an account of which is given in Bulletin No. 4 of our Division of Entomology. At the time this was published, arsenate of copper (Paris green) was discovered to be more deadly than white arsenic. Cowpea leaves dusted with the former arsenical were readily devoured by grubs of the grey-back beetle, and proved fatal to about 58 per cent. after one week, 75 per cent. after fifteen days, and 100 per cent. after the lapse of twenty-five days.

"These results, which were obtained in cages at the laboratory, were thought sufficiently conclusive to warrant preliminary field tests. The matter, however, was never fully investigated, and of late years the evident claims of this arsenical were set aside in favour of white arsenic, which, although cheaper, is less effective. The recent failure of various test-plots treated with white arsenic in canefields around Meringa should, I think, be attributed mainly to the methods of application adopted. In the writer's opinion, white arsenic applied loosely in the drills in even greater quantities than 200 lb. per acre would not prove effective against cane-grubs, for the simple reason that, when chancing to ingest a portion of such treated soil, the amount swallowed would often contain only a mere fraction of the arsenical; moreover, each shower of rain would tend to wash the minute particles of arsenic downwards, thereby causing additional and far greater adulteration with the soil. Thus it becomes imperative, if we would secure good results, to administer the poison in as concentrated a form as possible; and with this end in view, we are studying the effects upon cane-grubs of various methods of placing the bait. Later on, during the planting season, the more promising of these methods will be tested by means of experiment plots in the field.

"RANGE OF FLIGHT OF THE CANE-BEETLE.

"The topographical conditions of the country around Gordonvale probably play an important part in the distribution of this formidable cane-beetle, and, in the writer's opinion, may even be responsible for its occurrence in overwhelming numbers on certain restricted areas.

"We know that in many kinds of insects migration of the adult form often becomes necessary to the persistence of a species, and may at times lead to its excessive increase. Our canebeetle, for example, when chancing to occur in exceptional quantities over a small area, does not, I think, remain and breed there, unless imprisoned, as it were, by mountain ranges lying to leeward of the trade wind, knowing instinctively the many dangers that threaten crowded numbers; but generally migrates, if possible, in order to distribute its eggs more widely and establish the grubs in a varied assortment of soils, thereby reducing the percentage of mortality caused by parasitic and predaceous foes. Many strongly-winged insects enjoy a very extended range of flight, certain grasshoppers, butterflies, and moths affording familiar examples.

"Weakly fliers, on the other hand, including the beetle under consideration, are forced to rely chiefly on the wind as a means of transport, the measure of success achieved by a species being dependent, of course, on its size, strength, and degree of buoyancy.

"The grey-back cockchafer, which is about 1½ in. long and of somewhat bulky proportions, would seem, at first sight, quite unfitted for extended aerial transportation; but while studying the anatomy of this insect in 1916, I was surprised to discover that related scarabacidae of smaller size were heavier than this species.

"It has been estimated that one pound of grey-back beetles represents about 216 specimens; so that, in spite of its bulk, a single individual would weigh, on an average, only 2 scruples—viz., the weight of an ordinary wine-cork.

"The so-called 'Christmas Beetle' (*Anoplognathus boisduvali*), an insect scarcely half as big, proved slightly heavier; while a rutelid beetle (*Calvodes grayanus*), although not three-quarters the size of albobirtum, turned the scale at about 2½ scruples. These differences in weight, which were determined from living specimens, are due to variations in the consistency of the harder portions of the body known as the other skeleton, which in the grey-back cockchafer are so thin as to be almost leathery in texture, but in *boisduvali* and *grayanus* are comparatively thick and horny.

"As a general rule, weakly flight, coupled with large size, tends to retard the spread of moderately heavy insects, but where such drawbacks are associated with unusual bouyancy, they are likely to aid rather than hinder rapid distribution, especially when, as in the present instance, bulk is accompanied by a proportionate expanse of wing. In short, it appears likely that the dispersion of our cane-beetle and its occurrence locally in concentrated numbers should be attributed primarily to influences of a meteorological nature, operating in conjunction with such factors as the mechanical condition of soils, character and disposition of timber, and, more especially, the geographical situation of the higher lands and mountain ranges."

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MARCH, 1922.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%.	lb.	
Gay Lassie ...	Ayrshire ...	20 Feb., 1922	1,244	5.0	73.43	
Prim ...	Holstein ...	9 Feb. "	1,452	3.8	64.69	
Snowflake ...	Shorthorn...	20 Feb. "	1,041	5.2	63.95	
Little Buttercup...	Holstein ...	12 Dec., 1921	1,107	4.6	60.00	
Auntie's Lass ...	Ayrshire ...	31 Oct. "	949	4.2	47.83	
Lute ...	" ...	8 Jan., 1922	1,073	3.8	47.81	
College Ma Petite	Jersey ...	5 Feb. "	775	5.2	47.10	
College Cold Iron	" ...	25 Jan. "	785	5.0	46.32	
Thyra of Myrtle-view	Ayrshire ..	31 July, 1921	823	4.4	42.62	
Magnet's Leda ...	Jersey ...	8 Feb., 1922	878	4.0	41.29	
Skyark ...	Ayrshire ...	7 Feb. "	954	3.6	40.24	
Lady Annette ...	" ...	2 Jan. "	737	4.6	39.94	
Lilia ...	" ...	3 Mar. "	797	4.2	39.34	
Hedges Madge ...	Holstein ...	15 Aug., 1921	832	4.0	39.08	
Lady Mitchell ...	" ...	20 Dec. "	676	4.6	36.62	
Buttercup ...	Shorthorn...	28 Oct. "	968	3.2	36.13	
College St. Margaret	Jersey ...	25 Sept. "	580	5.2	35.62	
College Wildflower	" ...	10 Dec. "	572	5.2	35.12	
College Bluebell ...	" ...	22 Oct. "	696	4.2	34.35	
Glow VI. ...	Guernsey ...	28 Aug. "	528	5.4	33.70	
College Mignon ...	Jersey ...	7 July "	622	4.2	30.70	
Lady Meg ...	Ayrshire ...	25 Jan. "	727	3.6	30.66	
College Evening Glow	Jersey ...	10 Oct. "	639	4.0	30.00	
Iron Plate ...	" ...	12 July "	746	3.2	27.84	
College Nita ...	Holstein ...	26 Feb., 1922	694	3.4	27.56	
Miss Security ...	Ayrshire ...	20 Aug., 1921	649	3.6	27.56	
Lady Loch II. ...	" ...	31 Jan., 1922	525	4.4	27.19	
College Prima Donna	Holstein ...	17 Nov., 1921	680	3.4	27.01	
Bellona ...	Ayrshire ...	26 June "	559	4.0	26.25	
College Sunrise ...	Jersey ...	12 June "	410	5.2	25.18	
Nina ...	Shorthorn...	11 Nov. "	595	3.6	25.10	
Miss Betty ...	Jersey ...	7 July "	470	4.4	24.34	
Netherton Belle ...	Ayrshire ...	30 Nov., 1920	398	5.0	23.48	
Miss Saffron ...	" ...	20 Feb., 1922	540	3.6	22.78	
Miss May ...	" ...	3 Dec., 1921	511	3.8	22.77	
Yarraview Snow-drop	Guernsey ...	14 Oct. "	398	4.8	22.49	
Comedienne ...	Jersey ...	26 Nov., 1920	352	5.4	22.44	
College Promise ...	" ...	6 Jan., 1922	543	3.4	21.57	
Yarraview Village Belle	Guernsey ...	6 Aug., 1921	315	5.6	20.86	
Songstress ...	Ayrshire ...	4 Mar. "	319	5.4	20.36	
College Desire ...	" ...	16 Nov. "	376	4.6	20.36	

A SUMMARY OF SOME EXPERIMENTS CONDUCTED WITH SUGAR CANE BY THE BUREAU OF SUGAR EXPERIMENT STATIONS SINCE 1902.—I.

By H. T. EASTERBY, General Superintendent.

Last year (1921) the Bureau of Sugar Experiment Stations completed its twenty-first year of existence. In the course of that period a large number of experiments in cultivation, fertilisation, irrigation, and general husbandry of the sugar-cane plant have been carried out, the results of which are embodied in the twenty-one annual reports of the Bureau. It is recognised that it is an arduous task to wade through twenty-one reports to get at the results of any experiment, and it has been determined to issue a summary of the principal experiments made. This will subsequently be published in bulletin form, together with a summary of the chemical work carried out by the Bureau, mainly in connection with soils, which will be prepared by Mr. George Patten, formerly attached to the Bureau of Sugar Experiment Stations as First Assistant Chemist, but latterly with the Agricultural Laboratory.

DEEP CULTIVATION EXPERIMENTS.

The first experiments were undertaken at the Sugar Experiment Station at Mackay (the soil of which is alluvial and of fair average quality compared with the rest of the district) in order to demonstrate the necessity for, and primary value of, thorough deep subsoil cultivation, it being considered that in alluvial soils such methods of cultivation must precede all other methods for increasing production.

The mode of treatment included:—

1. Breaking up and turning over the land with a swing plough to a depth of not less than 12 inches.

2. The thorough stirring of the subsoil by a subsoil plough to a further depth of 6 to 8 inches, furnishing thus a loose mass of soil 18 to 20 inches in depth. This was later on followed by cross ploughings, the number of ploughings given, exclusive of breaking up, being four.

The experiment also included a similar piece of land of uniform depth and character and part of the same field. This received the treatment usually accorded to land by farmers in the Mackay district, and was a comparison plot.

The land on which the experiments were made was all in one piece and strictly uniform in depth of soil and other characteristics and had not borne crops for some considerable time.

Planting was done at the beginning of April, 1902, the variety of cane used being Rose Bamboo, or Rappoe. The cane was cut into plants having three eyes and laid in drills 5 ft. apart, the distance between the ends of the cane in the drill being 6 in. The cane was covered with $3\frac{1}{2}$ in. of soil. Germination took place in about ten days.

Subsequent cultivation was of a shallow nature not exceeding 3 in. in depth, and was done by the Planet Junior fitted with broad duck-foot hoes. This method is one strongly to be recommended, particularly in dry seasons. Professor King has repeatedly pointed out the efficacy of dry earth mulches in the conservation of soil moisture. Scientific authorities all over the world recommend this cultivation to be so done as to leave a level mulch of soil upon the top, after cutting through the capillary tubes that are leading moisture to the surface. Its importance through a dry period cannot possibly be over-estimated. In his work on soils, Hilgard says:—"The loose tilth of the surface, which is so conducive to the rapid absorption of the surface water, is also, broadly speaking, the best means of reducing evaporation to the lowest possible point. . . . It is true that relatively coarse compound particles are incapable of withdrawing capillary moisture from the dense soil or subsoil underneath, just as a dry sponge is incapable of absorbing any moisture from a wet brick, while a dry brick will readily withdraw nearly all the water contained in the relatively large pores of the sponge. A layer of loose, dry surface soil is therefore an excellent preventive of evaporation and to moderate the access of excessive heat and dryness to the active roots."

During the first eight months of the life of the cane the weather was dry and rainless, the year being the drought year of 1902, but the method of cultivation adopted kept the cane alive till good rain fell in December, which was followed by favourable weather in 1903, when a splendid growth took place and continued.

No fertiliser or irrigation water was applied to either of these experiments.

At the age of eighteen months the cane was harvested, with the following results:—

YIELD OF CANE AND SUGAR PER ACRE FROM SUBSOILED AND
NON-SUBSOILED PLOTS.

Method of Cultivation.	Weight of Cane per Acre. English tons.		Weight of Sugar per Acre. English tons.	
Deep subsoil cultivation	49.3		6.7	
Ordinary cultivation	29.5		3.9	

Difference = 19.8 tons per acre.

From a large number of analyses of soils in the Mackay district it has been shown that most of the soils in that district are fair, and some are very high, in total content of lime. This element; however, is in a very insoluble and inactive state. Deep and very thorough cultivation and exposure of the largest possible mass of soil to the air and sun are the most effective means of bringing these large amounts of lime into an available state. In potash, nitrogen, and phosphoric acid the Mackay soils are generally very low.

The cane grown by the deep subsoil and thorough cultivation had higher sucrose, higher purity, lower glucose, and a notably less content of fibre, thus resulting in a higher total amount of obtainable sugar in the cane than the cane grown by "ordinary cultivation." The higher fibre content of the latter is due to the thinner sticks and shorter joints.

Further subsoiling experiments were carried out with ratoon crops from 1905 to 1907. In one series all the ground between the rows was ploughed and subsoiled, while in the other the ground between the rows was simply ploughed to a depth of 8 in. These experiments were carried on over the first, second, and third ratoon crops, and with the exception of the subsoiling all other acts of cultivation were identical. The results from the three crops of ratoons were as under:—

Crops.	Yield of Cane per acre where the ground between the rows was ploughed and subsoiled. English tons.		Yield of Cane per acre where the ground between the rows was only ploughed to eight inches. English tons.	
First ratoons	38.9		27.0	
Second ratoons	31.3		19.2	
Third ratoons	20.4		9.91	

These experiments were not fertilised or irrigated.

Further experiments were again made at Mackay with subsoiling, in 1919, which were carried out in the following manner:—

Uniform land was divided into two pieces, the whole being cross-ploughed four times to 12 in., while one-half received a subsoiling with the special implement known as the subsoiler to a further depth of 7 in., making 19 in. in all. The other treatment of the whole of the land was identical. The cane used for plants was Green Gora, or N.G.24B. This crop was planted in April of 1919, and the difference between the subsoiled and unsubsoiled plots was well marked during the whole period of growth in the plant crop and also in the first ratoons.

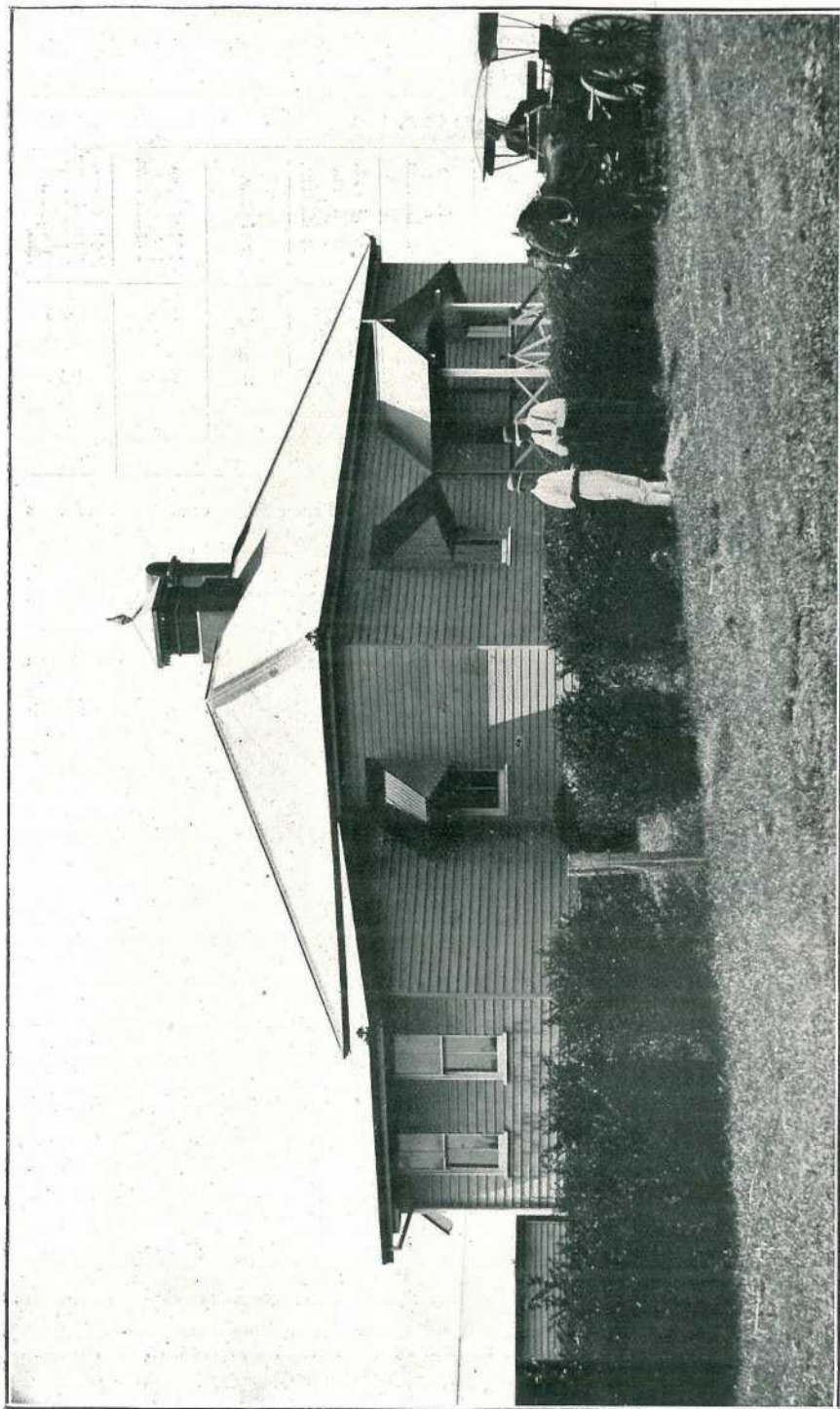


PLATE 44.—SUGAR LABORATORY, MACKAY.

Below are given the results of the plant and first ratoon crops:—

CROP RESULTS OF SUBSOILING EXPERIMENT—PLANT AND FIRST
RATOON CROP. VARIETY, GREEN GORU (N.G.24B).

Plot.	Treatment.	PLANT CROP, 1920.			FIRST RATOON CROP, 1921.		
		Age of Cane.	Yield of Cane per Acre in English tons.	Yield of Commercial Cane Sugar in English tons.	Age of Cane.	Yield of Cane per Acre in English tons.	Yield of Commercial Cane Sugar per Acre in English tons.
1	Plant Crop subsoiled and Ratoon Crop also subsoiled	17 months	37.1	5.15	12 months	35.8	5.35
2	Plant Crop not sub soiled, and succeeding Crop ratooned by ploughing 9 in. deep	„	28.5	3.85	„	29.9	4.48

Difference in favour of subsoiling on two crops—14.5 tons of cane and 2.17 tons of commercial cane sugar per acre.

Due to the large amount of working that the ordinary or farmer's plot received, the results for this are also good. In ordinary practice it is doubtful if all farmers cross-plough four times to 12 in. deep and thoroughly ratoon to 9 in.

Subsoiling experiments upon the open, porous, red soils of Bundaberg and Isis have never given payable results, so that, as far as the Bureau's experience goes, subsoiling is not recommended on these soils. Upon alluvial soils, and those with clay subsoils, the thorough deep subsoil cultivation pays handsomely.

THE GINDI BEEF SHORTHORN STUD AND HERD.

By H. P. BURNAGE, Manager.

PRESENT CONDITION OF THE CATTLE INDUSTRY.

The cattlemen of this State are feeling the aftermath of the war more than any other primary-producing section of the community. The present parlous condition of the beef industry, brought about by an unprecedented drop in the price of cattle, representing over several millions sterling in the course of comparatively only a matter of months, and the closing down simultaneously of the export market, are circumstances which, when examined from the aspect of cause and effect, are calculated to bring about an inevitable depreciation in the quality and type of the cattle throughout the State, unless concerted action is taken to prevent it.

QUEENSLAND'S LARGE HERDS.

Queensland, with its 6,500,000 cattle and its extensive meatworks in different parts of the State, was eulogised generally during the war for playing its part in contributing a large quota of meat for the troops overseas at a much lower price than that paid for meat purchased elsewhere by the British Government.

Concurrently with the demand for cattle for slaughtering purposes, there was an immediate occasion for the use of bulls which would effect what every cattleman worthy of the name was aiming at—early maturity and improved quality.

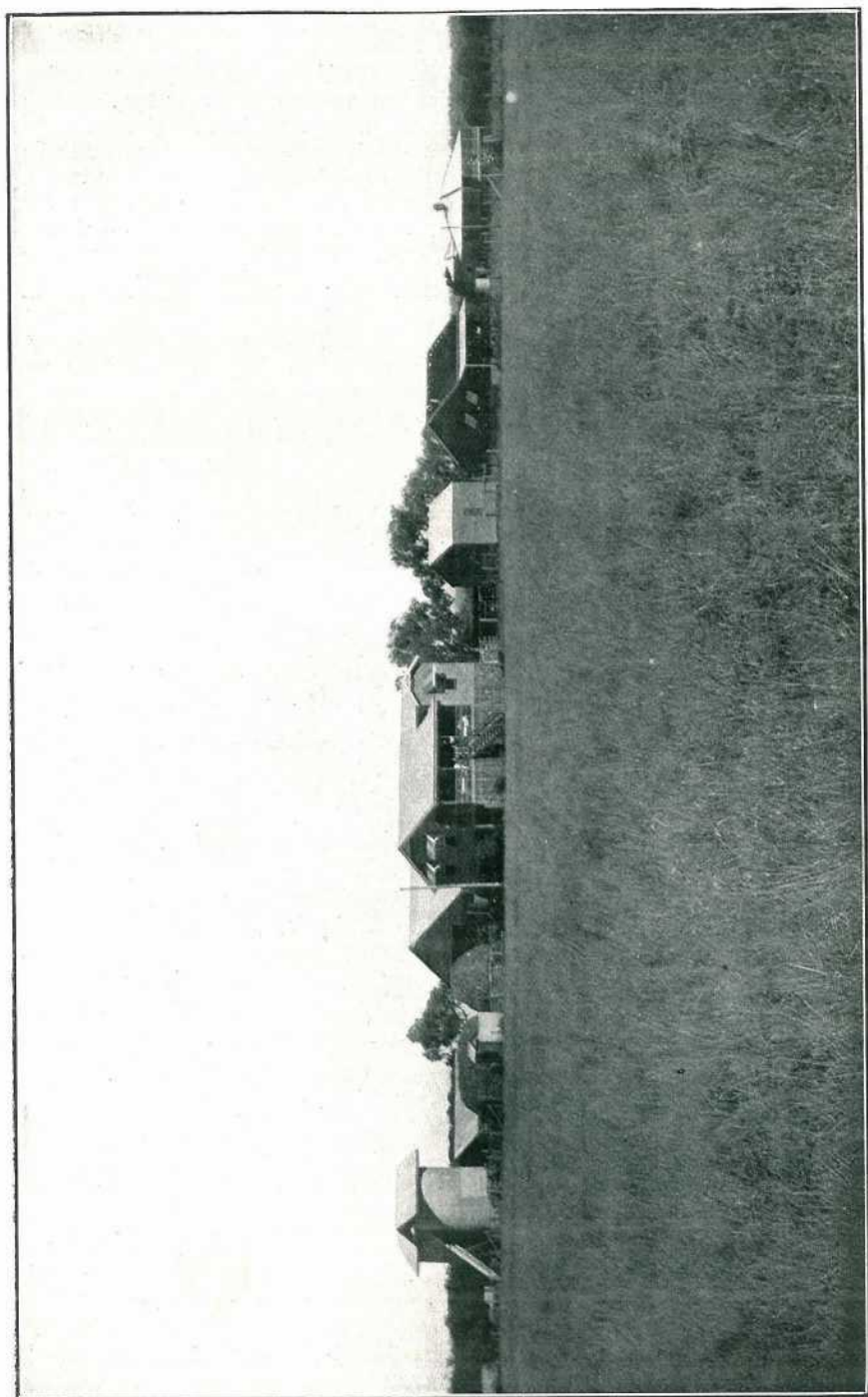


PLATE 45.—GINDIE STATE FARM (BEEF SHORTHORN STUD FARM), GENERAL VIEW.

THE NEED FOR IMPROVING AND MAINTAINING QUALITY.

The breeding of stud and herd bulls naturally became a very profitable occupation to those who could cater for the demand for animals possessing the characteristics and prepotency desired.

To-day, owing to the unprecedented slump in values of bulls, in keeping with other classes of stock, there is every likelihood of many breeders of high-class cattle reducing their herds, for the simple reason that station-owners will naturally be obliged to curtail their usual orders for herd bulls owing to stress of circumstances. Although this economic factor cannot be ignored, there are sound reasons for deprecating action which will have a tendency to bring about any depreciation in the quality of the stock about to be bred.

THE ARGENTINE AS A COMPETITOR IN THE WORLD'S MEAT MARKETS.

Whilst a crisis such as the cattle industry is suffering from has to be faced, it is obvious that consideration should be given to what is being effected by our more fortunately situated competitor in the meat trade—the Argentine.

Queensland in the first place has to "freeze" its beef as against the Argentine "chilling" it. Although our natural pastures are admittedly the finest in the world, we are handicapped to some extent by the fact that the Argentine fattens its cattle on alfalfa (lucerne), a food rich in protein (flesh-forming) substances, and where the fields under this crop stretch to an almost illimitable horizon. Immediately on top of these favourable conditions, one must give the Argentine cattle ranchmen the credit for their foresight in purchasing the highest priced stud stock bred in the United Kingdom.

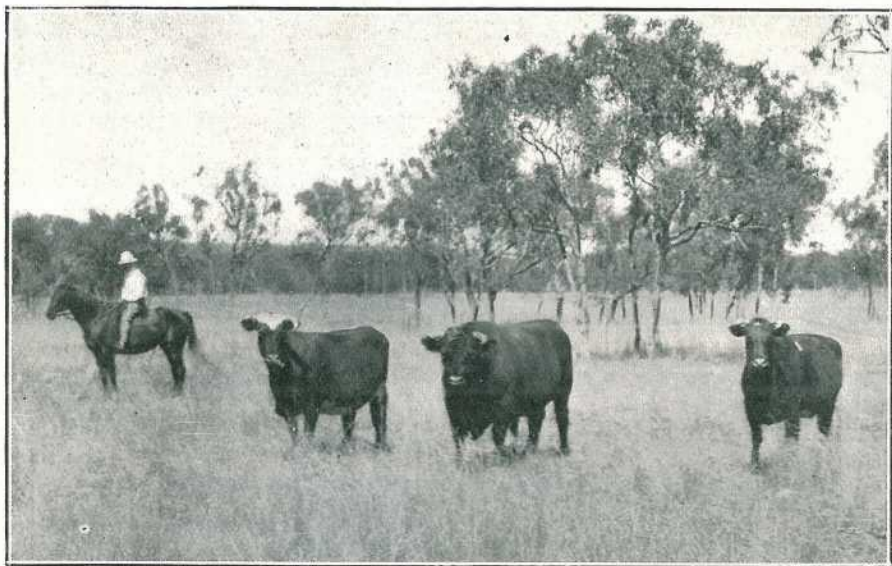


PLATE 46.—ALBANY DUKE OF BEAUFORT 20TH (161 S.H.B. of Q.)

A typical Sire to use for producing early maturing Stock.

WHAT QUEENSLAND CATTLEMEN SHOULD AIM AT.

Queensland's immediate objective should be directed towards herd improvement, the production of deep, evenly fleshed, early maturing, weighty steers, which could be marketed at from two and a-half to three years old—animals which can only be produced by using pure-bred prepotent beef bulls capable, when used with suitable cows, of transmitting characteristics which may be summed up in the one word "quality."

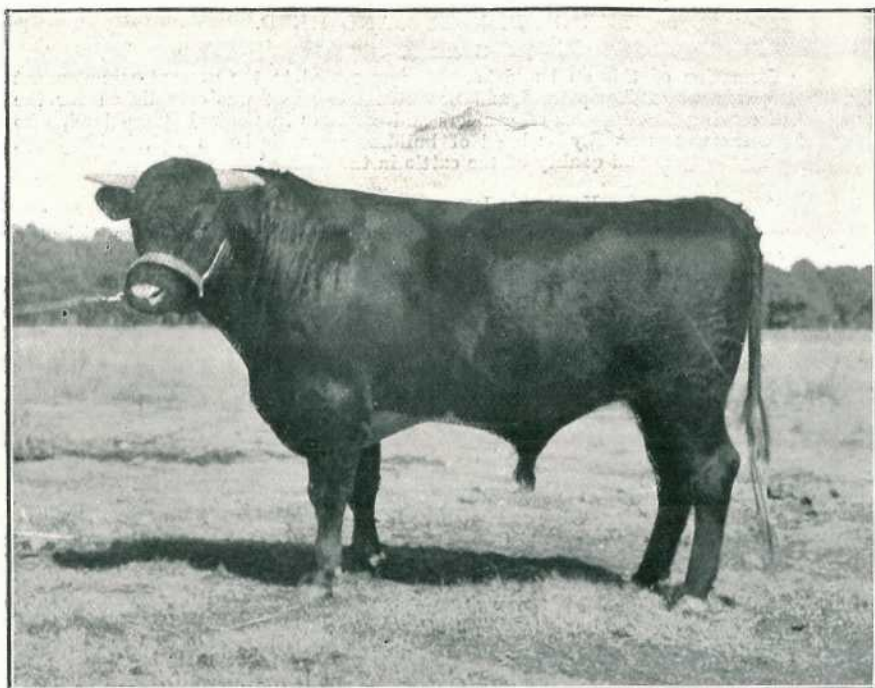


PLATE 47.—GINDIE DUKE OF BEAUFORT 2ND, 375 (S.H.B. OF Q.) AGE 22 MONTHS.
A Promising young Sire of good conformation, type, and early maturing quality.

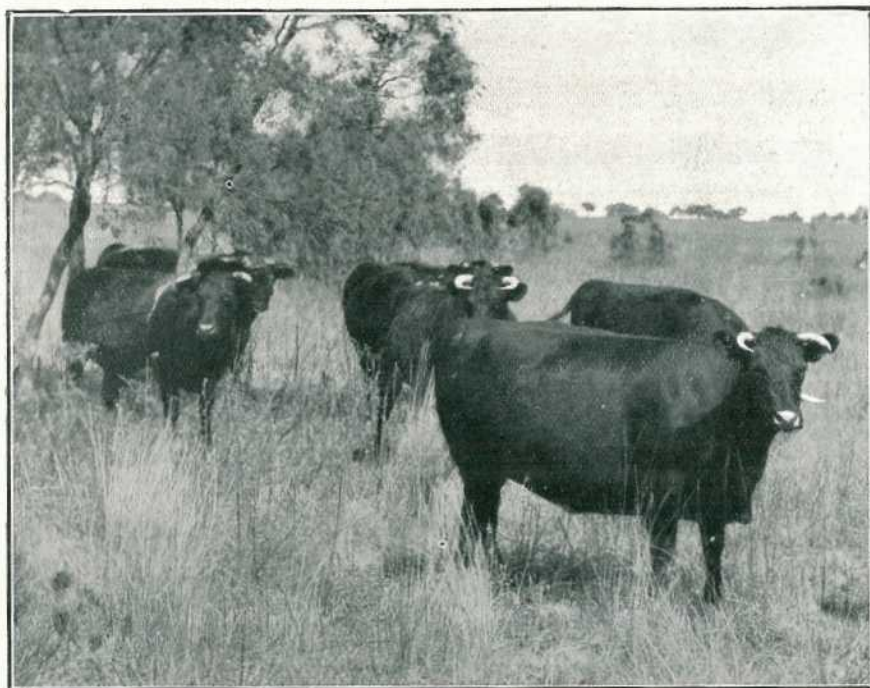


PLATE 48.—YANDILLA CHERRY DUKE (314 S.H.B. OF Q.), AND PORTION OF FAR-FAMED BELTREES HEIFERS USED FOR PRODUCTION OF EARLY MATURING QUALITIES FOR HERD IMPROVEMENT.

THE GINDIE STUD AND HERD.

OBJECTS.

The formation of this stud and herd was entrusted to the present management by the Department of Agriculture and Stock in 1914, and was established for the purpose of serving the interests of graziers and selectors in Central Queensland, who would have the means readily at hand of building up their herds and, incidentally, of improving the type and quality of the cattle in the district.

VALUE OF INOCULATED CATTLE.

Being in ticky country, care is taken to keep up the toleration to ticks by inoculation with blood from prepared and tested bleeders; consequently, bulls may be taken on to the coastal or intercoastal country without fear of any ill effects or consequences.

AREA OF FARM AND CLASS OF COUNTRY.

The farm, upwards of 10,000 acres in area, is watered by the Nogoia River, and by bores and windmills, and comprises a good balance between rich downs and river country, with an appreciable area of scrub and timbered lands; a portion of the latter is sand-ridge, where the natural feed comes away very quickly after rain.

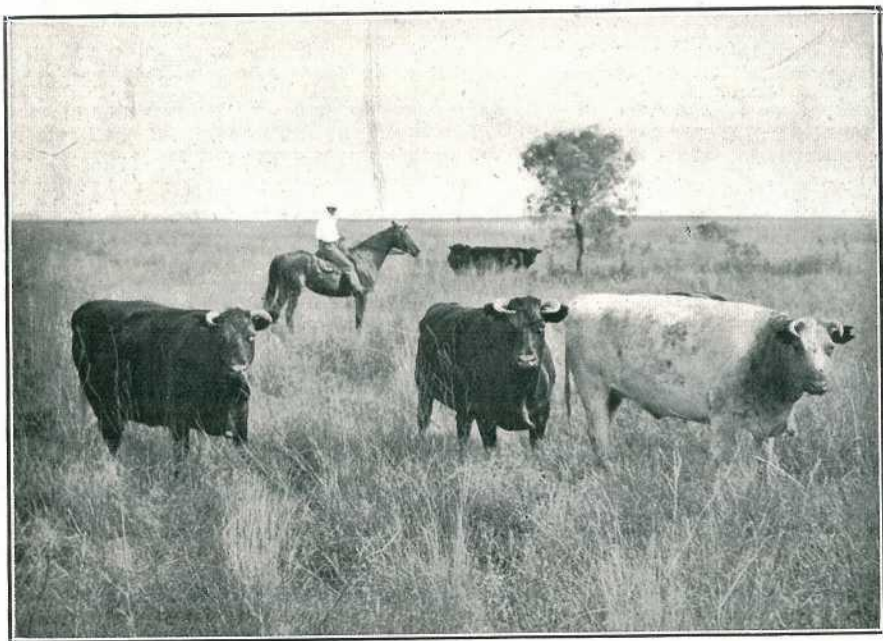


PLATE 49.—GRASS COUNTRY.

GRASS AND HERBAGE.

The average rainfall amounts to approximately 23 in. per annum, and by far the heaviest falls are experienced in the summer months. The district, of which the farm forms a small part, enjoys an excellent reputation for the natural wealth and richness of its grasses and herbage. Mitchell, Flinders, Panic, Blue Grass, Couch, Eriochloa (Early Spring), Sago Grass, and many other popular kinds are met with, according to their natural habitat. The resting of paddocks is practised to give the grasses a chance to re-seed themselves. As many of the Chloris family naturally thrive well, attention has been given to the introduction of Rhodes grass to provide a variety of pasture. In most seasons Chenopodium (fat hen) obtrudes itself for a time, and makes an excellent standby at certain periods between the herbage and grass seasons.

FODDER SUPPLIES.

The practice of stabbling and paddocking bulls between the respective breeding seasons, and the general requirements at other periods in the way of fodder for young bulls and stud animals, calls for ample supplies of both hay and ensilage.

Cultivation is maintained over a sufficient area of land to provide summer-growing fodders for filling the twin reinforced-concrete silos. Wheat and oats are grown as hay crops, and barley as a green fodder and grazing crop.

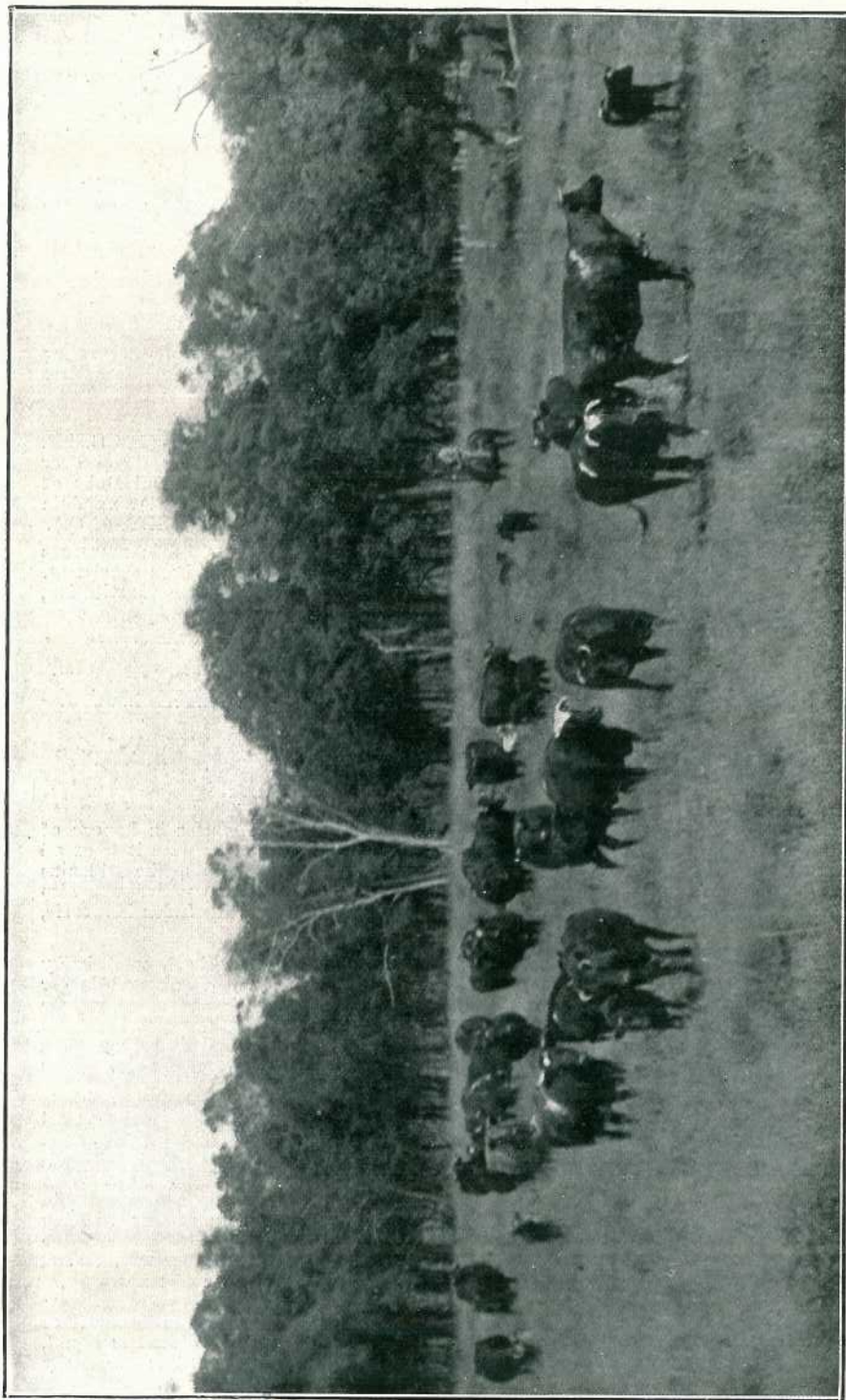


PLATE 50.—ONE OF THE FAMILY GROUPS.
Bred and mated with Albany Duke of Beaufort 20th (161 S.H.B. of Q.)

BREEDING SYSTEMS.

The stock are classed throughout into stud and family herd groups, with due regard to the mating of certain lines of blood calculated to keep up and improve the desired standard of type and conformation. A rigid system of selection is followed, both for females and males, in order that constitution and quality may be aimed at and maintained. By this means it is possible to ensure that not only are the sires sent out of undoubted purity, but they can be relied upon to perpetuate and project in their progeny that ascendancy of food feeding and early maturing qualities which count for so much in the animal bred for a specific purpose.

The universal adoption of maxims of this character by Queensland cattlemen, and putting them consistently into practice, will soon place the beef industry of the State on a sound footing, and enable the State to compete successfully in the world's markets.

FOUNDATION STOCK.

The animals throughout are good rich colours, reds and roans.

The females chosen for this purpose were—two imported Coates Herd Book heifers; three from the stud of Mr. J. H. Angas, of Collingrove, South Australia; two from Mr. J. Williamson's stud, Lockinver, Victoria; and 175 high-class heifers selected from the far-famed Belltrees herd owned by Messrs. H. E. A. and V. White, of Scone, New South Wales.

The bulls selected comprise the following:—Shenley Marco (imp.) (159 S.H.B. of Q.), Albany Duke of Beaufort 20th (161 S.H.B. of Q.), Lyndhurst Royal Peer 15th (163 S.H.B. of Q.), Beau Blanche 41st (164 S.H.B. of Q.), Grand Duke of Oxford 56th (376 S.H.B. of Q.), Yandilla Cherry Duke (314 S.H.B. of Q.), Yandilla Cherry Duke 3rd (311 S.H.B. of Q.), Wongan Duke of Derrimut (160 S.H.B. of Q.).

Since the inception of the stud some very fine cattle have been bred; numerous prizes have been taken at shows, and the demand for young stock has been consistent. Care is taken to send out only animals for herd improvement which possess constitution, type, and quality.

FLOWERING TREES OF BRISBANE BOTANIC GARDENS.

DILLENIA INDICA.

NATURAL ORDER DILLENIACEÆ.

By E. W. BICK, Curator Botanic Gardens.

Derivation.—(B.M. T.5016. 1857.) *Dillenia*, named by Linnæus in honour of John James Dillenius, a former Professor of Botany at Oxford, "because it is of all plants the most distinguished for the beauty of its flower and fruits, like Dillenius amongst botanists" (*Critica Botanica*, p. 80). The specific name *indica* was also given by Linnæus; Thunberg called it *Dillenia speciosa*; following Index Kewensis, it is here given as *Dillenia indica*.

Description.—A good-sized tree, up to 40 ft. in height, with a short, erect, bulky trunk, branches spreading into a broad, rounded head, bark of trunk and larger branches about $\frac{1}{4}$ in. thick, coarse and brittle, internally reddish brown, outer surface grey, shining, rugose, with many small cracks and scales. Leaves very ornamental in appearance, oblong lanceolate, 6 to 12 in. in length, deeply and sharply serrate, with numerous parallel stout ribs, ending in the points of the serratures, coriaceous when old. Petioles 1 to $1\frac{1}{2}$ in. long, channelled.

Flowers.—Large, from 6 to 8 in. in diameter, solitary, borne on slightly curved peduncles, among the terminal leaves, bringing the very large delightfully fragrant flower into an oblique position. Calyx of five, very large, concave, pale green, thick, and fleshy sepals, thin and membranous at the edge, enlarging with the fruit, which they permanently enclose. Petals five, 3 in. long, obovate, cuneate, white, concave in the upper portion, obscurely veined, and slightly waved. Stamens numerous, forming a dense compact mass around pistil, which they entirely conceal except for the stigmas, or, as Roxburgh expresses it, "forming a large yellow globe in the centre, which is elegantly crowned with the white, lanceolate, spreading rays of the stigma." Filaments short, white; anthers linear, yellow; ovaries 15 to 20; ovules minute; styles, as many as ovaries. Fruit compressed, consisting of the numerous subreniform capsules attached to the fleshy central mass that contains a clear glutinous liquid, which surrounds the seeds. The fruit are from 5 to 7 in. in diameter; the fleshy calyx is eaten either raw or cooked by the natives in their curries and chutneys, having an agreeable acid flavour not unlike rhubarb.

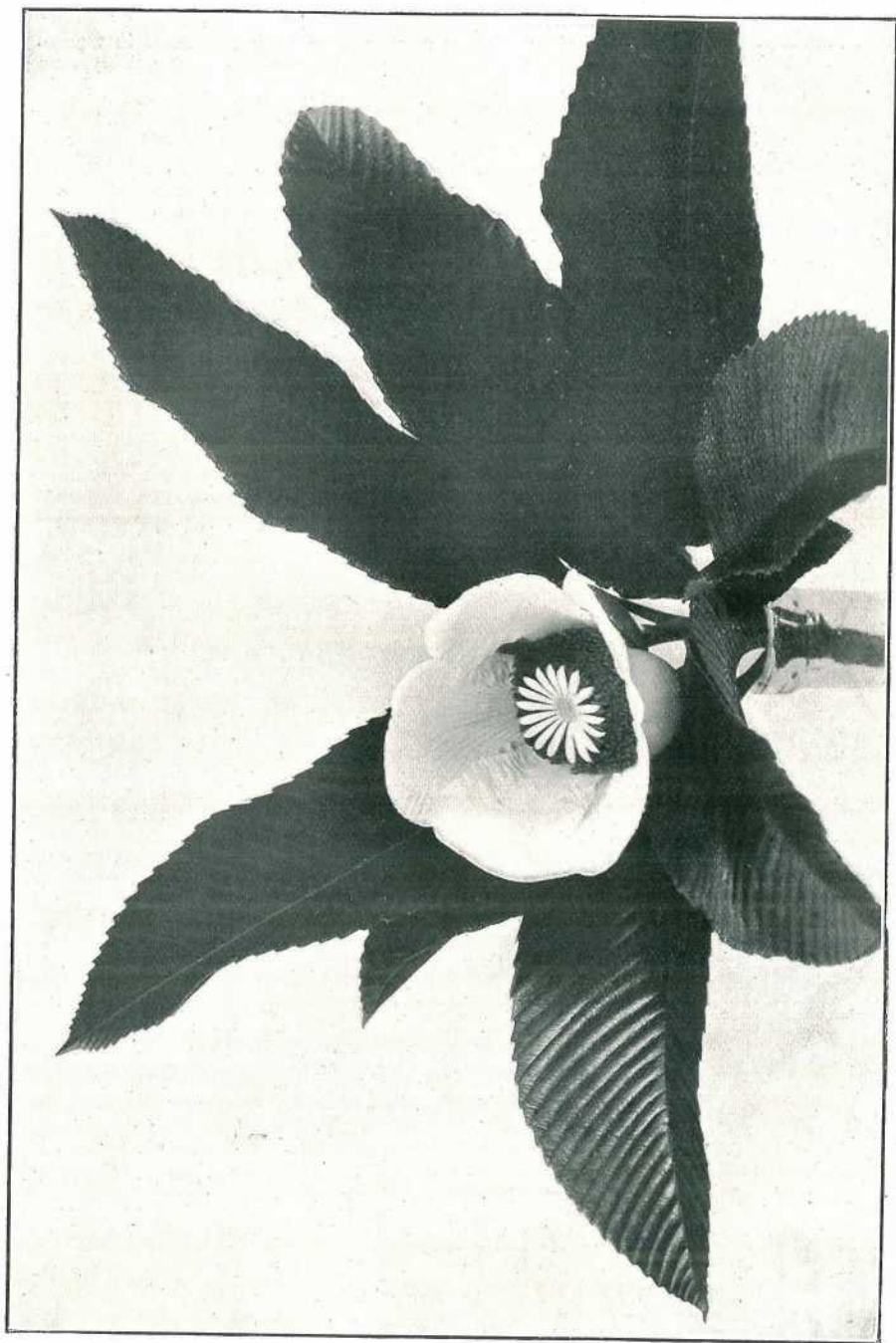


PLATE 51.—DILLEENIA INDICA.

Timber.—Sapwood white, heartwood light brown or pinkish, close and smooth grained, hard and tough, used in India for gun stocks and in boat building, and is said to be very durable under water (Brandis Forest Flora, p. 2).

Propagation.—From seed; the seeds are small and somewhat difficult to remove from the fruit, the outer calyx being tough; the young seedlings grow quickly, and the tree thrives best in a moist situation.

A very fine specimen grew in the Acclimatisation Society's grounds at Bowen Park some years ago, from which hundreds of young plants were propagated and distributed, chiefly to Northern Queensland; unfortunately, the old tree at Bowen Park died a year or two ago. A large specimen in the Botanic Gardens was killed by the 1893 flood, but a young tree between the Botanic Museum and kiosk is now flowering freely.

Habitat.—One of the handsomest of Indian trees, whether the beautiful foliage is considered or the size and structure of the flowers. It is largely cultivated by the natives throughout India, particularly about temples. It is indigenous along the base of the Himalayas, from Nepal to Assam, in Bengal, South India, Ceylon, Burmah, and the Malayan Peninsula.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 10.

SOCKET WOOD (*Daphnandra micrantha*).

Common Name.—Socket Wood (the branches when broken at the joints often show a ball-and-socket-like fracture).

Derivation.—Gk. *daphne*, the laurel or bay tree; *aner*, *andros*, a man (probably alluding to the anthers being like those of a daphne); *micrantha* from Gk. *mikros*, small; *anthos*, a flower.

Description.—A large tree, attaining a height of about 120 ft. and a barrel diameter of over 2 ft. Barrel sometimes slightly flanged at the base. Bark grey, often rough with small warts; when cut, yellow with a thin brown outermost layer; thickness of bark, $\frac{1}{2}$ in. on a tree with a barrel diameter of 2 ft. 3 in. Sapwood light yellow. Older leaves and branchlets hairless, young shoots often downy. Leaf stalks $\frac{3}{8}$ to $\frac{1}{2}$ in. long. Leaves opposite, elliptical, rather narrowed at the base, protracted into a fairly long point at the apex, margins coarsely toothed, lateral nerves and net veins more conspicuous on the underside; measurement of leaf blade, 2 to 4 in. long, two and two-thirds to four times as long as broad. Flowers in small bunches (panicles) in the forks of the leaves or at the scars of fallen leaves, the bunches much shorter than the leaves. Stalks of individual flowers short. Individual flowers measuring about $\frac{3}{10}$ in. in diameter when expanded. The outer part of the flower consists of 10 to 15 (11 to 12 in specimens we examined) perianth segments, the outer ones shorter than the inner ones. On the inside of the perianth segments, and shorter than them, are five stamens. On the inside of the stamens are six or more minute hairy staminodia (modified stamens) surrounding several finely hairy bristle-like carpels (female organs). Fruit consisting of the lower part of the perianth enclosing the mature carpels, narrowly egg-shaped or almost cylindrical, often oblique, $\frac{1}{2}$ to 1 in. long; carpels very slender, covered with fine brown hairs attaining $\frac{1}{4}$ in. in length. Flowering period, October; in fruit in January.

Distribution.—Confined to Australia. Common in the scrubs of the Killarney Ranges, National Park, Macpherson Range, Tambourine Mountain. It was also common in the scrubs about Brisbane. Amamoor and Imbil, in the Gympie District, are our northernmost records. As far south as the Hunter River, N.S.W. (J. H. Maiden).

Uses.—The timber could be used for general indoor and cabinet work.

References.—*Daphnandra micrantha*, Bentham, "Flora Australiensis," vol. v., p. 285; F. M. Bailey, "Queensland Flora," part iv., 1295; R. T. Baker, "Hardwoods of Australia," p. 332; J. H. Maiden, "Forest Flora of N.S.W.," vol. vii., p. 368.



Photo. by the Authors.]

PLATE 52.—THE SOCKET WOOD (*Daphnandra micrantha*).
Ranges eastward of Emu Vale, Killarney District.



PLATE 53.—THE SOCKET WOOD (*Daphnandra micrantha*).
 A.—Leaf showing underside. B.—Fruits. c—Seeds.

SUGAR: FIELD REPORTS.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report (dated 6th April, 1922) from the Southern Field Assistant, Mr. J. C. Murray:—

“During March the districts of Gin Gin, Bingera, and Nambour were visited. An inspection was also made of a portion of the country lying between Gympie and Yandina.

“Regarding the Gin Gin areas, the farmers are busy cultivating and planting. The crops look well, especially the 1900 Seedling. Provided the red soil gets an average amount of moisture, in this locality the Mauritius Seedling appears to do particularly well.

“Other canes that are giving the farmers satisfaction include Mahona, Rappoe, Q. 813, Shahjahanpur No. 10, H.Q. 285, and Demerara 1135. Standover cane is suffering slightly from disease, but nothing of a serious nature. No cane that is in any degree young and resistant is in anything but a healthy condition. Careful plant selection should continue to be the farmer's first consideration.

“Grubs are causing some growers more or less serious loss. In such cases the farmers are recommended to plant a resistant variety to this class of attack, such as D. 1135, cultivate often and thoroughly destroy if possible feed trees in the vicinity and experiment with poisons and repellants. The encouraging of birds, such as crows and ibises, is a good idea; the little bandicoot is also a friend of the farmer in this respect. Another factor of importance is to make sure the soil is not deficient in humus. A supply of vegetable matter in the soil diverts the attack from the cane root.

“Noxious weeds are not causing a great deal of trouble, excepting, perhaps, nutgrass, in places.

“It is too early yet to make any definite estimate, but as matters are going, the Gin Gin farmers should have a very fair crop. Rain is wanted, however. At Maroondan, the prospect of a good crop is fairly certain. The farmers have to work hard on these areas to keep a good tilth on their soil, but those who do thoroughly cultivate are generally amply rewarded for their trouble. Canes that are making rapid growth are Black Innis, 1900 Seedling, D. 1135, and D. 156. The farmers in the Maroondan area are particularly free from cane pests and the crops are showing no sign of disease. As frequently mentioned in connection with this place, the greater use of lime is essential, thus improving the texture of the soil, and consequently increasing its fertility. Maize as a rotation crop is to be recommended. Farmers are also urged to go in more for local experiment, which is the most conclusive method of determining the value of fertilising and other operations incidental to successful agriculture.

“Since last visiting the Bingera area there has been a great deal of rain and consequently the farms and plantation are looking very well. More rain will shortly be required, however, as this class of soil, being loose and friable, and having rapid production powers, can consume plenty of moisture.

“Varieties looking best at Bingera and South Kolan include, respectively, N.G. 16, Q. 813, M. 1900, D. 1135, D. 156, H.Q. 285, and Black Innis. Grub attacks are in evidence in places, although there is nothing serious as yet. On the eastern side of Bingera Railway Station farmers are obtaining splendid results, especially from 1900 Seedling. On the red forest loam this cane ratoons well and gives high sugar values. Meatworks fertilisers are principally used, the amounts applied per acre varying to suit the soil requirements. In this particular locality M. 87 and H.Q. 85 are also looking well.

“Oakwood Plantation is now a fine example of subdivision and closer settlement. All the farmers are doing well, and the district is to be congratulated on getting a fine type of settler to take up and farm this land. The cultivation leaves very little to be desired, and considerable experiment is being made with cane varieties and fertilising. Regarding the latter, Mr. Hansen, an Oakwood grower, has done some interesting work in this respect with a mixture containing superphosphate, sulphate of ammonia, nitrate of soda, and sulphate of potash. In all it took about 6 tons of fertiliser to treat 20 acres, and the cost was approximately £120. The method of applying was to place in ratooning furrow by hand on both sides of the stool. Soil analysis was taken as a basis for their operations in conjunction with conclusions previously arrived at by local experiment.

“Varieties making good growth at Oakwood are M. 16804, M. 87, H.Q. 77, Shahjahanpur No. 10, Gingor, D. 1135, 1900 Seedling, N.G. 16, and H.Q. 285.

“The growers are adopting the sensible method of ploughing-in all available vegetable matter.

"In the Nambour district there is a general air of prosperity. Everywhere the fields are green, and land settlement and building are making rapid strides. Sugar-cane production is making satisfactory progress, and it is possible the mill may increase its capacity. Regarding agricultural operations and methods incidental to sugar-cane culture there is nothing of importance to note since last visiting this district. Mr. Story, at Mapleton, has a fine showing of D. 1135 ratoons, and has amply demonstrated that this beautiful district will produce cane as well as other produce. This gentleman, last season, cut a standover plant crop here which averaged him 40 tons per acre with an average c.e.s. value of 12. Other farmers have good crops in this area and should be greatly encouraged to continue planting. On Petrie's Creek and the Maroochy River good progress is being made towards improving the farms. New land is being cleared, drains are being improved, and tramline improvements effected. Drainage is probably the greatest difficulty the farmers have to contend with. Soil conditions still point to the need for lime and green manures. While the land naturally is fertile, the texture of the soil in some cases wants improving, and this can only be accomplished by careful and thorough farming.

"The Maroochy River is a very fine residential as well as farming locality. Few districts possess such possibilities as this place, with its fine waterway and natural beauty. Cane varieties making noticeable headway are H.Q. 285, Q. 813, 1900 Seedling, Black Innis, N.G. 16, and H.Q. 77. All these canes appear to be suitable at present for the Nambour district generally, and H.Q. 285, Q. 813, and 1900 Seedling should be a fine combination of varieties for farmers to plant.

"At Yandina, Mr. Bowder, an enterprising grower, has a fine block of ratoon cane. The varieties are H.Q. 285, Rappoe, Q. 813, and D. 1135. Most of the 70 acres Mr. Bowder has under cane have been put in with a mattock, but it is intended to further clear and plough the plantation.

"There is not a great deal of cane being produced between Gympie and Yandina, but at Eumundi, where there is a lot of fine agricultural land suitable for cane-growing, Mr. Cook, a prominent Eumundi resident, is contemplating planting cane on a larger scale than has hitherto been attempted. The reaction of a soil test taken at Eumundi shows slightly acid. Judging by appearances the humus content of the soil is good and the texture fair. Rappoe and H.Q. 285 are varieties that are growing well, and, if farmers were to seriously consider cane-growing, should do well."

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report (dated 4th April, 1922) from the Northern Field Assistant, Mr. E. H. Osborn:—

"*Lower Burdekin Notes* (continued).—Early in the month a couple of days were spent at the Haughton Valley district, under very wet conditions. I was told that during the mill's run of over nineteen weeks 37,035 tons of cane had been crushed, of which 11,917 tons came from Inkerman. Of the total tonnage about 12 per cent. was burnt.

"The average c.e.s., for the season was 14.46 per cent., and some fairly high-density canes were crushed. The highest c.e.s. of the different varieties were:—

H.Q. 426	..	..	..	..	17.30	Local cane
Badila	..	..	..	..	17.85	Inkerman cane
B. 208	..	..	..	..	16.20	Local cane
Q. 855	..	..	..	..	15.40	"
Goru 24, 24A	..	..	..	..	15.10	"
Goru 24B	..	..	..	..	15.30	"
D. 1135	..	..	..	..	14.70	"

"At the time of my visit the prospects for the coming season were most encouraging, as the cane (unirrigated) looks very well and some magnificent crops should be harvested during the year, provided, of course, that the climatic conditions continue at all normal.

"Most of the cane was planted in July and August last, and its heavy growth has caused it to fall down in places. The chief varieties noticed were H.Q. 426, B. 208, Badila, N.G. 24, 24A, 24B, Q. 855, Q. 813, Q. 970, Malagache, and M. 1900. In all these varieties some really good cane was seen, 7 and 8 ft. high.

"A very pleasing feature of this district is to notice how well the ratoons thrive, third and fourth being quite usual. At present the farms are fairly scattered and consequently some long haulage is inevitable, but with the advent of the proposed tramway (8 miles in length) conditions for closer settlement will be very much better, and the supply of cane for the mill very much improved.

"The average rainfall for this area varies from 50 to 57 in., the former figure representing the fall taken by Mr. Humphrey, at Giru, and the latter at Mr. W.

Church's, towards the Mountain. So far this year the conditions for a vigorous growth have been ideal, as Giru has had 24.13 in. of rain for January and February. Although this area is comparatively a new one, the growers are fully alive to the value of liming and manuring, and a number of them are either making use of same or intend doing so very soon.

"So far, although grubs are being turned up in ploughing operations, no damage is visible, although, of course, it is very early for such to be apparent.

"Pioneer Mill.—Regarding this particular area the cane looks remarkably well, and old growers say that the crops look better at this period of the year than they have done for quite a number of years, and given good growing conditions until crushing time some splendid crops should result. With the bounteous rains experienced early in the year an early start will probably be necessary to handle the large crop expected to be cut for 1922.

"During the season's operations 89,332 tons of cane were crushed, about a-quarter of which was burnt; the average tonnage per acre was 18.7 tons, and the average c.e.s. 14.84 per cent.

"The principal canes grown were the Gorus 24, 24A, 24B, H.Q. 426, Badila, B. 208, Striped Singapore, and in smaller quantities Q. 813, Q. 855, Q. 903, Hybrid No. 1, and Badila Seedling.

"Inkerman (comprising Home Hill Area).—Prior to my visit parts of the district had been favoured with showers of 3 and 4 in., whilst at the township itself only about 1.69 in. had fallen up to the end of the first week in March.

"All around the district some very good crops of cane were seen, especially some of the unirrigated farms, considering that up to early in March only 14.25 in. of rain had been registered for the year. Some particularly good 24B was seen on the unirrigated farms of Messrs. Marriott Brothers. In their vicinity, 'up river,' several windmills have been erected since last August, and the appearance of the cane irrigated by their use is very favourable. Another very fine block of Badila was seen on Mr. Mulholland's farm down the river. There are about 38 acres of plant, and some of it shows a very fine growth of cane—large healthy stools with a splendid top.

"There is some fine, deep alluvial soil on this farm, and a portable engine is used for irrigation. Taking the conditions all through the Inkerman cane looks very well, and provided favourable rain comes along to keep the unirrigated blocks in good condition until thoroughly grown, a splendid crop of cane should be harvested for Inkerman this season. Last season Inkerman harvested 128,700 tons of cane; 12,000 of this went to the Haughton, and 8,000 tons to Proserpine. Of this quantity about 50 per cent. was burnt, and the average density of the crop was 14.1 c.e.s.

"Bowen Cane Areas.—These areas were visited early in March and found to be looking remarkably well. The rainfall to date had been—January 47.2 in., February 13.28 in., and March 2.82 in., or a total of 20.82 in. These falls have given the cane a real good start, but further showers would help things along very considerably. The number of growers who supplied Proserpine with cane last year amounted to fourteen, but this number is expected to reach thirty-eight for the coming season. Quite a number of other growers are coming in for 1923, and it seems as if a considerable amount of cane will be annually railed to Proserpine from Bowen. The cane grown is mostly in the vicinity of the river, and nearly all of the growers possess small irrigation plants, and as most of the land has a slightly downward grade from the river back, these plants will be able to do the work required.

"Proserpine Area.—This district was reached in the middle of March, and it was noticed that owing to too much wet the growers had not been able to do as much work on the land as they would have liked. In numerous places paddocks had had one or two ploughings, but further work had to be postponed. Although the fall had been so constant, yet the total amount was only 27.08 in. to date—i.e., January 3.12 in., February 19.53 in., March 4.43 in., total 27.08 in. Unfortunately, however, for some of the growers situated upon the river banks the rain early in February culminated in a flood overflowing the banks, and causing a fair amount of damage to low-lying adjacent areas. This, of course, will affect the tonnage expected this year to a certain extent.

"About the third week in March a spell of fine hot weather set in, and cultivation was resumed in earnest again. At present a large quantity of ploughing is being carried out, and grubbing operations are to be seen in practically every part of the district.

"Preparation for draining a very large area of land on the Hambledon Plains are also now in hand, and the opening of the line to Mackay will surely enable the mill to tap a further supply of cane land if required.

"Of the newer varieties of cane, Q. 813 with its second place for density, Q. 1121 with fourth, and Q. 903 with sixth, justify their growing on a far larger scale. A good deal of interest is being taken by the farmers' association in the work of the Experiment Station, as two of their members have just returned from a visit to the Mackay Station, and have supplied their association with an interesting account of their experience at Mackay, comprising also a list of the canes that they liked most now growing on the Station.

"In reviewing the district generally, it must be admitted that the cane, both plant and ratoon, is not as far advanced as it should be at this time of the year.

"Owing to too much wet very little early planting was carried out, and the ratoons also did not make the growth that they should from the same cause.

"As regards liming and fertilising, numerous growers speak of using both, and I am inclined to think that large quantities of same will be ordered ere very long, as the successful farmer in this area recognises the value of liming, thoroughly draining, and green manuring."

CANE PEST COMBAT AND CONTROL.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report from the Entomologist, Mr. Edmund Jarvis:—

"During the past four weeks 10 in. of rain has fallen here, promoting vigorous growth of the cane. On land where grubs are present, however, excessive wet at this time of year often proves detrimental to autumn-planted cane, which, when standing in super-saturated soil of a light character, needs the support of every root to prevent it from being blown over. This applies more particularly to early-planted crops of D. 1135, which are at present (25th March) carrying canes 8 to 10 ft. in length. With regard to late planting, it is worth recording that a 10-acre paddock of the above variety planted by Mr. D. McCaul last December—the stools of which are now about 4 ft. high—looks very promising, and is holding up well in light volcanic soil under very wet conditions. This paddock was kept bare during the fighting season, so that in all probability the beetles passed it by when ovipositing. It will be instructive to follow up the future development of this plot.

"We were interested also to learn from Mr. McCaul that See Chin, who grew cane successfully at Greenhills in the past, is said to have made use of moth-balls as a deterrent against cane-grubs. It may be well to mention in this connection that during November last, various experiments with naphthalene were carried out by the writer at Meringa Laboratory. Doses of from $\frac{1}{4}$ to 1 scruple were placed in cages holding about 13 cubic inches of moist soil, each enclosing a grub of the 'Small Brown Beetle' (*Lepidiota frenchi*, Black).

"When examined twenty-four hours later, about 65 per cent. of the grubs were on top of the soil, half of them being in a dying condition, while the remainder were found below ground, and apparently normal. At the end of two days (19th November) 35 per cent. were dead, and the remainder either sick or dying. Five days after treatment, when the soil had become more or less flavoured with the odour of naphthalene, all grubs usually succumbed after forty-eight hours. Grubs killed by this fumigant became flaccid, and before decomposing turned a peculiar pinkish-yellow colour.

"Field tests have not yielded satisfactory results. The odour from injections weighing a quarter of an ounce, buried in both heavy and light soils, did not, after a lapse of five weeks, penetrate in either, farther than from 1 to 1½ in.

"Unfortunately, laboratory experiments indicate that grubs of the 'grey-back' cockchafer are less susceptible to the smell of naphthalene than those of *Lepidiota frenchi*. For example, a third-stage grub of the former beetle confined about 2½ in. from an injection was found after an interval of three weeks to be quite unaffected. Our outside tests, however, were made during the wet season. Under dry conditions the soil porosity would, of course, be better, and doubtless the odour would penetrate farther.

"It may be mentioned that naphthalene does not injure cane roots and that the ordinary flaked form was found to be stronger than that sold under the name of moth-balls.

"GRUBS AT GREENHILLS

"This estate was visited on the 20th instant, and although unfortunately the cane on some portions is destroyed or showing unmistakable signs of grub infestation, it was interesting to find that the ravages of this pest had in some measure been controlled by the use of carbon of bisulphide. Owing to the courtesy of the manager, Mr. Hoelcher, and Mr. Flower of the Hambledon Plantation, we were able to note the result of experiments with this fumigant carried out by the C.S.R. Company

last month (February) on block J6. A number of $\frac{1}{4}$ -acre plots, treated at rates of from $\frac{1}{4}$ to $\frac{3}{4}$ oz. per stool, are already showing encouraging results. Examination of one of the stools on a control plot which had lost most of its roots and was fast turning yellow, revealed the presence of four grubs of *albolivium*, (grey-back beetle), three in the second and one in the third stage; while close alongside on a plot treated with $\frac{1}{2}$ oz. per stool the cane showed no signs of injury, was quite green, and possessed an abundance of fibrous feeding-roots.

"With regard to general infestation it may be mentioned that on block N2, near the western boundary of the estate, where the cane is fast turning brown, we found about a dozen grubs under each stool, fully 60 per cent. of which were still in the second stage.

"MANURIAL VALUE OF CANE-BEETLES.

"An analysis of certain samples of beetle-meal, prepared at this Laboratory last January from the dried bodies of 'grey-back' beetles, has been received from our Agricultural Chemist, and on the whole, may be considered as favourable. Mr. Brünnich reports:—'The value as a fertilizer is about £11 per ton, and higher than that quoted for European cockchafer.' A few of the details of this analysis were as follows:—Nitrogen, 10.20 per cent.; phosphoric acid, 1.66; potash, 1.75; lime, 0.27; proteins, 63.75; fat, 4.82.

"It will be noticed from the above that this beetle-meal possesses a high food value; but, unfortunately, the sample submitted was found to contain 0.16 per cent. of arsenic. On this account Mr. Brünnich, when referring to the food-value, remarks:—'The use as a food for birds or fowls is doubtful on account of the fairly high amount of arsenic contained in sample. If the arsenic could be eliminated the beetle-meal would be a very valuable fodder.'

"Perhaps in the present instance the arsenic may have been derived from cane-land treated with this poison in hope of destroying the grubs. As much as 200 lb. per acre has been applied on some plantations, and as we know that grubs are continually ingesting soil for sake of the organic matter contained, and it through their bodies, we may, I think, safely infer that in the case of treated soil the arsenic swallowed, although not enough to prove fatal, would tend to gradually accumulate during the larval condition, and be absorbed into the system; and that this would naturally be passed on through the pupa to the beetle. Judging by analysis the arsenic would seem to occur chiefly in the chitinous or horny portions of the outer integuments, such as wing-cases, body sclerites, legs, &c., as a sample from which these harder portions had been removed by sifting were found to contain 0.4 per cent. less than that present in the whole-beetle meal.

"A NOTE OF WARNING.

"The above notes, coupled with the fact that growers here are remarking upon the scarcity or total absence during the last eighteen months of ibises and other grub-eating birds, appears significant, and I am of opinion that it would be advisable to discontinue the practice still favoured by some growers of sprinkling large quantities of white arsenic in cane drills; seeing that this has not so far proved effective against the grubs, and may result in the destruction of our useful insectivorous birds. One can understand that if a large bird, like an ibis, for instance, were to fill its stomach with grubs each containing a small proportion of arsenic, it might in this way easily obtain an accumulated dose of poison sufficient to prove fatal.

"PARASITE OF BEETLE-BORER.

"Very shortly, upon commencement of the normal dry season, we intend pushing forward the distribution of tachinid-fly parasites, which work has been postponed during the wet, humid conditions experienced here from January to March, which are favourable to spore germination of the entomogenous fungus, *Empusa* sp., a vegetable parasite of tachinid flies.

"It is satisfactory to be able to report that we have now succeeded in establishing these useful parasites in the Gordonvale district. Specimens bred in our laboratory, and liberated at Riverstone last December commenced at once to breed in the field, producing the first brood of flies five weeks later, 22nd January.

"Owing to the interest taken in this work by Mr. G. Alley, the standing cane has been left uncut, and the third brood of flies, which are due to appear from this cane next month (April) will, it is hoped, spread throughout that district, and prevent the borer from doing further serious damage.

"At Mount Sophia flies were released on 6th January, and about eight weeks later when scouting for results, Mr. W. C. Dormer, Assistant Entomologist, found a specimen of the fly among the cane. This, no doubt, was a survivor from the first brood, which had emerged about three weeks earlier, but served to show that the parasites had been breeding there; so possibly those arising from this brood may become established in that locality."

REPORT ON INVESTIGATIONS REGARDING PRICKLY-PEAR CONTROL BY BIOLOGICAL MEANS.

By PROFESSOR T. HARVEY JOHNSTON, Scientific Controller.

As is well known, the Governments of the Commonwealth, Queensland, and New South Wales have co-operated financially in a scheme of investigations having in view the control of the prickly-pear scourge by means of its natural enemies, such as insects, fungoid organisms, and bacteria. The Commonwealth Prickly-pear Board, which controls the financial side of the work, consists of a representative appointed by each of the Governments concerned, while the whole of the investigational side is in charge of the Scientific Controller.

At a meeting of the Board just held in Brisbane, the writer reported on the present state of the inquiry, and from that report the following information is now being made available to the public, on account of the very encouraging results recorded in it.

In addition to various organisms brought back to Australia from South America, either by the writer or by Mr. W. B. Alexander, one of the members of the staff, four large consignments have been shipped across from the United States (chiefly from Texas, but some from Florida also) by another member of the staff, Mr. J. C. Hamlin, who is still engaged in the United States and the adjacent parts of Mexico, collecting and breeding material for transportation to Australia. Besides, a large number of organisms have been received from that country from time to time through the post. All material received is subject to plant quarantine.

Particular care has been taken to eliminate, by careful breeding, all parasites which might be likely to control the activities of the various organisms proposed to be employed in the biological campaign against the pest. Then, again, systematic experimentation is being conducted with a view to ascertaining, firstly, whether the organisms introduced are effective against all or any of the many kinds of prickly-pear now naturalised in Eastern Australia; and, secondly, whether they are likely to prove inimical to any plants (including fruits) of economic importance. Work along the lines indicated has been carried on for some time in the laboratories of the Prickly-pear Board, the headquarters being at Sherwood, near Brisbane, with a field station near Westwood in Central Queensland.

It is proposed to establish another field station very soon, its location to be in one of the prickly-pear infested districts of New South Wales. The Queensland experiment station was established first because of the more favourable climatic conditions for fungoid and insect development, on account of the warm moist summer.

Eight distinct kinds of fungi, known to cause disease in prickly-pears either in North or in South America, were introduced into the Sherwood laboratory. Of these several have as yet failed to respond to the cultural methods, while of the remainder, only one (*Glaesporium lunatum*) has proved itself to be of any real value. Under certain conditions—namely, combined heat and moisture such as occurs during Queensland summer—this fungus may set up a serious decay of infected pear joints under laboratory experimentation. It has not attacked any other plants experimented with. Until it has been tried out in the field, one cannot state what economic value it has.

A bacterial disease was discovered by the writer while in Florida in 1920, and the organism causing it has been isolated and carefully investigated in the laboratory, where it has proved itself to be capable of causing a very virulent disease amongst all the kinds of prickly-pear naturalised in Queensland and New South Wales. However, as its dissemination appears to depend on inoculation of each joint—a procedure which would be too expensive if human agency were used, on account of labour costs—the services of certain insect enemies of cacti are being tested with a view to utilising them. Of those now under observation at least one has shown itself to be a very efficient transmitter of the disease germ, while a second kind is also capable of carrying it from joint to joint.

Of the many species of insect enemies either brought or sent across from America, several have proved to be of very little value as possible controls, though they are restricted to prickly-pears. Amongst these might be mentioned the various cactus weevils (*Gerstaeckeria* spp.), one kind of cactus bug (*Narnia*), and the cactus midges (*Asphondylia*).

Others, such as certain kinds of cochineals (*Coccus* or *Dactylopius* spp.), have been found to prefer certain kinds of prickly-pear. One species at present being cultivated in the laboratory readily attacks the spiny pest pear of the Burnett and Rockhampton districts, but does not normally develop to maturity on the common

pest pear (*Opuntia inermis*), nor on the velvety tree pear (*O. tomentosa*), though it will do so occasionally. This species of insect slowly destroys the affected prickly-pear joints, and though its effects take some time before killing the part to which they have attached themselves, yet their rapid multiplication during warm weather should make them a very useful ally in the work of controlling the pest. Certain Australian ladybird beetles have been found to prey upon and destroy it.

Besides the cactus bug already named, no less than four other species have been introduced. All of them belong to the genus *Chelinidea*. They are more or less gregarious. Their attacks cause the plant to become sickly so that little or no new growth is put forth. Their influence is then not so much destructive but retarding, and to that extent they should greatly help in controlling the pest. They have not, as yet, been found capable of transmitting the bacterial disease.

The cactus longicorn beetles, *Monilema*, have proved to be very useful enemies of the different pest pears, which they literally eat up, exerting their destructive action both in the larval or grub stage as well as in the adult beetle stage. Unfortunately they breed slowly, and this fact will greatly limit the extent to which they can be utilised in the work. Certain other beetles (*Disonychia*) have been found to be of little or no use against the Australian prickly-pears.

Among the moths, three species stand out, not only on account of their highly destructive effects on the various kinds of pear but also on account of the readiness with which they can transmit the bacterial germs which cause the serious disease referred to earlier in this report. Among the moths are the two kinds of Moth Borers (species of *Melitara*) of which one—the Florida species—has as yet failed to become established, while the other—the Texas species—is doing excellent work, being capable of attacking and destroying all the various kinds of prickly-pear now naturalised in Australia, though apparently preferring the two commonest pest pears. The destructive work is begun as soon as the tiny larva escapes from the egg shell, and is continued for about three months, by the end of which time the full-sized caterpillar, now about two inches long, undergoes pupation, the grey moth emerging about a month later. A considerable amount of time has been spent in breeding up material free from the various parasitic wasps and flies with which some of the consignments were infected, and in controlling a bacterial disease which carried off great numbers in the caterpillar stage.

The other moth is a small yellow insect called *Mimorista*, which in its larval stage very rapidly destroys the young joints of prickly-pear. It is also capable of transmitting the bacterial disease already referred to.

The injuries caused by these three species of moths readily become invaded by scavenging flies. In the United States and South America there are many species which breed especially in decaying cacti, but although large numbers belonging to about half a dozen species (*Stratiomyidae* and *Syrphidae*) have been bred out in Brisbane from material received from abroad, yet none has become established here, as the flies have failed to lay eggs. Some small local flies (*Sepsids* and *Drosophilids*) have, however, shown that they will breed readily in rotting prickly-pear and thus aggravate the injuries caused by the other agents, but, as they are small and are not restricted to cacti, their effects are not likely to be as great as those of the true cactus scavenging flies. Further attempts are being made to introduce these desired insects from North America.

It will be seen from the above sketch of the work that the investigations in Queensland show that three groups of organisms stand out prominently, as giving great promise in the biological campaign against the prickly-pear menace—(1) the moth borers (*Melitara*), (2) the *Mimorista* moths, (3) the bacterial disease. The third is apparently dependent for its transmission on either of the former two groups, and though it can be readily propagated in the laboratory, it is of little use distributing it until either of the moth larvæ can be distributed too. Consequently the progress of the work of eradication depends, as far as the investigation shows, on the breeding of the moths. This breeding cannot be unduly forced on, and although a large number is confidently expected to be produced within the next month or two, yet the various species must be bred up in great numbers before any attempt to distribute them broadcast can be made. The public is then asked to refrain from requesting specimens of these prickly-pear destroyers, as none will be distributed until such time as they can be spared, and then the public will be informed through the Press. These insects can be best bred up, at this stage of the work, at one or other of the Board's laboratories.

The information obtained, set forth in brief in the foregoing statement, appears to be of such importance to the States of Queensland and New South Wales, and especially to those whose lands are invaded by the prickly-pear, that the Press of the various Eastern Australian capitals has been invited to assist in making it public.

Judging from the laboratory results, it seems as if there has now been established in Australia a complex of organisms which, provided they act together in the field as they are doing in the laboratory, and provided the moths breed sufficiently rapidly, may ultimately bring about complete control of the prickly-pear menace.

The influence of these biological agents will be at first slow, but as the numbers of insects grow so will the effects increase, and it is hoped that in a few years' time appreciable progress will have been made in those districts in which the organisms will be liberated. Of course, there may be various Australian insects or birds which may develop a liking for the introduced organisms and thus control their activities—*e.g.*, certain kinds of ants have been found to readily attack and destroy the young cactus bugs, and even *Melitara* larvæ during their wanderings, but these are matters which are beyond control in the field.

BANANA BEETLE BORER.

By JOHN L. FROGGATT, B.Sc., Entomologist in Charge of Banana Beetle Borer Investigations.

An insect pest (belonging to the group commonly known as "Weevils") which has forced itself into great prominence amongst banana-growers is the Banana Beetle Borer. The original introduction of this borer into Queensland appears to be shrouded in mystery, but it would seem that on many different occasions when banana plants were introduced from the islands and Jamaica, this pest was brought in with them. By widespread distribution of the imported plants many centres of infestation were formed from which the beetle has spread. At the present time it appears to be scattered throughout a very large part of the banana areas and is still spreading further afield. Even in the last twelve months an appreciable increase in the extent of distribution and amount of damage done has been observed in areas where few or no precautions have been taken. There is no doubt that this pest demands the urgent co-operation of all banana-growers in order to cope with it successfully.

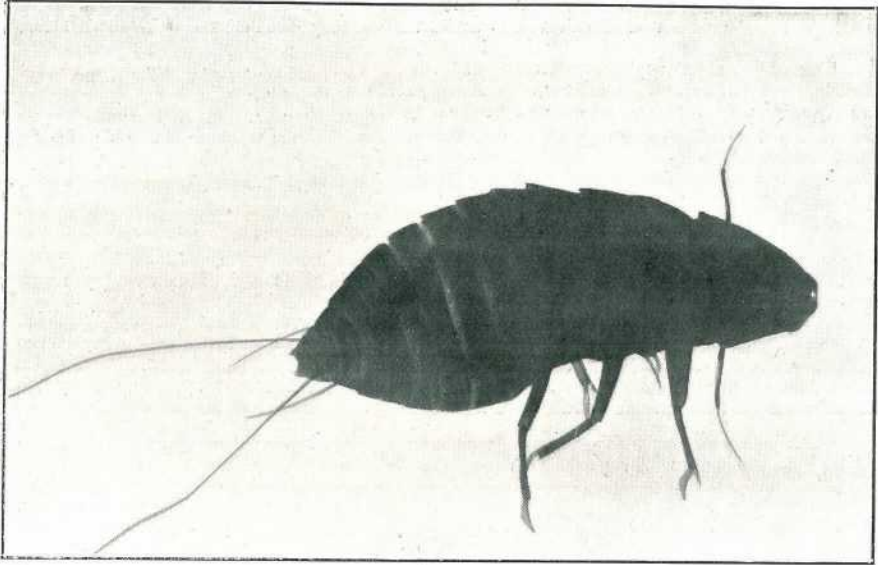
Scientific investigations were begun on the banana beetle borer problem in January, 1921, since when a large amount of work has been done both in the field and in the laboratory, as a result of which much important information has been obtained on the life and habits of the beetle at different periods of the year. Through lack of any published information on systematic research work on the problem, the investigations had to be taken up from the beginning.

The whole of the development of the beetle is passed within the plant, which renders close observation of the different stages extremely difficult and also nullifies the usual methods of treatment for insect pests.

The female beetle when ready to deposit the egg usually selects a site on the plant just about ground level, where the "stem" and the bulb join. She then eats out a small tunnel and, turning round, deposits the egg in the bottom of the tunnel by means of a slender hollow tube projected from the tip of the abdomen. The egg is then lying just underneath the surface of the plant. It is opaque white and about one-twelfth of an inch in length. The egg lies in the tunnel for several days before the larva (or "grub") emerges; this period varies enormously at different times of year, the maximum noted being 35 to 37 days in July, 1921, and the minimum 4 to 5 in January, 1922.

When the grub is ready to emerge, it cuts the egg-envelope by means of its jaws and, working itself free, begins to eat its way into the bulb of the plant. At first the tunnels are very small, but as the grub develops the tunnels become larger. Many grubs may be present in the one plant and in the course of their feeding destroy a considerable amount of the substance of the bulb, which may be called the storehouse of food not only for the plant but also for its product—the bunch of bananas. Where the bulb is badly infested no bunch at all may be formed, or the bunch may be small and the fruit undersized through lack of sufficient nourishment. It is not uncommon in badly infested plantations to find the young suckers small and weedy, again through lack of nourishment from the parent bulb. This is a very serious matter, for the continued prosperity of the plantation depends on the production of strong, healthy suckers.

In most cases the grubs tunnel partially round the outer portion of the bulb, and by this means damage, if not completely sever, the ends of the roots inside the plant; as a result the roots may die back or become weakened and more subject to attack by diseases, and the plant, for want of proper support in the ground, falls out of the stool.



1.—Unflattened specimen, showing convexity of dorsal surface.

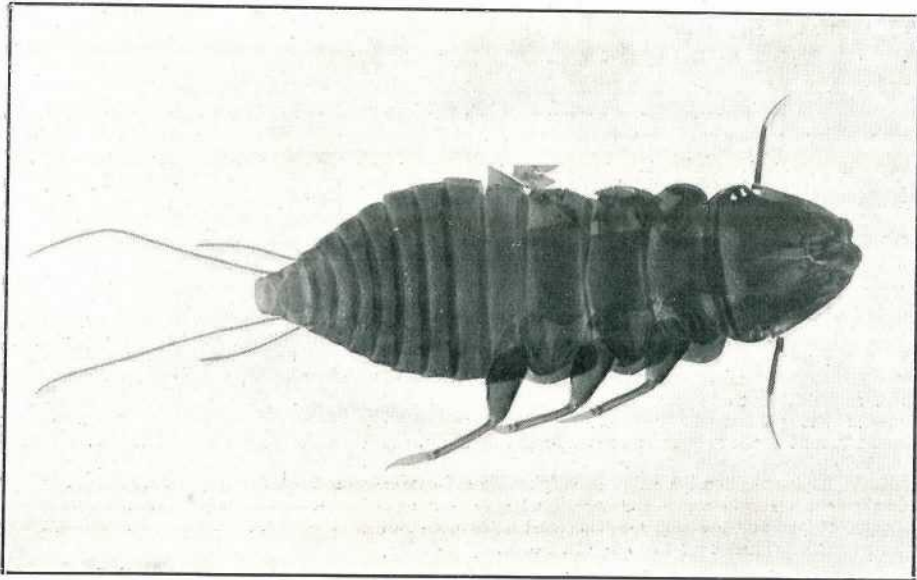


Photo. W. C. Dormer.]

2.—Specimen mounted in balsam (magnified 153 diameters).

PLATE 54.—TRIUNGULIN OF *MACROSIAGON CUCULLATA*, MACL.

When nearing full growth the grub tunnels towards the outer surface of the bulb and in the end of the tunnel turns into the pupa which is nearly always found just underneath the surface of the bulb below ground level. The grub stage occupies 3 to 4 weeks in the warmer portion of the year, but in the colder months this period has been extended to almost 7 weeks. The grub, when full grown, measures a little more than half an inch in length and is white with a very distinct reddish-brown head.

The pupal stage occupies 5 to 7 days in the warmer part of the year, but in the winter it is considerably prolonged. During this stage no movement occurs while the larval structures disappear and the parts of the beetle gradually form. When almost fully developed the pupa changes from creamy to a light yellow or reddish brown, which is the colour of the beetle when it emerges.

After emergence the beetle is comparatively soft, and lies quiet in the pupal chamber for several days, during which time the body becomes harder and the colour darker: that of the mature beetle is black. Before the full colour has been attained, however, the beetle may eat its way out through the plant into the soil. The beetle is a little less than half an inch in length, but specimens are obtained very much smaller than this, due to starvation in the larval stage.

At least a fortnight elapses from the date of emergence of the beetle until the first eggs are laid, but from then on the deposition of eggs is continuous. Variations in egg deposition are marked in the hotter as well as the colder months, being less at these times than in the spring and autumn.

The beetles are found sheltering (and, perhaps, feeding) in the rotting stems and corms, often in numbers.

Experiments have shown that the beetles are most abhorrent of light: though they move *under* the surface of the soil by day they are never found *on* the surface exposed to light. It is thus extremely difficult to follow the movements of the beetles by night. Experiments have been carried out with different-coloured lights to try and find a colour which would not drive them away. So far these tests have proved unsuccessful.

Numerous experiments were carried out, largely in the field, to endeavour to prove whether the beetles flew or not. So far the results have been entirely negative.

Series of tests were made with various oils, &c., to test their efficacy as attractants or deterrents. None of the substances so far tested have any practical value for application in the field.

The life of the beetle is a long one. Of beetles collected in January, 1921, and fed on banana corm, the last died at the end of March, 1922; in other cases of beetles bred in the laboratory and collected in the field during last year, a large number are still alive.

A long series of tests are at present being carried out on poisoning, which, from laboratory results, appear favourable as a means of destroying the beetles. If the laboratory results prove satisfactory, field tests will be instituted to prove its value under practical conditions.

The only means of control that are at present practicable are to dig out and destroy infested material and lay "corm baits" to "trap" the beetles. To make these baits, split a banana bulb into several pieces and lay each piece with a cut surface flat on the ground in or alongside the infested stool; examine these "baits" once a day (the morning for preference), and destroy the beetles found underneath them. Careful attention must be paid to the stems lying on the ground, as these are also liable to be breeding-grounds for the beetle borer. If chopped into small pieces, though eggs be laid in them, the grubs will not be able to mature for want of sufficient food, and the stems will rot or dry up much faster than if left whole.

Of natural enemies there is very little evidence. On three occasions a predaceous beetle grub has been found which attacks the grubs and the beetle of the banana borer, but so far there is no satisfactory evidence of this grub ever acting as a check on the development of the banana borer.

In October, 1921, a small consignment of a predaceous beetle, an enemy of the banana beetle borer, was received from Java, and liberated at once in a small area when infestation was bad in the bananas. So far it has not been recovered; but, as Jepson records that the developmental period is a long one (Bulletin 7, Dept. of Agric., Fiji), it must not be taken for granted that this beetle has died out.

NORTHERN EXPERIMENTS—1921-1922.**POTATOES IN COMPARATIVE TRIAL—TOLGA.**

By N. A. R. POLLOCK, Northern Instructor in Agriculture.

FARM OF W. S. ALLEN, TOLGA.

Forest land; broken up, 1920.

Crop of cowpeas for seed, harvested May, 1921.

Land ploughed 7 in. deep—June, 1921.

Land ploughed 7 in. deep—September, 1921.

Drills 4 ft. 3 in. apart, 18 in. between sets.

Planted 13th September.

Good rains fell in October, but, November and half December being without rain, the plants received a severe check, but responded excellently to the rains when they fell in late December.

Harvested 6th and 7th March, 1922.

Results—

						Per Acre (saleable).	
						Tons.	Cwt.
Up-to-date	..	..	..	..	..	4	15
Brownell Beauty	..	..	..	..	..	4	0
Plunket	..	..	..	..	..	4	7
Carmen	..	..	..	..	..	3	15
Beauty of Hebron	..	..	..	..	..	3	10
Victory	..	..	..	..	..	3	5
Early Rose	..	..	..	..	..	2	5
Manistee	..	..	..	..	..	1	13

Remarks.

Up-to-date maintains its superiority in yield. Every root dug well, second growth being almost entirely absent and percentage of "smalls" very low.

Plunket.—A poor strike resulted from the seed, but the potatoes came true to type; last season the resultant potatoes would not be recognised as Plunkets. Plants yielded consistently and, as with the coastal lands, this variety can be recommended.

Brownell Beauty.—Yielded well, but badly subject to second growth, many of the tubers being ill-shaped and unsaleable.

Carmen.—An old favourite in the district, yielding nicely-shaped attractive tubers, and a consistent fair cropper.

Beauty of Hebron.—During the growing season this variety promised to eclipse all others: it flowered first, and when the rains came made a heavy growth of top and produced some very good tubers. Had the season been good it should have yielded heavily. Certainly worthy of more extended trial.

Victory.—This potato in appearance, growth, and length of season is very similar to *Up-to-date*. The proportion of saleable potatoes was the best of the trial. Worthy of further trial.

Early Rose.—Being an early sort, this variety, like *Beauty of Hebron*, probably suffered more from the dry weather. Tubers were small and trial disappointing.

Manistee.—Only a 50 per cent. strike occurred, and the variety did not appear thrifty at any stage of growth. In the scrub soils late plantings in February and March with this variety are more successful. Cannot recommend it for main-crop plantings.

Coronation.—Seed was very mixed, and appeared more like Brownells. The variety is understood to be a blue potato similar to *Guyra Blue* or *Commonwealth*. No record of yield made.

Manhattan.—Owing to unsound seed only a few roots matured, but these yielded well, and the variety is worthy of further trial.

On the whole, considering the season experienced, which is unique in the history of the Tableland—heavy rains in October followed by six or eight weeks' dry weather—the results are distinctly good. Had the rains, as is usual, followed on the first heavy fall, the result would have been much heavier and the early maturing sorts would have turned out better, especially *Beauty of Hebron*, which, with *Manhattan*, stands more heat than other varieties.

SHOW DATES, 1922.

Show society secretaries are invited to forward for insertion in this list dates of forthcoming shows. Alterations of dates should be notified without delay.

Longreach: 2nd and 3rd May.
 Wondai: 3rd and 4th May.
 Charleville: 3rd, 4th, and 5th May.
 Toogoolawah: 4th and 5th May.
 Grafton: 3rd to 6th May.
 Blackall: 9th and 10th May.
 Miriam Vale: 9th and 10th May.
 Mitchell: 10th and 11th May.
 Boonah: 10th and 11th May.
 Murgon: 10th and 11th May.
 Roma: 16th and 17th May.
 Emerald: 17th and 18th May.
 Kilkivan: 17th and 18th May.
 Ipswich: 17th and 18th May.
 Wallumbilla: 23rd and 24th May.
 Maryborough: 23rd to 26th May.
 Hughenden: 23rd and 24th May.
 Springsure: 24th and 25th May.
 Lowood: 25th and 26th May.
 Childers and Beaudesert: 30th and 31st May.

Bundaberg: 1st to 3rd June.
 Marburg: 2nd and 3rd June.
 Brookfield: 3rd June.
 Cairns: 7th and 8th June.
 Gin Gin: 7th and 8th June.
 Woombye N.C.A.H.S.: 7th and 8th June.
 Mount Lareom: 9th and 10th June.
 Gladstone: 15th and 16th June.
 Rockhampton: 22nd, 23rd, and 24th June.
 Esk: 28th and 29th June.
 Mundubbera: 29th and 30th June.

Mackay: 30th June and 1st July.
 Gayndah: 4th, 5th, and 6th July.

Nambour: 5th and 6th July.
 Townsville: 5th and 6th July.
 Charters Towers: 12th and 13th July.
 Gatton: 12th and 13th July.
 Proserpine: 13th, 14th, and 15th July.
 Rosewood: 19th and 20th July.
 Caboolture: 20th and 21st July.
 Mount Gravatt: 22nd July.
 Barcaldine: 25th and 26th July.
 Crow's Nest: 26th July.
 Pine Rivers: 28th and 29th July.
 Wellington Point: 29th July.

Sandgate: 4th and 5th August.
 Royal National: 7th to 12th August.
 Belmont: 19th August.
 Murrumbidgee: 22nd to 24th August.
 Coorparoo: 26th August.
 Kenilworth: 31st August.

Beenleigh: 1st and 2nd September.
 Zillmere: 1st and 2nd September.
 Gympie: 7th, 8th, and 9th September.
 Wynnum: 9th September.
 Imbil: 13th and 14th September.
 Laidley: 13th and 14th September.
 Sherwood: 16th September.
 Rocklea: 23rd September.
 Kileoy: 28th and 29th September.

Esk Camp Drafting: 4th and 5th October.
 Pomona: 4th and 5th October.
 Southport: 6th October.
 Enoggera: 7th October.

DAIRYING INDUSTRY.**BOARD MEETING, 6TH APRIL, 1922.**

A large number of important matters were dealt with by the Advisory Board, and amongst those coming before the Board for consideration were:—

The Board has received notification from the Railway Department that their request for a 20 per cent. reduction in rail freights on dairy products in their manufactured state to market has been complied with, and that same would operate as from the 3rd April, 1922.

In view of the injury in transit and the consequent depreciation of cheese sent loose by rail to Brisbane, it was recommended by the Board that all cheese for export should be crated at the factories and consigned therefrom direct to the cold stores; this recommendation to come into operation from the commencement of the next export season.

The Board has decided to interview the Commissioner for Railways and discuss with him matters pertaining to better facilities for transport, &c., of dairy products to factories.

The Board realises the importance and need for the introduction of a standardised system of bookkeeping and costing system in factories so that the management of same may be conducted upon the most economical lines, and intend to urge the adoption of such a scheme as soon as possible.

A recommendation was made to the Minister for Agriculture in connection with railway charges on bacon factory products carried by rail from the factory to the market.

DAIRYING INDUSTRY ADVISORY BOARD.

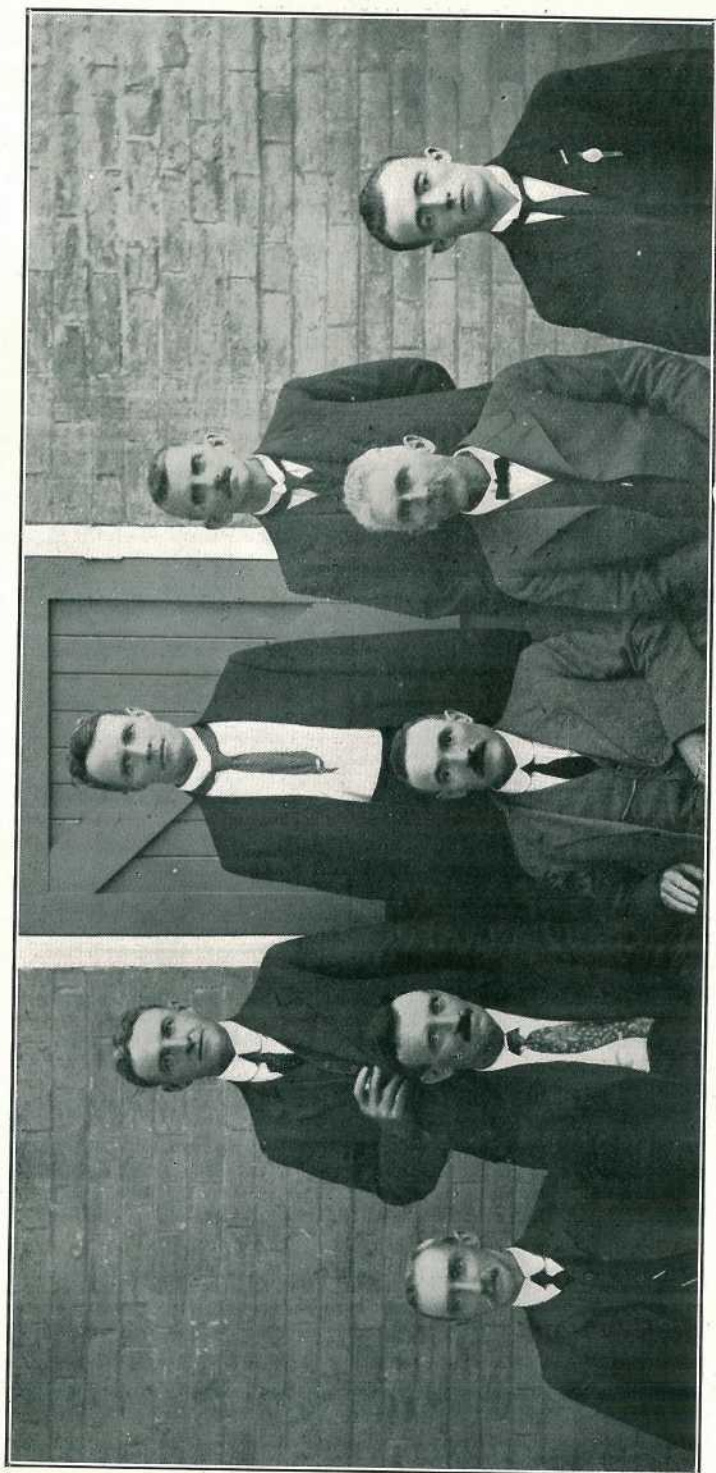


PLATE 55.—Standing (Left to Right)—T. FLOOD PLUNKETT, W. PORCELL, H. KEEFER.
Sitting (Left to Right)—J. E. DEAN, W. T. HARRIS, E. GRAHAM (Chairman), G. BURTON, W. H. FRANKLIN (Secretary).

FRUIT FLY INVESTIGATIONS.

[FIRST PROGRESS REPORT.]

By HUBERT JARVIS, Entomologist in charge of Fruit Fly Investigations at Stanthorpe.

Early in February Mr. Hubert Jarvis, of the Division of Entomology, Department of Agriculture and Stock, was appointed to investigate the fruit-fly problem in the Granite Belt. The following report of his observations and activities covers the period from 12th February to 12th March, 1922, and is made available for publication by the Minister for Agriculture and Stock (the Hon. W. N. Gillies, M.L.A.):—

The greater part of the time embraced in the following report has been spent interviewing orchardists and inspecting orchards, travelling, and making arrangements for and establishing the office in Stanthorpe.

The following sub-districts have been visited:—

Dalveen, Cottonvale, Thulimba, Summit, Applethorpe, Stanthorpe, Beverley, Broadwater, Glen Aplin, Eukey, and Ballandean.

In all these areas the Queensland fruit fly (*Dacus Tryoni*) was found to be present in one or more of its phases.

It appears with the earliest fruit, and disappears with the latest, thus being active for a period of about six months.

The following fruits have been examined and found to harbour fruit fly larvæ or maggots:—

Stone Fruits—Peach (var. Comet) and Nectarine.

Pomaceous Fruits—Apple, var. Jonathan, Five Crown, Munro Favourite, Granny Smith, Gravenstein, Delicious, Lady Hopetoun. Pear—Beurre Box and one other.

Other fruits—those of earlier production—said to be attacked are Prune, Plum (all varieties), Cherry Plum, Cherry, and Fig.

No wild fruits suitable for the development of the fruit fly (*D. Tryoni*) have yet been met with in the Granite Belt.

THE EGG OVIPOSITION.

The eggs of the fruit fly have been found in the following fruits:—

Apples: Five Crown, Jonathan, Gravenstein.

Peach: var. Comet.

Oviposition appears to be continuous, varying stages of maggot growth having been found in single fruits, the eggs also being present.

The eggs are laid side by side in a cavity made by the ovipositor (egg-layer) just beneath the skin of the fruit. The ovipositor, when in use, protrudes beyond the end of the body of the female, and can, therefore, easily be seen with the naked eye.

The number of eggs laid in individual punctures (in fruit examined) varied from four to eight. The fly usually chooses a spot on the sunny side of the fruit, or on any swelling likely to ripen and sweeten early. In the peach, the first attack is almost invariably on one of the ridges or cheeks of the fruit. The fruit fly appears to be attracted by the aroma of ripening fruit. Thus, fruit situated on the outside of the tree, and that matures earlier than fruit deeply sheltered, is in consequence more badly attacked by the fly.

It has been observed that the suitability or otherwise of the medium (tissue) in which the eggs are deposited is a governing factor in hastening or retarding the hatching of same. Thus, with eggs laid in hard, immature apples, this is delayed and they often perish, with the result also that the surface of the fruit has a pitted appearance, owing to the tissue surrounding the puncture growing outwards and leaving the mark or sting in the centre. These marks are locally known as "dead stings."

As many as thirty punctures have been found in one fruit (Five Crown apple), and as few as one only.

THE MAGGOT.

The maggot when hatched in the peach usually works inward to the centre, there obtaining probably the maximum amount of heat and moisture—two conditions favourable to its rapid development.

In the apple, on the other hand, the maggot appears to keep fairly near the surface until about half-grown, when it works inward, being at that stage more able to break down the tissue and create those conditions desirable for its growth.

As many as forty maggots have been found in one peach (eggs also being present), and seldom fewer than fifteen maggots (thus showing the importance of collecting all infested fruit and destroying same).

The number of maggots is, however, by no means in correspondence with the number of punctures.

Eggs may perish owing to unsuitability of tissue or fungus-disease; and flies are often accidentally disturbed while boring the fruit before they have time to lay their eggs.

THE PUPA.

The pupa has been found in the soil (under trees carrying fruit) at varying depths, from $\frac{1}{2}$ in. to 3 in.—i.e., 2 to 3 in. in clean or clear ground, and $\frac{1}{2}$ in. to 1 in. in ground covered with weeds and grass.

The pupa has, too, been found within the fruit (apple) and also slightly projecting from same. A search has been made for pupæ under trees, the crops of which, with a history of maggot-infestation, have been some weeks gathered, the soil being sifted to a depth of 1 ft., with, however, negative results.

THE ADULT FLY.

The fruit fly (*Dacus Tryoni*) has on several warm, sunny days been observed on the wing, and also ovipositing in peaches at Dalveen, the Summit, and Eukey, but nowhere in any numbers, probably owing to the lateness of the season. The specimens observed were shy and restless and very easily disturbed.

OTHER FRUIT FLIES.

One specimen only of *D. Tryoni*, var. *solani* (H.T. MSS.) male has been met with. This specimen was caught in a "Magnet" trap with "Magnet" lure, at Mr. D. Stephen's orchard at Dalveen; this trap, according to Mr. Stephen's testimony, had been set for about two months, and had not, during this period, been examined. (The scent of the lure was still quite strong, however.)

WORK IN HAND.

A collection is being formed, embodying all stages of development of the fruit fly, for reference and for experimental work.

Steps are being taken to secure, by breeding, a large stock of pupæ and adult flies; this material is required for investigation.

Projected experiments are along the following lines:—

To ascertain—

- (1) The depth to which the maggot will penetrate into the soil.
- (2) The longevity of the adult fly.
- (3) The duration of the pupal stage during the winter months.
- (4) The possibility of breeding the fly during the winter.
- (5) In which stage or phase of its development, and where, the fly winters.

CONTROL MEASURES.

Natural Enemies.

Two species of ground beetles (Carabidæ) have been found plentifully under infested fruit and leaves; and are, doubtless, doing useful work as predators.

The Fruit Fly Parasite (*Opius Tryoni*, Cam., Braconidæ) has so far not been met with.

CONCLUDING REMARKS.

At present the only practical means of control is in cleaning up all infested fruit, both on the ground and on the trees, and boiling, burying, or burning same. Boiling is, however, by far the safest and best means of destruction. Burying (if 18 in. deep, and the ground pressed hard) should prove fatal to the maggots and pupæ; experiments projected will indicate the correct procedure in this respect. The method of destruction by drowning will also be tested; but there are already grounds for concluding that, on the fruit being put into a large tub or barrel and covered with water, any maggots harbouring in it would be destroyed.

Trapping by Means of Lures.

Some measure of success has apparently been achieved in this direction by Mr. A. Hall, of the Summit. He has, I believe, succeeded in trapping both the male and female of the Queensland Fruit Fly (*Dacus Tryoni*). Flies submitted to me by him, as so trapped, I have identified as of this species; about 25 per cent. of the number submitted (80) were male flies, and the remainder females.

I have seen (in the field) one Fruit Fly (*D. Tryoni*) female enter Mr. Hall's trap (baited with this "new lure") and get caught; but I have not as yet had an opportunity to observe its action or test it further.

OTHER FRUITS AND VEGETABLES, &c.

Fly maggots, closely resembling in habits and structure the maggot of the Fruit Fly (*D. Tryoni*), have been found by me in Tomato. These maggots are being bred-out in the office, and may probably prove to be the maggot stage of the Tomato Fly (*Lonchæa splendida*).

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MARCH, 1922 AND 1921, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Mar.	No. of Years' Records.	Mar., 1922.	Mar., 1921.		Mar.	No. of Years' Records.	Mar., 1922.	Mar., 1921.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
Atherton	In. 9.11	21	In. 5.91	26.25	Nambour	In. 9.85	26	In. 0.92	13.70
Cairns	18.21	40	11.24	32.21	Nanango	3.44	40	0.60	6.28
Cardwell	16.41	50	9.06	18.38	Rockhampton ...	5.07	35	1.59	3.84
Cooktown	14.99	46	19.55	25.48	Woodford	8.32	35	1.39	12.16
Herberton	8.41	35	5.91	21.13					
Ingham	16.25	30	11.14	15.26					
Innisfail	26.11	41	15.74	62.62					
Mossman	18.84	14	23.08	32.78					
Townsville	7.89	51	1.34	2.93					
<i>Central Coast.</i>					<i>Darling Downs.</i>				
Ayr	7.37	35	1.01	6.48	Dalby	2.77	52	0.48	1.18
Bowen	5.99	51	2.11	11.71	Emu Vale	2.69	26	0.90	0.61
Charteris Towers ...	3.66	40	8.12	5.44	Jimbour	2.66	34	1.57	2.15
Mackay	12.62	51	2.15	28.58	Miles	2.78	37	0.85	2.10
Proserpine	12.73	19	4.33	26.87	Stanthorpe	2.80	49	1.20	1.77
St. Lawrence	6.07	51	0.15	4.50	Toowoomba	3.95	50	0.94	5.15
					Warwick	2.70	57	0.22	0.82
<i>South Coast.</i>					<i>Maranoa.</i>				
Biggenden	4.32	23	0.65	4.08	Roma	2.86	48	0.55	3.01
Bundaberg	5.55	39	1.07	3.31					
Brisbane	5.84	71	2.01	7.86					
Childers	5.19	27	0.54	4.45					
Crohamhurst	11.67	30	2.17	14.09					
Esk	4.94	35	0.98	5.44					
Gayndah	3.31	51	1.53	4.29					
Gympie	6.34	52	2.01	6.73					
Glasshouse M'tains ...	9.79	14	1.54	14.60					
Kilkivan	4.08	43	1.87	4.70					
Maryborough	6.41	51	0.80	5.10					
					<i>State Farms, &c.</i>				
					Bungewongorai ...	1.81	8	0.26	2.78
					Gatton College ...	3.55	23	0.03	3.64
					Gindie	2.89	23	0.80	1.66
					Hermitage	2.64	16	0.36	6.29
					Kairi	7.99	8	7.15	31.17
					Sugar Experiment Station, Mackay	11.93	25	1.59	26.31
					Warren	2.96	8	1.01	2.11

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for March this year, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE E. BOND,
State Meteorologist.

THE 1922 SUGAR CROP.

The General Superintendent of the Bureau of Sugar Experiment Stations states that a rough preliminary estimate of the 1922 Queensland sugar crop places the figure at present at about 290,000 tons. The yield was expected to be higher than this, but the recent dry weather at Bundaberg and Mackay has reduced the expected tonnage to some extent. Whether the above figure will be realised depends on a continuance of favourable weather, which would mean more rain in the Bundaberg and Mackay districts. The cyclone and flood season should now be over, but there is still the frost menace in the Southern districts to be considered. The above output will be in excess of last year's figures (281,000) and also of the present consumption.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, MARCH, 1922.

The laying for the concluding month of the 1921-22 competition was very inferior. This can be attributed to an unavoidable change in feed. Heavy moulting was prevalent in nearly every pen. The following identification rings were placed on the birds competing in the single tests:—Light breeds—"A," white band; "B," red; "C," blue; "D," green; "E," pink; "F," yellow. The heavy breeds are the same, with the exception of "A" bird, which has a black ring instead of a white. The fresh birds competing in the 1922-23 test are placed in pens as follows:—"A," white band; "B," red; "C," blue; "D," green; "E," pink; "F," yellow. The returned birds which laid 200 2-oz. eggs, or over, in single tests, have a sealed band on leg with number of eggs laid in 360 days. The scores for the month are for thirty days, all birds being returned on 31st March. The following are the individual records:—

Competitors.	Breed.	Mar.	Total.
LIGHT BREEDS.			
*J. M. Manson	White Leghorns	71	1,519
*W. and G. W. Hindes	Do.	76	1,509
*T. Fanning	Do.	84	1,479
*Mrs. R. Hodge	Do.	80	1,471
*H. Fraser	Do.	81	1,431
R. Gill	Do.	70	1,384
Oakleigh Poultry Farm	Do.	97	1,368
*C. M. Pickering	Do.	57	1,321
F. Birchall	Do.	74	1,319
*Geo. Trapp	Do.	58	1,317
R. C. Cole	Do.	97	1,301
W. A. Wilson	Do.	96	1,297
Mrs. E. White	Do.	88	1,286
*H. C. Towers	Do.	87	1,277
*W. Becker	Do.	51	1,276
*Thos. Taylor	Do.	49	1,258
Bathurst Poultry Farm	Do.	84	1,245
H. C. Thomas	Do.	53	1,244
*Thos. Eyre	Do.	48	1,243
*C. Goos	Do.	38	1,242
*S. L. Grenier	Do.	42	1,232
*R. C. J. Turner	Do.	29	1,229
*E. A. Smith	Do.	65	1,226
*E. Chester	Do.	56	1,223
*G. Williams	Do.	61	1,221
*Mrs. L. Anderson	Do.	48	1,121
*J. W. Newton	Do.	41	1,191
J. W. Short	Do.	52	1,193
M. F. Newberry	Do.	56	1,192
H. Stacey	Do.	66	1,187
*B. Chester	Do.	55	1,174
W. Barron	Do.	61	1,172
*H. P. Clarke	Do.	40	1,162
*Haden Poultry Farm	Do.	34	1,154
Linquenda Poultry Farm	Do.	75	1,124
O. C. Goos	Do.	58	1,119
Mrs. E. Z. Cutcliffe	Do.	53	1,084
E. Stephenson	Do.	51	1,067
*W. and G. W. Hindes	Brown Leghorn	56	1,028
Brampton Poultry Farm	White Leghorns	49	1,022
W. N. Glover	Do.	35	1,009

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Mar.	Total.
HEAVY BREEDS.			
T. Fanning	Black Orpingtons ...	91	1,487
W. Becker	Langshans ...	105	1,457
*R. Burns	Black Orpingtons ...	62	1,424
*T. Hindley	Do. ...	78	1,406
*A. E. Walters	Do. ...	72	1,384
*Parisian Poultry Farm	Do. ...	78	1,372
*C. C. Dennis	Do. ...	75	1,350
*J. Ferguson	Chinese Langshans ...	65	1,311
G. Muir	Black Orpingtons ...	95	1,310
Jas. Ryan	Rhode Island Reds ...	82	1,309
*E. Morris	Black Orpingtons ...	76	1,302
Rev. A. McAllister	Do. ...	57	1,264
*J. Cornwell	Do. ...	76	1,246
*E. F. Dennis	Do. ...	56	1,234
Jas. Every	Langshans ...	79	1,220
Jas. Potter	Black Orpingtons ...	92	1,218
*N. A. Singer	Do. ...	50	1,211
*J. E. Smith	Do. ...	79	1,196
*H. M. Chaille	Do. ...	82	1,166
*R. Holmes	Do. ...	65	1,159
*E. Oakes	Do. ...	58	1,156
*E. Stephenson	Do. ...	74	1,147
G. Cumming	Do. ...	63	1,138
*A. Shanks	Do. ...	57	1,131
*Mrs. G. Kettle	Do. ...	45	1,128
J. W. Newton	Do. ...	46	1,059
F. Harrington	Rhode Island Reds ...	74	1,056
T. C. Hart	Black Orpingtons ...	63	996
Total ... ..	...	4,517	85,855

* Indicates that the pen is engaged in single test.

DETAILS OF SINGLE TEST PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
J. M. Manson	248	247	292	241	293	198	1,519
W. and G. W. Hindes (W.L.)	268	240	256	270	242	233	1,509
T. Fanning	256	241	282	230	225	245	1,479
Mrs. R. Hodge	248	242	267	256	258	200	1,471
H. Fraser	285	210	261	253	228	195	1,431
C. M. Pickering	244	235	239	198	211	194	1,321
Geo. Trapp	244	200	233	206	235	199	1,317
H. C. Towers	221	201	226	181	203	245	1,277
W. Becker	248	236	199	198	217	178	1,276
Thos. Taylor	223	205	207	178	188	257	1,258
Thos. Eyre	224	193	170	207	242	207	1,243
C. Goos	217	228	185	155	180	277	1,242
S. L. Grenier	194	237	178	212	210	201	1,232
R. C. J. Turner	205	202	204	211	192	215	1,229
E. A. Smith	257	165	232	216	196	160	1,226
E. Chester	241	188	197	191	193	213	1,223
G. Williams	269	223	177	169	206	177	1,221
Mr. L. Anderson	217	219	181	193	220	185	1,221
J. W. Newton	209	228	250	194	134	179	1,194
B. Chester	173	183	213	198	213	194	1,174
H. P. Clarke	240	151	203	161	224	183	1,162
Haden Poultry Farm	144	198	214	210	194	195	1,154
W. and G. W. Hindes (B.L.)	163	174	164	117	158	252	1,028

DETAILS OF SINGLE TEST PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
R. Burns	188	205	302	214	244	271	1,424
T. Hindley	246	247	265	183	215	250	1,406
A. E. Walters	282	228	223	210	220	221	1,384
Parisian Poultry Farm	243	226	218	312	165	208	1,372
C. C. Dennis	220	197	208	253	244	228	1,350
J. Ferguson	216	209	224	254	218	190	1,311
E. Morris	246	213	163	246	214	220	1,302
J. Cornwell	174	226	206	234	187	219	1,246
E. F. Dennis	208	218	199	187	204	218	1,234
N. A. Singer	221	205	182	211	172	220	1,211
J. E. Smith	267	284	185	133	166	161	1,196
H. M. Chaille	153	216	209	239	186	163	1,166
R. Holmes	167	209	197	205	213	168	1,159
E. Oakes	201	190	198	215	172	180	1,156
E. Stephenson	233	190	210	210	147	157	1,147
A. Shanks	162	190	191	200	166	222	1,131
Mrs. G. Kettle	184	223	248	112	170	189	1,126

CUTHBERT POTTS,
Principal.

General Notes.

PUBLICATION RECEIVED.

The "Dairyman's Calendar," compiled by Lever Bros., Ltd., Melbourne and Sydney, a booklet which should prove a considerable help in the business of Dairy Farming, dealing, as it does, with the feeding and general treatment of dairy cattle for each month in the year, as well as of their particular ailments, injuries, &c.

The booklet is obtainable "post free," Sunlight Works, Sydney.

PRICE OF CHAFF BAGS AND WOOL BALES.

Cotton growers are informed that the State Produce Agency, Turbot street, Brisbane, can supply chaff bags at 6½d. each, and wool bales at 3s. each, suitable for cotton intended for transport.

TOWERS PASTORAL, AGRICULTURAL, AND MINING ASSOCIATION.

The committee have changed the dates for holding the Association's Annual Show, from Wednesday and Thursday, 12th and 13th, to Tuesday and Wednesday, 11th and 12th July, 1922.

Answers to Correspondents.

SUN-DRYING OF BANANAS.

C. B. SUTTON, Novar, Bilambil, Tweed Heads—

In reply to your query of even date regarding sun-drying of bananas, Mr. A. H. Benson, Director of Fruit Culture, writes:—"This is a very simple matter. The fruit should be allowed to become thoroughly ripe, the skin should then be removed and the fruit placed on wooden trays 3 ft. long and 2 ft. wide, made by nailing four pieces of timber 6 in. wide and 3 ft. long to a cleat at each end, the cleats to be 2 in. by 1 in. The trays are then exposed to the direct rays of the sun, and when the fruit is dry on the one side it should be turned over so as to dry the other side. The fruit—when sufficiently dried which is known by its consistency, that is to say, there must be no moisture—is then placed in a sweat box to even up. The sweat box consists of a light case of any desired size in which the fruit is placed loosely. Whilst in the sweat box the fruit which is over dried absorbs the moisture from the fruit that is under dried and the sample then becomes of even quality. After the fruit is removed from the sweat box it should be placed in a wire bucket and dipped for about five seconds into boiling water, this is to kill any eggs that may have been laid by moths or other insects on the fruit during the process of drying or sweating. After dipping the fruit is placed on the trays which are put out in the sun and fruit thus rapidly dried. It is then ready to pack. The finished product should be packed in any size boxes that are desired, the boxes should be lined with clean paper and the fruit evenly and firmly packed."

PAPER MULCH FOR PINEAPPLE-GROWING.

A Nambour correspondent asks for further information on the use of paper as a mulch for pineapples, which appeared in the "Agricultural Gazette of New South Wales" for March last, and which we republished in the March issue of this Journal. As we have no details of the kind of paper used for the purpose, nor of its preparation, if any, for exposure to the weather, our correspondent might obtain further information by writing to the editor of the N.S. Wales Journal, Sydney.

TANNING RABBIT SKINS.

B. SCHNEIDER, Box 54, P.O., Stanthorpe—

Boil some wattle bark until it is of a thick, pasty consistence. Add enough water to make it the shade of brown required. Place the skins in this tan liquid, with the fur side of one resting on the skin side of the next, in layers, until all are covered. Leave them in the liquor for a fortnight or twenty-one days—the longer period for preference. Then take them out and peg them on a board, as when first dried. Leave them until thoroughly dry, and they will be fit for whatever use you may put them to. The skins should be of a good brown colour.

TO GET RID OF BLACK ANTS.

W. BILLINGTON, Warra—

(1) Try sprinkling shelves, &c., with oil of pennyroyal. (2) Wash with carbolic soap. (3) Dissolve a piece of ammonia the size of a hen's egg in one quart of water and brush the shelves with it. (4) Pour gasoline into their mounds (if outside) and set fire to it. (5) Lay carpet rag strings soaked in corrosive sublimate in their tracks. (6) Make the following mixture:—White lime slaked, 6 quarts; kerosene oil, $\frac{1}{2}$ pint; turpentine, 1 wine glass; soft soap, 5 lb.; cowdung, 3 quarts; water, 16 quarts. This latter is suitable for washing fruit trees. None of these remedies is permanent, but will require repeating often.

COAL ASHES FOR THE SOIL.

W. BROWNE, Palmwoods—

Mr. J. C. Brünnich, agricultural chemist, in reply to your letter, advises that coal ashes have practically no manurial value. The application of coal ashes may help to loosen stiff soils, but, on red sandy loam, it may do some harm.

Farm and Garden Notes for June.

FIELD.—Winter begins on the 24th of this month, and frosts will already have been experienced in some of the more exposed districts of the Southern coast and on the Darling Downs. Hence insect pests will, to a great extent, cease from troubling, and weeds will also be no serious drawback to cultivation. The month of June is considered by the most successful lucerne-growers to be the best time to lay down this crop, as any weeds which may spring up in the event of a dropping season will be so slow-growing that the young lucerne plants will not be choked by them.

The land should now be got ready for millets, sorghums, panicum, &c. Oats, barley, vetches, clover, tobacco, buckwheat, field carrots, and Swedes may now be sown. Some advocate the sowing of early maize and potatoes during this month, but obviously this can only apply to the more tropical parts of Queensland. The land may be got ready, but in the Southern districts and on the tableland neither maize nor potatoes should be planted before August, or at the earliest, in warm early districts, at the end of July. There is always almost a certainty of frosts, more or less severe, during these months. Arrowroot will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes, yams, and ginger. Should there be a heavy crop, and consequently a glut in the market, sweet potatoes may be kept by storing them in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe, and will rot or dry up and shrivel in the sand pit. Before pitting, spread the tubers out in a dry barn or in the open, if the weather be fine. In pitting them or storing them in hills, lay them on a thick layer of sand; then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them; then put down another layer of tubers, and repeat the process until the hill is of the requisite size. The sand excludes the air, and the potatoes will keep right through the winter. Late wheat may still be sown, but it is too late for a field crop of onions. In tropical Queensland the bulk of the coffee crop should be off by the end of July. Yams may be unearthed. Cuttings of cinnamon and kola-nut tree may be made, the cuttings being planted under bell glasses. Collect divi-divi pods and tobacco leaves. English potatoes may be planted. The opium poppy will now be blooming and forming capsules. Gather tilseed (sesame), and plant out young tobacco plants if the weather be suitable. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples. Gather all ripe bananas. Fibre may be produced from the old stems.

Cotton crops are now fast approaching the final stages of harvesting. Growers are advised that all cotton in the Central District should be consigned to the Australian Cotton-growing Association, Rockhampton; whilst those in the Southern areas should consign their cotton to the Association at Whinstanes, Brisbane. All bags should be legibly branded with the owners' initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus the address labels.

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

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

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

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

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

Land for early potatoes should now be got ready by well digging or ploughing.

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

FLOWER GARDEN.—No time is now to be lost, for many kinds of plants need to be planted out early to have the opportunity of rooting and gathering strength in the cool, moist spring time to prepare them for the trial of heat they must endure later on. Do not put your labour on poor soil. Raise only the best varieties of plants in the garden; it costs no more to raise good varieties than poor ones. Prune closely

all the hybrid perpetual roses; and tie up, without pruning, to trellis or stakes the climbing and tea-scented varieties, if not already done. These and other shrubs may still be planted. See where a new tree or shrub can be planted; get these in position; then they will give you abundance of spring bloom. Renovate and make lawns, and plant all kinds of edging. Finish all pruning. Divide the roots of chrysanthemums, perennial phlox, and all other hardy clumps; and cuttings of all the Summer bedding plants may be propagated.

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

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

Orchard Notes for June.

THE COAST DISTRICTS.

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

When planting, see that the centre of the hole is slightly higher than the sides, so that the roots, when spread out, will have a downward, not an upward tendency; set the tree at as nearly as possible the same depth as it was when growing in the nursery, cut off all broken or bruised roots, and spread those that remain evenly, and cover them with fine top soil. If the land is dry, the tree should then be given a good watering, and when the water has soaked in, the hole can be filled up with dry soil. This is far better than watering the tree after the soil has been placed round it and the hole filled up. Custard apples will be ripening more slowly as the nights get colder, and if the weather becomes unduly cold, or if immature fruit is sent South, the fruit is apt to turn black and be of no value. This can easily be

overcome by subjecting the fruit to artificial heat, as is done in the case of bananas during the cooler part of the year, when it will ripen up properly and develop its flavour. Grade custard apples carefully, and pack in cases holding a single layer of fruit only for the Southern markets.

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

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

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

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

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

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

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

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

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

ASTRONOMICAL DATA FOR QUEENSLAND.

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

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1922.	APRIL.		MAY.		JUNE.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6.2	5.50	6.18	5.20	6.36	5.3
2	6.3	5.49	6.18	5.19	6.36	5.3
3	6.3	5.48	6.19	5.18	6.37	5.3
4	6.4	5.47	6.20	5.17	6.37	5.3
5	6.5	5.45	6.21	5.17	6.38	5.2
6	6.5	5.44	6.22	5.16	6.38	5.2
7	6.6	5.43	6.22	5.16	6.39	5.2
8	6.6	5.42	6.23	5.15	6.39	5.2
9	6.7	5.41	6.23	5.14	6.40	5.2
10	6.7	5.40	6.24	5.14	6.40	5.2
11	6.8	5.39	6.25	5.13	6.41	5.2
12	6.8	5.38	6.25	5.13	6.41	5.2
13	6.9	5.37	6.26	5.12	6.42	5.2
14	6.9	5.36	6.26	5.12	6.42	5.2
15	6.10	5.35	6.27	5.11	6.42	5.3
16	6.10	5.34	6.27	5.10	6.42	5.3
17	6.11	5.33	6.28	5.10	6.42	5.3
18	6.11	5.32	6.28	5.9	6.43	5.3
19	6.12	5.31	6.29	5.9	6.43	5.4
20	6.12	5.30	6.29	5.8	6.43	5.4
21	6.13	5.29	6.30	5.8	6.43	5.4
22	6.13	5.28	6.31	5.7	6.43	5.4
23	6.14	5.27	6.31	5.7	6.43	5.4
24	6.14	5.26	6.32	5.6	6.44	5.4
25	6.15	5.25	6.32	5.6	6.44	5.4
26	6.15	5.24	6.33	5.5	6.44	5.5
27	6.16	5.23	6.33	5.5	6.44	5.5
28	6.16	5.22	6.34	5.4	6.44	5.5
29	6.17	5.22	6.34	5.4	6.44	5.5
30	6.17	5.21	6.35	5.3	6.44	5.6
31	...	...	6.35	...	...	...

PHASES OF THE MOON, OCCULTATIONS, &c

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer Time" is not used.

		H. M.
5 April	(First Quarter	3 46 p.m.
12 "	○ Full Moon	6 44 a.m.
19 "	) Last Quarter	10 54 a.m.
27 "	● New Moon	3 4 p.m.
	Perigee on 10th at 6.36 p.m.	
	Apogee on 22nd at 8.12 p.m.	

The moon will pass, apparently, close to Jupiter on the 11th soon after sunset. If viewed from a higher southern latitude the moon will be seen to occult the planet.

4 May	(First Quarter	10 56 p.m.
11 "	○ Full Moon	4 6 p.m.
19 "	) Last Quarter	4 17 a.m.
27 "	● New Moon	4 4 a.m.
	Perigee on 8th at 5.12 p.m.	
	Apogee on 20th at 2.30 p.m.	

On the 8th, between 11 and 12 p.m., the moon will be again very near, apparently, to Jupiter in the constellation Virgo, with the very interesting binary star—Gamma Virginis—slightly below them.

3 June	(First Quarter	4 10 a.m.
10 "	○ Full Moon	1 38 a.m.
17 "	) Last Quarter	10 3 p.m.
25 "	● New Moon	2 20 p.m.
	Perigee on 4th at 5.12 a.m. and on 29th at 1.24 p.m.	
	Apogee on 17th at 9.18 a.m.	

The moon will pass Saturn on the 4th at a quarter past three in the afternoon, and will enable this planet to be seen in the daytime if a small telescope or binoculars are directed about six times the moon's diameter northward. It will also pass Jupiter on the 5th a little before four o'clock in the morning, again in apparent proximity to Gamma Virginis. Jupiter will again be occulted in high southern latitudes.

Venus, Jupiter, and Saturn will be evening stars during these three months. Mars will be somewhat later in rising, but will be visible early in the evening during the latter part of the period.

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 somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

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

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