

1912.
QUEENSLAND.

ANNUAL REPORT OF THE BUREAU OF
SUGAR EXPERIMENT STATIONS.

(AS REQUIRED BY "THE SUGAR EXPERIMENT STATIONS ACT OF 1900.")

Presented to both Houses of Parliament by Command.

TO THE HONOURABLE THE SECRETARY FOR AGRICULTURE AND STOCK.

SIR,—I have the honour to submit the Twelfth Annual Report of the General Superintendent of Sugar Experiment Stations.

ERNEST G. E. SCRIVEN,
Director.

The first General Superintendent of Sugar Experiment Stations, Dr. A. J. Gibson, resigned that position in May this year, upon his transfer to the Treasury Department to assume the position of General Manager of Central Sugar Mills. Dr. Gibson's services to the Bureau of Sugar Experiment Stations were highly appreciated, and it was a matter of great regret from the scientific aspect of the Experiment Station work that so little of his time was available, due to the valuable work rendered by him in connection with the Royal Commission on Central Sugar Mills and the time subsequently spent in the inspection and valuation of lands around the sites of proposed Mills. The present writer was appointed General Superintendent in August of this year, and had, prior to 1910, been connected with the Bureau of Sugar Experiment Stations since its inception in 1901.

Prior to setting forth the report of work accomplished during the previous year, the following remarks, kindly supplied by the late General Superintendent, Dr. Gibson, will be read with interest:—

"In the early part of 1911 very heavy rains were experienced, more particularly in the Northern part of Queensland. In the Mossman district in particular, great damage was done to crops, and in some instances fairly large areas of land were swept away, and in others heavy deposits of sand were left. These floods interfered materially with the volume of the crop, and also, in a measure, with the quality of the cane. In the Southern districts severe frosts occurred in the winter months, and as a result much damage was done to cane crops in the low-lying lands. Although the cane harvested in 1911 was considerably less than the previous record year, 1910, nevertheless the product obtained from the cane, owing to the high price of sugar, was in value almost equal to that year. The situation was much interfered with owing to the fact that an industrial dispute had arisen in the cane sugar industry, and it was not possible for the cane to be removed before considerable deterioration had set in. The farmers in many instances were called upon to work in the factories, and during the period that they were engaged there the cultivation of their crops was neglected. Following upon this a very dry period was experienced for several months, practically existing right throughout the whole coast length of Queensland in the sugar districts. The ground became so hard that it was almost impossible to do cultivation work of any kind; the farmers were not able to do much planting, and the planting that had been done was in many instances a failure. In the previous Annual Report mention was made that a number of experimental plots were about to be established in the various sugar localities of Queensland. Much difficulty was experienced in getting farmers to take over the work, and in specific instances where arrangements had been made for plots, some of the growers withdrew from the undertaking owing to the existing economic conditions. However, plots were established in the following localities, viz.:—Mossman, Cairns, Johnstone River, Herbert River, Burdekin, Proserpine, Bundaberg, Isis, and Maryborough districts. Two Agricultural Instructors, Messrs. H. T. Harvey and H. Burn, were appointed for the purpose of supervising the work of the experimental plots and for the purpose of instructing more particularly inexperienced farmers in the methods of cultivation, planting, &c. One of the Instructors is situated in the Southern District, and travels over the sugar areas from Rockhampton southwards. The other

Instructor deals with the districts from Proserpine northwards. Mackay is dealt with from the Mackay Sugar Experiment Station. It is found that the policy of getting into close personal touch with farmers on the land and disseminating knowledge which has been compiled and verified at the Mackay Station is in many instances productive of good. The plots are only intended to demonstrate to the farmers methods employed at the Mackay Sugar Experiment Station, and further, for the purpose of thoroughly testing different varieties of cane in the various sugar localities.

ENTOMOLOGIST.—An entomologist, Mr. A. A. Girault, has been appointed, and his services are available to deal with entomological problems in relation to the sugar industry of Queensland. At the time of his arrival the grub pest was causing grave concern to sugar-growers, and it was deemed advisable that Mr. Girault take up his headquarters at Cairns. He is now established at Nelson, where, with an assistant, he is engaged in pursuing investigations in connection with the grub pest. It is only to be expected that an investigation of this kind must extend over lengthened periods before any definite conclusions can be arrived at. In Mr. Girault the industry has an earnest and capable officer, and it is hoped that, as a result of his investigations, much good will result. There is, however, need for more entomologists in the industry, as there are a number of matters which require very close investigation. The subject matter is one which requires that assistance be rendered in the direction of pointing out and describing to farmers the nature of the various diseases and how, if possible, to prevent their spread. Numerous instances are to hand where, through ignorance or carelessness, diseases have spread to such an extent that they have become a serious menace to the industry.

"In the previous Annual Report mention was made that a number of seedling varieties of cane had been obtained from the Acclimatisation Society in Brisbane. These varieties are now being tested at the Sugar Experiment Station, Mackay. The matter of obtaining suitable varieties of cane of the highest commercial value is still engaging the attention of the Station; but it is felt that even more should be done, particularly in regard to the propagation of varieties of cane from seed. Some time previously experiments had been made in this direction at the Mackay Station, but without any beneficial results; it may have been that the locality was unsuited for the purpose. The fact, however, still remains that many excellent varieties have been obtained from seed in other parts of the world, and it appears necessary that some other locality should be chosen and this line of research vigorously pursued. The matter of sending some competent person to New Guinea for the purpose of introducing fresh varieties of cane has been under consideration, and the matter is now receiving attention. In the North of Queensland in particular the New Guinea varieties have given excellent results, and it is with the idea in view of maintaining the virility of the best varieties of cane that fresh introductions are being sought from New Guinea.

"Concerning farm implements, steps are being taken by growers in the direction of obtaining mechanical appliances of suitable design in order to cheapen the cost of field work. In the Burdekin district in particular there are tractors for hauling farm implements in use. The economic conditions in production of cane to-day are such that it is imperative that farmers take every advantage of suitable machinery which have a tendency to cheapen the cost of work. Unfortunately, these mechanical devices are not within the means of individual farmers, and it appears there is need for co-operative effort on their part to enable them to get such appliances.

"During the year the General Superintendent has continued his visits to the various parts of the sugar-growing centres throughout Queensland and held meetings of farmers and discussed cane matters with them. A certain portion of the year the General Superintendent was also engaged in business connected with the Central Sugar Mills Department, and in May of 1912 was transferred to the Bureau of Central Sugar Mills."

On taking up his duties the present General Superintendent, towards the end of September and during part of October, paid a brief visit to each of the leading sugar districts—viz., Bundaberg, Mackay, and Cairns—in order to collect data for the present report, to get into touch with the sugar industry generally, and carry out some inspection work at the Mackay Station and elsewhere. The dryness of last and this year has had a most prejudicial effect upon the current season's cane crop, and up to the time of this visit Mackay and the Herbert River were especially suffering. Fortunately, at Mackay, the rain, which fell at the end of October, has considerably relieved the position of growers as far as the young plant and ratoon crops are concerned. At Innisfail and Cairns some rain had fallen and matters were consequently brighter.

The situation is complicated by the high price demanded for labour for cultivation purposes, and its unreliability in many districts. This is naturally giving rise to a great deal of unrest among growers, and is having a bad effect upon the culture of the cane. It was found that many farmers had abandoned the idea of further plantings, whilst others were carrying out work themselves upon which they had previously employed labour. The system of volunteer ratooning was also being considerably practised, because it required little or no labour, although the returns are very largely behind those obtained by judicious cultivation. It has been and will be the earnest endeavour of this Bureau to introduce better methods of cultivation, combined with the proper use of green manuring, liming where necessary, and fertilising. Such methods, if carefully followed by cane-farmers, must lead to the increased yield of cane from smaller areas, so that the cost of labour in the slack or off season may be considerably cut down.

It is to be regretted that many farmers are sceptical concerning the methods of the Experiment Station, but as such methods have proved successful, not only at the Mackay Station but in other

countries where they are practised, they can and should be made to pay here. Particularly is this the case in Hawaii, where similar methods are carried out by the planters in a highly scientific and practical manner, and where every item of cane culture is watched by acute business men in its relation to the dollar.

WORK OF THE MACKAY CENTRAL SUGAR EXPERIMENT STATION.

The Chemist-in-Charge, Mr. L. C. McCready—due to the frequent absences of the late General Superintendent, Dr. Gibson, upon Central Mill Work—has been largely responsible for the carrying on of the experiments during the past year, and the present appearance of the Station and the careful manner in which the experimental work has been performed call for high commendation.

The following report has been compiled chiefly from data furnished by Mr. McCready:—

The year has been of a nature almost unprecedented. The heavy rainfall in 1911 was followed by an early and severe winter and an almost total lack of rainfall during a period of eight months. This could not have anything but a deterrent effect upon the cane, but owing to the deep and thorough cultivation practised at the Station very fair crops have been obtained.

The popularity of the Station has greatly increased, and the daily correspondence has been almost trebled. Visits from local farmers take place frequently, and the greatest interest is displayed in all the experiments.

EXPERIMENTS WITH SIX QUEENSLAND SEEDLINGS, MAURITIUS MALAGACHE, AND BARBADOES SEEDLING 147.

Following the harvesting of the first ratoon crop of this experiment, as detailed in last year's report, the canes were allowed to continue as a second ratoon crop. The extreme dryness of the season, and the almost total absence of moisture, caused the crop, with the exception of Malagache and Barbadoes 147, to become so backward and stunted in appearance that the crop was ploughed out. Under these circumstances the data from the plant and first ratoon crops can only be supplied, and are set out in the Tables following:—

ANALYTICAL RESULTS OF QUEENSLAND SEEDLINGS, BARBADOES 147, AND MAURITIUS MALAGACHE—(1910-1911.)

Name or Number of Variety.				PLANT CROP, 1910.				FIRST RATOON CROP, 1911.				AVERAGE OF TWO YEARS.	
				Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	Sucrose.	Purity.
Queensland Seedling	6	...	...	9.7	5.84	2.66	60.2	16.1	13.23	1.59	82.1	9.50	73.8
Do.	30	...	...	17.6	16.01	.65	90.9	20.9	19.56	.36	93.5	17.78	92.6
Do.	102	...	...	15.4	11.72	2.66	76.1	18.5	15.07	1.86	81.4	13.39	79.2
Do.	116	...	...	17.3	13.12	1.48	75.8	20.2	18.05	.90	89.3	15.58	83.3
Do.	121	...	...	18.8	17.35	.34	92.2	20.3	18.85	.45	92.7	18.10	92.8
Do.	176	...	...	14.2	9.87	2.89	69.5	18.9	16.68	1.81	88.2	13.27	80.4
Barbadoes	147	...	...	19.2	17.86	.49	93.0	21.4	20.01	.41	93.5	18.93	93.2
Mauritius Malagache	...	...	...	18.0	15.76	1.45	87.5	18.8	16.48	1.22	87.6	16.12	87.6

CROP RESULTS: QUEENSLAND SEEDLINGS, BARBADOES 147, AND MAURITIUS MALAGACHE (1910-1911).

Name or Number of Variety.				PLANT CROP.		FIRST RATOON CROP.		TOTAL YIELD TWO CROPS.	
				Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.
Queensland S.	6	...	...	29.2	1.5	8.1	.9	37.3	2.4
Do.	30	...	...	50.5	7.1	32.1	5.4	82.6	12.5
Do.	102	...	...	59.2	6.0	34.4	4.4	93.6	10.4
Do.	116	...	...	42.0	4.8	38.1	6.1	80.1	10.9
Do.	121	...	...	51.9	8.1	37.8	6.4	89.7	14.5
Do.	176	...	...	43.8	3.9	34.4	5.0	78.2	8.9
Barbadoes	147	...	...	51.0	8.0	46.2	8.0	97.2	16.0
Mauritius Malagache	...	...	...	69.2	9.7	42.0	6.2	111.2	15.9

MANURIAL EXPERIMENTS, FIRST RATOON CROP.

As mentioned in a previous report, the above plat was originally intended to serve as a trashing experiment, but as this process has been almost entirely abandoned on account of labour, it was decided to substitute an experiment having for its aim the determination of the relative values of manures containing single elements as well as mixed fertilisers.

The method of ratooning was the same as used in former years, and is one which the Station can confidently recommend. It consisted of the following treatment:—The trash was first burnt, the middles were then split open with a swing plough to a depth of about 12 in. This was followed by the sub-soiler, which stirred the soil in the open furrow to a further depth of 6 in. The stool was then off-barred and the sub-soiler again followed. This ensured that the whole of the ground between the rows had been thoroughly loosened and subsoiled to a depth of at least 18 in. The row of hard ground containing the stools was then loosened by means of fork hoes, and the ridge left in the centre levelled down by means of the Planet Junior, with which implement all the subsequent cultivation was done. Owing to the dry weather prevailing, manure was not applied at this stage, as is our usual custom, but was withheld pending a shower of rain. Unfortunately, this shower never arrived until late in December. Taking into consideration the usual wet season in January and February, and the fact that such might interfere with a second application, it was considered advisable to make the application of manure in one lot, and not in two as in the plant crop.

The dressing allowed was only at the rate of 2 cwt. per acre, which was 1 cwt. less of each fertiliser than was applied to the plant crop.*

As mentioned in last year's report, the experiment consists of two areas, divided into five plats each, and planted with the varieties of cane known as New Guinea 24A and New Guinea 40. These plats received identical treatment, and were manured as follows:—

Plat 1 in each series received 2 cwt. per acre, nitrate of soda.

Plat 2, 2 cwt. sulphate of ammonia.

Plat 3, 2 cwt. sulphate of potash.

Plat 4, 2 cwt. mixed fertiliser, containing sulphate of ammonia, sulphate of potash, and superphosphate.

Plat 5, no manure.

The manure in all cases was applied by hand at the foot of the stools, and then lightly covered with a scuffler.

The usual preliminary analyses were carried out in June, July, and August, the sample consisting of one representative stool.

The final and fibre analyses were carried out in September, the sample consisting of all canes growing on 40 running feet.

The following tables gives the details of analyses:—

FIRST PRELIMINARY EXAMINATION OF CANES IN THE MANURIAL EXPERIMENTS, FIRST RATOON CROP—JUNE, 1912.

Variety of Cane.	Manure.	Quantity of Manure per Acre.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
<i>First Series.</i>								
New Guinea 24A ...	Nitrate of Soda ...	2 cwt.	6-6-12	9 mo's	16.1	11.73	2.68	72.8
Do. ...	Sulphate of Ammonia ...	do.	6-6-12	do.	16.0	11.48	2.68	71.7
Do. ...	Sulphate of Potash ...	do.	6-6-12	do.	16.6	13.02	1.90	78.4
Do. ...	Mixed Fertiliser ...	do.	6-6-12	do.	16.4	12.45	2.45	75.9
Do. ...	No Manure ...	Nil	6-6-12	do.	16.3	12.51	2.26	76.7
<i>Second Series.</i>								
New Guinea 40 ...	Nitrate of Soda ...	2 cwt.	6-6-12	9 mo's	15.0	10.75	2.56	71.6
Do. ...	Sulphate of Ammonia ...	do.	6-6-12	do.	14.3	9.96	2.56	69.6
Do. ...	Sulphate of Potash ...	do.	6-6-12	do.	14.2	10.20	2.40	71.8
Do. ...	Mixed Fertiliser ...	do.	6-6-12	do.	13.6	8.85	3.02	65.07
Do. ...	No Manure ...	Nil	6-6-12	do.	14.4	10.85	2.14	75.3

* Dressings of fertiliser as light as this, however, are not to be recommended for general use.—[General Superintendent.]

SECOND PROGRESSIVE ANALYSIS OF CANES IN THE MANURIAL EXPERIMENTS, FIRST RATOON CROP—
JULY, 1912.

Variety of Cane.	Manure Applied.	Quantity of Manure per Acre.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
<i>First Series.</i>								
New Guinea 24A ...	Nitrate of Soda ...	2 cwt.	2-7-12	10 mo's	16.6	13.82	1.49	83.2
Do. ...	Sulphate of Ammonia ...	do.	2-7-12	do.	17.2	14.97	1.24	87.03
Do. ...	Sulphate of Potash ...	do.	2-7-12	do.	17.4	15.40	1.12	89.02
Do. ...	Mixed Fertiliser ...	do.	2-7-12	do.	17.6	15.75	1.11	89.4
Do. ...	No Manure ...	Nil	2-7-12	do.	17.3	14.97	1.28	86.5
<i>Second Series.</i>								
New Guinea 40 ...	Nitrate of Soda ...	2 cwt.	3-7-12	10 mo's	12.5	8.90	2.26	71.2
Do. ...	Sulphate of Ammonia ...	do.	3-7-12	do.	13.4	10.08	2.07	75.2
Do. ...	Sulphate of Potash ...	do.	3-7-12	do.	13.7	10.76	1.68	78.5
Do. ...	Mixed Fertiliser ...	do.	3-7-12	do.	14.0	10.52	1.81	75.1
Do. ...	No Manure ...	Nil	3-7-12	do.	14.8	12.80	1.31	86.4

THIRD PROGRESSIVE ANALYSIS OF CANES IN MANURIAL EXPERIMENTS, FIRST RATOON CROP—AUGUST 1912.

Variety of Cane.	Manure Applied.	Quantity of Manure per Acre.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
<i>First Series.</i>								
New Guinea 24A ...	Nitrate of Soda ...	2 cwt.	6-8-12	11 mo's	18.3	16.83	.47	91.9
Do. ...	Sulphate of Ammonia ...	do.	6-8-12	do.	18.9	17.14	.60	90.6
Do. ...	Sulphate of Potash ...	do.	7-8-12	do.	18.1	16.52	.67	91.2
Do. ...	Mixed Fertiliser ...	do.	7-8-12	do.	18.5	17.04	.53	92.1
Do. ...	No manure ...	Nil	7-8-12	do.	18.4	17.09	.50	92.8
<i>Second Series.</i>								
New Guinea 40 ...	Nitrate of Soda ...	2 cwt.	7-8-12	11 mo's	15.2	12.78	1.08	84.7
Do. ...	Sulphate of Ammonia ...	do.	7-8-12	do.	15.4	13.04	1.14	84.6
Do. ...	Sulphate of Potash ...	do.	7-8-12	do.	17.2	15.72	.69	91.3
Do. ...	Mixed Fertiliser ...	do.	7-8-12	do.	15.4	13.45	.88	87.3
Do. ...	No Manure ...	Nil	7-8-12	do.	16.3	14.66	.72	89.9

FINAL ANALYSIS OF CANES IN THE MANURIAL EXPERIMENTS, FIRST RATOON CROP.—SEPTEMBER, 1912.

Variety of Cane.	Manure Applied.		Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	Date of Arrowing.
First Series.											
New Guinea 24A	Nitrate of Soda	12-9-12	12 mo's	20.7	19.11	.68	92.31	10.29	17.14	} Did not arrow.
Do.	Sulphate of Ammonia ...	...	12-9-12	do.	20.2	18.50	.60	91.58	9.65	16.71
Do.	Sulphate of Potash ...	...	12-9-12	do.	20.5	19.44	.50	94.82	10.74	17.35
Do.	Mixed Fertiliser ...	...	12-9-12	do.	20.9	19.37	.48	92.67	11.02	17.33
Do.	No Manure ...	...	12-9-12	do.	21.2	19.90	.36	93.86	11.18	17.67
Second Series.											
New Guinea 40	Nitrate of Soda	13-9-12	12 mo's	17.9	15.18	1.31	84.80	12.21	13.32	} Did not arrow.
Do.	Sulphate of Ammonia ...	...	13-9-12	do.	16.8	13.83	1.45	82.32	12.48	12.10
Do.	Sulphate of Potash ...	...	13-9-12	do.	17.5	15.59	.75	89.08	12.18	13.69
Do.	Mixed Fertiliser ...	...	13-9-12	do.	17.2	14.49	1.25	84.24	10.87	12.91
Do.	No Manure ...	...	13-9-12	do.	18.3	16.71	.61	91.31	12.31	14.65

Immediately following the final analyses in September the cane was cut and carted to the Racecourse Mill. From the mill weights the following tables of crop results have been compiled:—

CROP RESULTS: MANURIAL EXPERIMENTS—FIRST RATOON CROP, 1912.

Variety of Cane.	Manure Applied.	Age of Cane.	No. of Canes per Acre.	Average Weight of Sticks in Pounds.	Weight of Cane per Acre in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
<i>First Series.</i>							
New Guinea 24A ...	Nitrate of Soda ...	12 months	28,096	2·3	29·1	11,191	4·9
Do. 24A ...	Sulphate of Ammonia ...	do.	25,047	2·6	29·6	11,059	4·9
Do. 24A ...	Sulphate of Potash ...	do.	25,047	2·4	26·9	10,489	4·6
Do. 24A ...	*Mixed Fertiliser ...	do.	24,829	2·7	30·7	11,858	5·2
Do. 24A ...	No manure ...	do.	29,838	1·8	23·9	9,493	4·2
<i>Second Series.</i>							
New Guinea 40 ...	Nitrate of Soda ...	12 months	34,848	1·6	26·2	7,834	3·4
Do. 40 ...	Sulphate of Ammonia ...	do.	36,808	1·7	28·7	7,781	3·4
Do. 40 ...	Sulphate of Potash ...	do.	40,075	1·3	24·9	7,646	3·4
Do. 40 ...	Mixed Fertiliser ...	do.	31,363	2·1	30·7	8,888	3·9
Do. 40 ...	No manure ...	do.	34,630	1·2	18·6	6,113	2·7

* This mixed fertiliser consisted of sulphate of ammonia, sulphate of potash, and superphosphate.

FINANCIAL RESULTS: MANURIAL EXPERIMENTS—FIRST RATOON CROP, 1912.

No. of Plat.	Manure.	Variety of Cane.	Age of Cane.	Total Cost of Manure per Acre.	Net Value of Increased Yield of Cane per Acre.	Profit per Acre Calculated to Equal Manure Values Applied.
<i>First Series.</i>						
1	Nitrate of Soda ...	New Guinea 24A	12 months	£ s. d. 1 19 6	£ s. d. 4 3 2	£ s. d. 2 3 8
2	Sulphate of Ammonia ...	" 24A	"	2 4 0	4 11 2	2 2 3
3	Sulphate of Potash ...	" 24A	"	1 19 6	2 8 0	0 8 6
4	Mixed Fertiliser ...	" 24A	"	1 13 0	5 8 9	4 10 8
5	No Manure ...	" 24A	"	...	...	...
<i>Second Series.</i>						
1	Nitrate of Soda ...	New Guinea 40	12 months	£ s. d. 1 19 6	£ s. d. 6 1 7	£ s. d. 4 2 1
2	Sulphate of Ammonia ...	" 40	"	2 4 0	8 1 7	5 5 6
3	Sulphate of Potash ...	" 40	"	1 19 6	5 0 9	3 1 3
4	Mixed Fertiliser ...	" 40	"	1 13 0	9 13 7	9 12 2
5	No Manure ...	" 40	"	...	...	...

TOTAL CROP RESULTS TO DATE: MANURIAL EXPERIMENTS—PLANT AND FIRST RATOON CROPS (1911-1912).

Variety of Cane.	Manure Applied.	Number of Plat.	PLANT CROP, 1911.		FIRST RATOON CROP, 1912.		TOTAL YIELD TWO CROPS.			
			Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.		
<i>First Series.</i>										
New Guinea 24A ...	Nitrate of Soda ...	...	1	57·3	9·9	29·1	4·9	86·4	14·8
„ 24A ...	Sulphate of Ammonia ...	...	2	54·6	9·0	29·6	4·9	84·2	13·9
„ 24A ...	Sulphate of Potash ...	...	3	52·4	9·6	26·9	4·6	79·3	14·2
„ 24A ...	Mixed Fertiliser ...	...	4	51·1	8·2	30·7	5·2	81·8	13·4
„ 24A ...	No Manure ...	...	5	47·0	8·2	23·9	4·2	70·9	12·4
<i>Second Series.</i>										
New Guinea 40 ...	Nitrate of Soda ...	...	1	49·1	7·4	26·2	3·4	75·3	10·8
„ 40 ...	Sulphate of Ammonia ...	...	2	48·0	7·1	28·7	3·4	76·7	10·5
„ 40 ...	Sulphate of Potash ...	...	3	47·4	6·8	24·9	3·4	72·3	10·2
„ 40 ...	Mixed Fertiliser ...	...	4	47·4	7·3	30·7	3·9	78·1	11·2
„ 40 ...	No Manure ...	...	5	42·0	6·5	18·6	2·7	60·6	9·2

FINANCIAL RESULTS TO DATE: MANURAL EXPERIMENTS—PLANT AND FIRST RATOON CROPS (1911-1912).

Number of Plat.	Variety	Cane.	Manure Applied.	PLANT CROP, 1911.			FIRST RATOON CROP, 1912.			TOTAL RESULTS FOR THE TWO CROPS.		
				Total Cost of Manure per Acre.	Net Value of Increased Yield of Cane per Acre.	Profit per Acre calculated to equal Manure Values Applied.	Total Cost of Manure per Acre.	Net Value of Increased Yield of Cane per Acre.	Profit per Acre calculated to equal Manure Values Applied.	Total Cost of Manure per Acre.	Net Value of Increased Yield of Cane per Acre.	Profit per Acre calculated to equal Manure Values Applied.
				£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
<i>First Series.</i>												
1	New Guinea 24A		Nitrate of Soda ...	3 5 0	8 2 1	4 17 1	1 19 6	4 3 2	2 3 8	5 4 6	12 5 3	7 0 9
2	„	24A	Sulphate of Ammonia	3 10 0	5 19 9	2 6 2	2 4 0	4 11 2	2 2 3	5 14 0	10 10 11	4 8 5
3	„	24A	Sulphate of Potash	3 5 0	4 5 5	1 0 5	1 19 6	2 8 0	0 8 6	5 4 6	6 13 5	1 8 11
4	„	24A	Mixed Fertiliser ...	2 16 6	3 5 3	0 10 0	1 13 0	5 8 9	4 10 8	4 9 6	8 14 0	5 0 8
5	„	24A	No Manure.. ...	...	...	...	...	...	...	...	...	...
<i>Second Series.</i>												
1	New Guinea 40		Nitrate of Soda ...	3 5 0	5 12 3	2 7 3	1 19 6	6 1 7	4 2 1	5 4 6	11 13 10	6 9 4
2	„	40	Sulphate of Ammonia	3 10 0	4 14 6	1 2 9	2 4 0	8 1 7	5 5 6	5 14 0	12 16 1	6 8 3
3	„	40	Sulphate of Potash	3 5 0	4 5 5	1 0 5	1 19 6	5 0 9	3 1 3	5 4 6	9 6 2	4 1 8
4	„	40	Mixed Fertiliser ...	2 16 6	4 5 5	1 13 8	1 13 0	9 13 7	9 12 2	4 9 6	13 19 0	11 5 10
5	„	40	No Manure... ...	...	...	...	...	...	...	...	...	...

The interpretation of results of experiments such as the above requires the greatest care, and, as pointed out in Bulletin 29 of the Hawaiian Experiment Station, erroneous conclusions may be drawn unless such experiments are carried on for a number of years or are compared with a similar series of plats that are not fertilised, but which are upon uniform land next to the experiment in question. No conclusions, will, therefore, be drawn until this experiment has passed through another crop.

RATOON EXPERIMENTS.

It will be remembered that a series of plats were laid out to determine the best method of ratooning cane. The plant crop of these experiments came on remarkably well, and details of the analyses and weight per acre were given in last year's report. It was then hoped that the ratoons from this plant crop would furnish the cane for the experiments, which were in duplicate, and were to be carried out as follows:—

Plat 1.—Trash to be left on ground and cane allowed to volunteer.

Plat 2.—Trash to be burnt. The middles to be opened with the swing plough, followed by the subsoiler to a depth of from 16 to 18 in. The land next to the rows will then be turned over with the swing plough on to the middles and the subsoiler will again follow. This ensures all the rows being deeply ploughed and moved, and is the method of cultivating ratoons practised at the Experiment Station with excellent results.

Plat 3.—Trash to be buried between the rows.

Plat 4.—Trash to be put in every other space between the rows, the cleared spaces being cultivated with the plough. This is generally known as "relieving."

Unfortunately, however, climatic conditions interfered to such a considerable extent that it was considered wiser to plough out the cane and commence again, using somewhat larger plats for the experiment, and selecting the one variety for the duplicates—viz., N.G. 40—instead of N.G. 15 and 24B, as previously. This puts the test back, and the results, of course, cannot be available now till 1914.

EXPERIMENTS WITH MISCELLANEOUS CANES.

During the year 1909 the following varieties of cane were introduced:—Hambleton 426 and 452, Mauritius 1900 Seedling, Couve, and Mauritius 189, Barbadoes 208 being reintroduced. These canes, with the exception of Hambleton 452 (which died out), were carefully propagated, and by March of last year had furnished sufficient seed to enable us to enter them into further experiment. Two sport canes—viz., New Guinea 40 and 64—have also been added.

As a check, a plot was planted with Demerara 1135. These canes received identical treatment with regard to cultivation and manuring, in order to arrive at their relative commercial values.

The piece of land chosen for this experiment was of a particularly heavy nature, and previously grew canes for distribution purposes. It received the following preparation:—The trash from the previous crop was burnt, and the stools were ploughed out, carted off, and destroyed (this latter operation being rendered necessary on account of some of the stools being diseased). The land was then ploughed, harrowed, run down fine with the roller and scrubber, and a dressing of two tons per acre of lime added to loosen the soil and make it more friable. It was then cross-ploughed and harrowed down.

Following a shower of rain early in October the surface was well pulverised with the disc harrow, and a mixture of Red Mauritius bean and Iron Age and Giant cowpeas was sown. Towards the end of January a fair crop of green manure was ploughed under and allowed to rot. The land was then ploughed and subsoiled to a depth of 20 in. Towards the end of March a disc ploughing was given, the plot divided out, and then planted with the varieties mentioned.

Owing to the prevailing climatic conditions the whole of the above canes had an extremely trying time. Within a week of planting heavy rains set in, which, by setting the ground, seriously retarded germination, all of the canes with the exception of Hambleton 426 and New Guinea 40 Sport being affected more or less in coming away. The rain was followed by early frosts, which again caused a further check. The almost total lack of rainfall up to the following December again had a serious effect on their growth.

The following is a short description of the canes:—

Hambleton 426.—A thick brown to light red coloured cane, short jointed, and somewhat similar to Goru, habit semi-erect, good stooler and germinator, good drought-resisting qualities.

Demerara 1135.—Brown to red coloured cane of medium stoutness and particularly erect habit, stools and trashes well, joints about 4 in. long, parallel sided, foliage sparse and erect.

1900 Seedling.—A stout, blue to black coloured cane, with medium to long joints, erect habit, fair stooler and germinator; stood dry weather badly but made marvellous growth since rain. Possesses a decided peculiarity in regard to foliage, which is broad and drooping and in most cases variegated, also has the short joint peculiar to seedling canes to a marked extent.

Barbadoes 208.—Green-coloured, stout cane, heavily waxed, shows in places a reddish blush, joints 3 to 5 in. in length, barrel-shaped near top, and having a peculiar hump opposite eyes on lower half of cane, habit erect, stools and trashes well, foliage broad and erect. Subject to disease.

Mauritius 189.—An erect, blue to black coloured cane of fair thickness, stools and trashes well, joints from 4 in. to 5 in. long, parallel-sided, and occasionally zig-zag. Did not stand dry weather well.

Couve.—Stout, blue-coloured cane, covered with white wax, joints 4 in. to 6 in. long, slightly barrel-shaped, lodging habit, stools fairly, trashes well. Subject to disease.

N.G. 64 Sport.—Green to light yellow coloured cane, with a purple to red blush and longitudinal skin cracks, of fair thickness, joints 4 in. to 5 in. long and barrel-shaped, lodging habits, stooling power fair, trashes easily, stood drought indifferently.

N.G. 40 Sport.—A green-coloured cane of medium thickness, with a red to brown blush, joints from 3 in. to 4 in. long and barrel-shaped, erect habit, good stooler and trasher.

The usual preliminary analyses were carried out in June, July, and August, and the final analyses in September, the results being shown in the following tables:—

FIRST PRELIMINARY ANALYSIS OF MISCELLANEOUS CANES—PLANT CROP, JUNE, 1912.

Country.	Variety of Cane.	Date Analysis.	Age of Cane.	Density of Juice (Brix).	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Hambleton, Queensland	H.Q. 426	3-6-12	15 months	17.1	13.98	2.06	81.7
Demerara...	D. 1135	3-6-12	do.	14.0	10.06	2.26	71.8
Queensland	1900 Seedling	4-6-12	do.	14.4	9.56	3.68	66.3
Barbadoes	B. 208	4-6-12	do.	14.1	10.28	3.18	72.9
Mauritius	M. 189	4-6-12	do.	15.2	11.13	2.56	73.2
Mauritius	Couvé	4-6-12	do.	12.7	7.36	3.68	57.9
Queensland	N.G. 64 Sport	4-6-12	do.	12.1	6.82	3.68	56.3
Queensland	N.G. 40 Sport	4-6-12	do.	12.4	7.10	3.80	57.2

SECOND PROGRESSIVE ANALYSIS OF MISCELLANEOUS CANES—PLANT CROP, JULY, 1912.

Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Hambledon, Queensland	H.Q. 426	1-7-12	16 months	20·6	19·28	·40	93·5
Demerara...	D. 1135	1-7-12	do.	13·6	10·65	1·78	78·3
Queensland	1900 Seedling	1-7-12	do.	16·8	14·38	1·55	85·5
Barbadoes	B. 208	1-7-12	do.	14·3	11·50	1·90	80·4
Mauritius	M. 189	1-7-12	do.	15·7	12·74	1·73	81·1
Mauritius	Couvé	1-7-12	do.	13·1	8·18	2·95	62·4
Queensland	N.G. 64 Sport	1-7-12	do.	13·1	9·01	2·68	68·7
Queensland	N.G. 40 Sport	1-7-12	do.	12·1	7·80	2·74	64·4

THIRD PROGRESSIVE ANALYSIS OF MISCELLANEOUS CANES—PLANT CROP, AUGUST, 1912.

Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Hambledon, Queensland	H.Q. 426	5-8-12	17 months	19·4	17·90	·52	92·2
Demerara	D. 1135	5-8-12	do.	17·2	15·40	·68	89·5
Queensland	1900 Seedling	5-8-12	do.	15·9	13·42	1·05	84·4
Barbadoes	B. 208	5-8-12	do.	17·2	15·59	·59	90·6
Mauritius	M. 189	5-8-12	do.	19·3	17·79	·58	92·2
Mauritius	Couvé	5-8-12	do.	13·4	9·27	1·77	61·7
Queensland	N.G. 64 Sport	5-8-12	do.	12·9	8·85	2·16	68·6
Queensland	N.G. 40 Sport	5-8-12	do.	13·4	8·94	2·11	66·7

FINAL ANALYSIS OF MISCELLANEOUS CANES—PLANT CROP, SEPTEMBER, 1912.

No. of Plat.	Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	Date of Arrowing
1	Hambledon, Q.	H. Q. 426	9-9-12	18 months	21·3	19·73	·34	92·62	9·63	17·83	Sept. 1
2	Demerara	D. 1135	9-9-12	do.	17·3	14·54	1·08	84·04	11·01	12·93	
3	Queensland	1900 Seedling	9-9-12	do.	19·3	17·56	·85	90·98	10·81	15·77	
4	Barbadoes	B. 208	9-9-12	do.	19·2	17·72	·72	92·29	10·57	15·84	
5	Mauritius	M. 189	9-9-12	do.	19·5	17·68	·78	90·66	10·47	15·82	Aug. 1
6	Mauritius	Couvé	9-9-12	do.	15·6	11·99	1·71	76·85	9·03	10·90	Aug. 1
7	Queensland	N.G. 64 Sport	9-9-12	do.	17·0	13·83	1·59	81·47	8·54	12·66	
8	Queensland	N.G. 40 Sport	9-9-12	do.	17·7	15·61	·96	88·19	8·99	14·20	

Immediately after the final analyses the whole of the above canes were cut and sent to the Race-course Mill. From the mill weights the following tables of crop results have been compiled:—

CROP RESULTS OF THE MISCELLANEOUS CANES—PLANT CROP, 1912.

Number of Plat.	Country.	Variety of Cane.	Age of Cane.	Number of Canes per Acre.	Average Weight of the Sticks in Pounds.	Weight of Cane per Acre in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
1	Queensland ...	Hambledon Seedling 426 ...	18 months	22,651	2.2	23.1	9,242	4.1
2	Demerara ...	Demerara Seedling 1135 ...	do.	28,531	2.6	33.3	9,659	4.3
3	Mauritius ...	Seedling 1900 ...	do.	17,206	3.5	27.4	9,685	4.3
4	Barbadoes ...	Seedling 208 ...	do.	23,958	2.8	29.9	10,625	4.7
5	Mauritius ...	Seedling 189 ...	do.	27,007	2.3	27.9	9,888	4.4
6	Mauritius ...	Couvé ...	do.	21,997	3.6	35.9	8,783	3.9
7	New Guinea ...	Sport from No. 64 ...	do.	26,353	3.4	40.8	11,580	5.1
8	New Guinea ...	Sport from No. 40 ...	do.	28,967	2.8	36.4	11,597	5.1

EXPERIMENTS WITH MAURITIUS SEEDLINGS.

As mentioned in the Report for 1910, the following canes were received from Mauritius:—55, 87, 89, 779, 998, 1002, 1201, 1237, and 1474. Of these, Nos. 1201 and 1237 failed to germinate after the long sea voyage. The remainder made good growth and were planted out in 1910 in order to gain enough seed to experiment with. This planting was most successful, the canes coming away well, and presenting a most promising appearance. In August of last year all these canes were planted out in competition, on a piece of land, which received the following treatment:—

The land, having been under cane for five successive seasons, was broken up and allowed to rest for a few months. It was then deeply ploughed with a swing plough, harrowed down, and in October, 1910, planted with small red Mauritius bean. A fine crop of green manure was ploughed under in the end of February. The land received in June a ploughing with the disc implement and was again allowed to lie fallow. In the middle of July the plot received deep ploughing, followed by the subsoiler to a depth of 20 in. This was followed a week later by a disc ploughing. It was then laid out into plats and planted with the varieties before mentioned, a short description of which follows:—

M 55.—A stout blue-coloured cane of good length, and covered with white wax, good stooler and germinator, erect habit, arrows slightly, joints 4 to 5 in. long, parallel-sided, eyes small and round.

M 87.—A stout light red to reddish blue coloured cane of good length, lightly waxed, good stooler and germinator, erect habit, partially arrowed, joints 4 to 6 in. long, slightly barrel-shaped, eyes large and pointed.

M 89.—A stout light red coloured cane with heavy white wax, of good length, good stooler and germinator, erect habit, partly arrows, joints 4 to 6 in., parallel-sided and occasionally zig-zag, eyes medium and from round to slightly acute.

M 779.—Stout green-coloured cane with roseate blush and white wax, of good length, good stooler and germinator, and erect habit, joints 4 to 5 in., slightly barrel-shaped, eyes small and round.

M 998.—A dark red coloured cane of medium stoutness and good length, good stooler and germinator, erect habit, arrows slightly, joints 4 to 5 in., bulging at eyes, eyes medium and slightly acute.

M 1002.—A rosy coloured thin cane covered with white wax, fair stooler and germinator, possesses a peculiar foliage, very sparse, and having an elliptical shaped leaf sheath, joints 3 to 4 in. long, eyes medium and slightly acute, has not arrowed.

M 1474.—A stout green-coloured cane of medium length, possesses a red blush and is heavily waxed, good stooler and germinator, and very erect habit, has not arrowed, joints 3 to 4 in. long, slightly barrel-shaped, eyes small and round.

During the early part of their growth these canes all suffered more or less from the drought conditions then prevailing. They, however, held their own well, and when rain did fall came away with astonishing rapidity, and, especially in the case of Nos. 55, 87, 89, 779, 998 and 1474, a very satisfactory crop resulted. The canes are all of an erect habit and are of very promising appearance. Unfortunately, as seen from the tables following, Nos. 55, 87, 89 have arrowed very early. This, however, may to a certain extent be put down to the dry conditions prevailing during growth, and perhaps to the fact that these canes, with the exception of 87, possess small to medium eyes, leading one to the conclusion that arrowing will not prove such a serious fault as in the case of a cane with large prominent eyes, as the small to medium eyes are less prone to throw out shoots, thus tending to a loss in weight.

The usual preliminary and progressive analyses have been carried out as in other experiments, the results being given in the following tables. The sugar percentages are not particularly high, but it is hoped they will improve.

FIRST PRELIMINARY EXAMINATION OF MAURITIUS SEEDLINGS—PLANT CROP, JUNE, 1912.

Country.				Variety of Cane.				Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Mauritius	...	...	...	M.	55	...	...	5-6-12	10 months	12.2	6.46	4.06	52.9
Do.	...	...	...	M.	87	...	...	5-6-12	do.	13.7	9.01	3.10	65.7
Do.	...	...	...	M.	89	...	...	5-6-12	do.	11.2	5.58	4.54	49.8
Do.	...	...	...	M.	779	...	...	5-6-12	do.	12.0	6.06	3.93	50.5
Do.	...	...	...	M.	998	...	...	5-6-12	do.	12.2	7.71	3.02	63.1
Do.	...	...	...	M.	1002	...	...	5-6-12	do.	13.1	8.18	3.18	62.4
Do.	...	...	...	M.	1474	...	...	5-6-12	do.	11.1	4.87	4.72	43.8

SECOND PROGRESSIVE ANALYSIS OF MAURITIUS CANES—PLANT CROP, JULY, 1912.

Country.				Variety of Cane.				Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Mauritius	...	...	...	M.	55	...	...	2-7-12	11 months	15.2	11.05	2.74	72.6
Do.	...	...	...	M.	87	...	...	2-7-12	do.	14.4	10.45	2.74	72.5
Do.	...	...	...	M.	89	...	...	2-7-12	do.	14.0	10.55	2.51	75.3
Do.	...	...	...	M.	779	...	...	2-7-12	do.	13.7	9.33	2.80	68.1
Do.	...	...	...	M.	998	...	...	2-7-12	do.	12.3	8.55	2.51	69.5
Do.	...	...	...	M.	1002	...	...	2-7-12	do.	14.5	11.55	1.71	79.6
Do.	...	...	...	M.	1474	...	...	2-7-12	do.	12.7	8.82	2.51	69.4

THIRD PROGRESSIVE ANALYSIS OF MAURITIUS SEEDLINGS—PLANT CROP, AUGUST, 1912.

Country.				Variety of Cane.				Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Mauritius	...	...	...	M.	55	...	...	5-8-12	12 months	14.4	10.69	2.21	74.2
Do.	...	...	...	M.	87	...	...	5-8-12	do.	16.9	13.95	1.57	82.5
Do.	...	...	...	M.	89	...	...	6-8-12	do.	13.6	8.94	2.26	65.7
Do.	...	...	...	M.	779	...	...	6-8-12	do.	15.0	11.37	1.87	75.8
Do.	...	...	...	M.	998	...	...	6-8-12	do.	14.1	10.95	1.83	77.6
Do.	...	...	...	M.	1002	...	...	6-8-12	do.	17.9	16.06	.76	89.1
Do.	...	...	...	M.	1474	...	...	6-8-12	do.	14.8	11.26	1.68	76.98

The final analyses were carried out in the usual manner, the cane growing upon 40 running feet of ground being all taken for the sample so as to ensure its correctness. The results appear hereunder:—

FINAL ANALYSIS OF MAURITIUS SEEDLINGS—PLANT CROP, SEPTEMBER, 1912.

No. of Plat.	Country.	Variety of Cane.				Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.	% Fibre in Cane.	% Sucrose in Cane.	Date of Harvesting.
1	Mauritius	M.	55	...	...	12-9-12	13 mo's	18.4	15.81	1.35	85.92	9.09	14.37	10 June
2	Do.	M.	87	...	...	12-9-12	do.	17.6	14.97	1.25	85.95	9.66	13.51	1 June
3	Do.	M.	89	...	...	12-9-12	do.	17.2	13.29	2.15	77.25	8.86	12.41	16 June
4	Do.	M.	779	...	...	12-9-12	do.	17.5	12.89	1.47	73.65	9.43	11.64	
5	Do.	M.	998	...	...	12-9-12	do.	16.4	13.53	1.35	82.50	11.60	11.95	
6	Do.	M.	1002	...	...	12-2-12	do.	19.5	17.46	.68	92.20	11.24	15.45	
7	Do.	M.	1474	...	...	12-9-12	do.	17.6	15.25	1.20	86.70	8.81	13.91	

The whole of the plats were then harvested and carted to the Racecourse Mill. The mill weights, checked by weighing over the station weighbridge, have provided the data for the following table of crop results:—

CROP RESULTS OF THE MAURITIUS SEEDLINGS—PLANT CROP, 1912.

Number of Plat.	Name or Number of Variety.	Age of Cane.	Number of Canes per Acre.	Average Weight of the Sticks in Pounds.	Weight of Canes per Acre in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
1	Mauritius Seedling 55	12 months	22,433	4.3	43.9	14,146	6.3
2	Do. 87	do.	24,175	5.0	54.1	16,389	7.3
3	Do. 89	do.	21,562	4.1	39.8	10,813	4.8
4	Do. 779	do.	21,997	3.2	32.2	8,416	3.7
5	Do. 998	do.	26,571	2.8	33.7	9,038	4.0
6	Do. 1002	do.	21,780	2.8	27.2	9,726	4.3
7	Do. 1474	do.	20,255	3.1	28.3	8,846	3.9

EXPERIMENT WITH SEEDLING CANES FROM ACCLIMATISATION SOCIETY, BRISBANE.

In previous Annual Reports it has been mentioned that the Queensland Acclimatisation Society had presented a large number of their seedling canes to the Department of Agriculture. The following canes were forwarded to this Station in July, 1910, and were immediately planted out, namely:—

Country.	Name or Number.	Country.	Name or Number.	Country.	Name or Number.
Queensland	.. 1046	Queensland	.. 1071	Demerara	.. 145
"	.. 1049	"	.. 1078	"	.. 306
"	.. 1070	"	.. 1084	Barbadoes	.. 3747
"	.. 1074	"	.. 1092	"	.. 3412
"	.. 1079	"	.. 1098	"	.. 6450
"	.. 1086	"	.. 1103	Queensland	.. Badila Seedling
"	.. 1095	"	.. 1121	"	.. 155
"	.. 1102	"	.. 1113	"	.. Hybrid No. 1
"	.. 1133	"	.. 1110	"	.. 554
"	.. 1115	"	.. 865	"	.. 430
"	.. 1112	"	.. 881	"	.. 452
"	.. 1108	"	.. 886	"	.. 365
"	.. 866	"	.. 889	"	.. 285
"	.. 884	"	.. 899	"	.. 6
"	.. 887	"	.. 903	"	.. 64
"	.. 891	"	.. 979	"	.. 65
"	.. 900	"	.. 976	"	.. 286
"	.. 918	"	.. 970	"	.. 307
"	.. 977	"	.. 1023	"	.. 102
"	.. 1035	"	.. 1019	"	.. 126
"	.. 1025	"	.. 1009	"	.. 153
"	.. 962	"	.. 1001	"	.. 25
"	.. 1013	"	.. 997	"	.. 116
"	.. 1004	"	.. 992	"	.. 112
"	.. 999	"	.. 987	Barbadoes	.. 176
"	.. 995	"	.. 811	Demerara	.. 115
"	.. 928	"	.. 813	"	.. 1135
"	.. 803	"	.. 820	"	.. 1483
"	.. 812	"	.. 830	Barbadoes	.. 1529
"	.. 815	"	.. 849	Queensland	.. N.G. 24B Seedling
"	.. 822	"	.. 853	Barbadoes	.. 3922
"	.. 840	"	.. 794	Queensland	.. 162
"	.. 854	"	.. 792	"	.. 137
"	.. 795	"	.. 779	"	.. 558
"	.. 793	"	.. 768	"	.. 437
"	.. 787	"	.. 764	"	.. 363
"	.. 777	"	.. 750	"	.. 422
"	.. 767	"	.. 747	"	.. 328
"	.. 763	"	.. 682	"	.. 174
"	.. 748	"	.. 694	"	.. 59
"	.. 745	"	.. 698	"	.. 30
"	.. 684	"	.. 717	"	.. 58
"	.. 695	"	.. 721	"	.. 303
"	.. 704	"	.. 795	"	.. 80
"	.. 719	"	.. 121	"	.. 103
"	.. 794	"	.. 115	"	.. 135
"	.. 1048	Barbadoes	.. 147	"	.. 8
"	.. 1052	"	.. 224	"	.. 45

The above canes when planted were not of a very high class as plants, being all somewhat stunted in appearance. Good weather, however, set in immediately, and out of the total, 103 germinated and made satisfactory growth, namely:—

Country.	Name or Number.	Country.	Name or Number.	Country.	Name or Number.
Queensland	.. 1048	Queensland	.. 884	Queensland	.. 558
"	.. 1052	"	.. 889	"	.. 437
"	.. 1074	"	.. 899	"	.. 365
"	.. 1079	"	.. 903	"	.. 174
"	.. 1092	"	.. 979	"	.. 59
"	.. 1098	"	.. 1035	"	.. 286
"	.. 1103	"	.. 1025	"	.. 307
"	.. 1121	"	.. 962	"	.. 135
"	.. 1113	"	.. 1013	"	.. 840
"	.. 1110	"	.. 1004	"	.. 855
"	.. 881	"	.. 999	"	.. 792
"	.. 887	"	.. 995	"	.. 768
"	.. 891	"	.. 928	"	.. 763
"	.. 900	"	.. 812	"	.. 748
"	.. 918	"	.. 820	"	.. 745
"	.. 977	"	.. 822	"	.. 694
"	.. 970	"	.. 849	"	.. 698
"	.. 1023	"	.. 795	"	.. 721
"	.. 1019	"	.. 779	"	.. 121
"	.. 1009	"	.. 767	"	.. 115
"	.. 1001	"	.. 750	Barbadoes	.. 147
"	.. 997	"	.. 747	Demerara	.. 115
"	.. 992	"	.. 684	"	.. 1135
"	.. 987	"	.. 695	"	.. 1483
"	.. 813	"	.. 719	Barbadoes	.. 3412
"	.. 1049	"	.. 795	Queensland	.. Badila Seedling
"	.. 1071	"	.. 116	"	.. Hybrid No. 1
"	.. 1078	"	.. 112	"	.. 554
"	.. 1086	Barbadoes	.. 224	"	.. 452
"	.. 1095	Demerara	.. 145	"	.. 328
"	.. 1102	"	.. 306	"	.. 6
"	.. 1133	Barbadoes	.. 3747	"	.. 58
"	.. 1115	"	.. 3922	"	.. 303
"	.. 1112	Queensland	.. 137	"	.. 102
"	.. 1108				

In April of 1911 the whole of the above canes were planted out to provide seed for further experiments. Unfortunately very adverse weather conditions set in. Within three weeks of planting, cold weather and frosts were experienced, which had the effect of chilling the ground and seriously affecting germination. The canes, however, though checked somewhat, in most cases came through. The dry weather following had its effect in retarding growth, and as a consequence all but the strongest failed to establish themselves sufficiently to provide seed.

Early in August of this year a careful selection of the most promising of these seedlings was made, and the following varieties were planted out in competition:—

Country.	Name or Number.	Country.	Name or Number.	Country.	Name or Number.
Queensland	.. 58	Barbadoes	.. 3412	Queensland	.. 795
"	.. 135	"	.. 3747	"	.. 855
"	.. 286	Queensland	.. 1112	"	.. 1001
"	.. 307	"	.. Hybrid No. 1	"	.. 1098
"	.. 437	"	.. 1049	Demerara	.. 306
"	.. 695	"	.. 59	Barbadoes	.. 3922
"	.. 813	"	.. 137	Queensland	.. 1133
"	.. 970	"	.. 303	"	.. Badila Seedling
"	.. 1092	"	.. 365	"	.. 963
"	.. 1110	"	.. 694	"	.. 1121

The land selected for the above experiment was the plot on which the experiments with nitro-bacterine culture had been previously carried out, but care has been taken to plant the cane in the opposite direction to those experiments, so as to secure uniformity. The beans having been ploughed under, the land has since lain in bare fallow, with an occasional light ploughing to prevent fouling with weeds. The extra work given before planting consisted of a deep swing ploughing crossways, in July last, followed early in August by a deep swing ploughing lengthways, followed by the subsoiler to depth of eighteen inches. The land was then laid out into plats of two 5-ft. drills each, with 7-ft. interspaces between the plats, and planted with the above varieties. The plants used consisted of three-eye plants, spaced 6 in. apart.

Owing to the scarcity of seed beforementioned, the preliminary analytical data with reference to the above canes is in some cases not available. Where samples could be obtained, however, an analysis has been made, the details of which appear in the following tables:—

PRELIMINARY EXAMINATION OF CANES FROM THE QUEENSLAND ACCLIMATISATION SOCIETY—PLANT CROP,
SEPTEMBER, 1912.

Country.	Variety of Cane.						Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Queensland	Q.	58	...	...	...	...	5-9-12	16 months	16.6	13.66	1.30	82.28
Do.	Q.	59	...	...	...	...	5-9-12	do.	18.3	16.65	.51	90.98
Do.	Q.	135	...	...	...	...	5-9-12	do.	16.6	12.18	1.95	73.37
Do.	Q.	137	...	...	...	...	6-9-12	do.	18.0	16.25	.52	90.27
Do.	Q.	286	...	...	...	...	5-9-12	do.	19.3	17.78	.60	92.12
Do.	Q.	303	...	...	...	...	5-9-12	do.	18.4	16.59	.55	90.16
Do.	Q.	307	...	...	...	...	5-9-12	do.	17.6	15.07	.92	85.62
Do.	Q.	365	...	...	...	...	5-9-12	do.	17.0	14.84	.85	87.29
Do.	Q.	437	...	...	...	...	5-9-12	do.	15.0	10.72	2.37	71.45
Do.	Q.	813	...	...	...	...	5-9-12	do.	18.6	16.88	.79	90.75
Do.	Q.	855	...	...	...	...	5-9-12	do.	16.4	13.59	1.26	82.86
Do.	Q.	970	...	...	...	...	5-9-12	do.	19.5	17.66	.76	90.56
Do.	Q.	1092	...	...	...	...	6-9-12	do.	17.0	13.43	1.65	79.29
Do.	Q.	1098	...	...	...	...	6-9-12	do.	20.2	18.39	.94	91.03
Demerara	D.	306	...	...	...	...	6-9-12	do.	18.0	15.53	1.35	86.27
Barbadoes	B.	3412	...	...	...	...	6-9-12	do.	18.0	14.91	1.57	82.83
Do.	B.	3922	...	...	...	...	6-9-12	do.	16.0	14.50	.59	90.62
Do.	B.	3747	...	...	...	...	6-9-12	do.	18.4	15.79	1.20	85.81
Queensland	Q.	Badila Sport	...	...	...	...	6-9-12	do.	19.6	17.63	.62	89.94
Do.	Q.	1049	...	...	...	...	6-9-12	do.	20.7	18.53	.75	89.51
Do.	Q.	1121	...	...	...	...	6-9-12	do.	17.6	14.84	1.20	84.31

After the above canes had been planted out, a second selection from the remaining seedlings was made, and all those canes which, though not providing sufficient seed for experiment, still appeared healthy, and in some cases had provided one or two stools of vigorous cane, were again planted out in a better piece of ground in the expectation that, given more favourable conditions, they might improve and ultimately prove canes of value.

To this end, a piece of land originally under cassava has been brought into cultivation and planted with the following varieties:—

Country.	Name or Number.		Country.	Name or Number.		Country.	Name or Number.	
Queensland	..	1048	Queensland	..	768	Queensland	..	112
"	..	881	"	..	840	"	..	558
"	..	900	"	..	928	"	..	554
"	..	822	"	..	1004	"	..	115
"	..	779	"	..	899	"	..	698
"	..	747	"	..	1115	"	..	745
"	..	767	"	..	1095	"	..	763
"	..	719	Barbadoes	..	224	"	..	792
Demerara	..	145	Queensland	..	887	"	..	812
"	..	1483	"	..	918	"	..	999
"	..	115	"	..	1009	"	..	1013
Barbadoes	..	147	"	..	849	"	..	1025
Queensland	..	721	"	..	750	"	..	889
"	..	748	"	..	684			

The balance of the original varieties, a list of which follows, were not continued. In some cases the canes have died right out, whilst in others they were so affected with disease that they were thrown out as being worthless.

Country.	Name or Number.		Country.	Name or Number.		Country.	Name or Number.	
Queensland	..	1046	Queensland	..	1070	Queensland	..	1023
"	..	1084	"	..	865	"	..	891
"	..	866	"	..	886	"	..	1103
"	..	976	"	..	803	"	..	1074
"	..	811	"	..	815	"	..	1071
"	..	830	"	..	854	"	..	1086
"	..	794	"	..	793	"	..	1108
"	..	787	"	..	777	"	..	979
"	..	764	"	..	682	"	..	962
"	..	704	"	..	717	"	..	820
Barbadoes	..	176	Barbadoes	..	1529	"	..	452
Queensland	..	N.G. 24B Seedling	"	..	6450	"	..	977
"	..	162	Queensland	..	155	"	..	1113
"	..	430	"	..	363	"	..	1079
"	..	422	"	..	285	"	..	1052
"	..	64	"	..	30	"	..	1078
"	..	65	"	..	80	"	..	1102
"	..	103	"	..	126	"	..	884
"	..	153	"	..	8	"	..	1035
"	..	25	"	..	45	"	..	995
"	..	987	"	..	992	"	..	328
"	..	997	"	..	1019			

In addition to the above, Queensland Nos. 116, 121, 102, 6, and 174 were discarded for the reason that they had already been tested at this Station.

EXPERIMENT WITH CANES FROM LOUISIANA AND CANE KNOWN AS CASSILIS.

In March of 1910 two plants each of the following varieties were received from Audubon Park, Louisiana, namely:—D117, D604, La Striped, T211, and La Purple. Owing to the long voyage and the time occupied, the plants had all perished with the exception of the Louisiana Striped and Trinidad 211, and of these one and two eyes respectively were available. These two canes were carefully propagated, and in April, 1911, were cut and planted out in order to provide seed for further experiment. The canes, more especially the Trinidad 211, came along well, and by August of this year had provided an abundance of seed for planting out in competition.

These two canes, to which has been added the Cassilis, a cane spoken of favourably by Mr. Scougall, of Tiaro, and to whom we are indebted for the original plants, have been planted out in competition with the Queensland Seedlings beforementioned, and will be grown under identical conditions.

In the following tables will be found the analytical data of the above canes, of which a preliminary analysis was made early in September:—

PRELIMINARY EXAMINATION OF CANES FROM LOUISIANA AND CANE KNOWN AS "CASSILIS."
PLANT CANE, SEPTEMBER, 1912.

Country.	Variety of Cane.							Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	% Sucrose in Juice.	% Glucose in Juice.	Purity of Juice.
Louisiana ...	T. 211	...	...	...	...	...	...	5-9-12	16 months	16.1	11.30	2.63	70.18
Do. ...	La Striped	...	...	...	...	...	...	5-9-12	do.	18.5	16.83	.67	90.97
Unknown ...	Cassilis	...	...	...	...	...	...	5-9-12	do.	17.6	15.51	.87	88.12

DISTRIBUTION OF CANE VARIETIES.

During the past year a great number of cane varieties have been distributed to the various districts free of charge. The canes for distribution were carefully chosen and well inspected before leaving the Station. Every care is taken in the packing, and they are shipped by the quickest means of transport. Applications for plants were received from almost every district in the State. For the benefit of *bonâ fide* cane-growers it may be here stated that the Station is prepared to make distributions during March and August of each year. Any applications received will be promptly dealt with at those periods.

It is most gratifying to note the keen demand for these new canes displayed by the farmers all through the State. The applications this year have been exceptionally numerous and the amount distributed considerable, all hands having been kept busily employed packing in order to meet the demand.

During the months of July and August this year 50 assortments have been despatched per parcel post to individual farmers, in addition to 30 large bundles shipped to Farmers' Associations. This amount represents a large increase over any year since the inception of the Station and does not take into consideration the local supply which resulted in the further distribution of approximately 100 assortments.

The chemist in charge states that when on a visit to the Proserpine district he was greatly pleased to note the interest displayed by the local farmers in the varieties sent from the Mackay Station. In the majority of cases the canes were showing themselves well adapted to the district, and the growers and mill authorities appeared to regard them most favourably.

In connection with the several experimental plats established in the North and South of Queensland, a large amount of cane has also been packed and forwarded.

The canes sent for the greater part consisted of ten varieties. On an average, sufficient seed was sent to plant up two drills of from 2 to 3 chains in length with each variety. These canes will now be grown in the various districts, and it is the intention of the Department to distribute them when grown, using each plot as a district centre. This should to a great extent tend to lessen the demand on the Station itself, and also prove a much more economical system than the one at present in use.

In order to cope with the increasing demand for canes, a piece of ground about 1 $\frac{3}{4}$ acre in extent, and formerly occupied by a crop of sisal hemp, has been cleared, brought into cultivation, and planted with approved varieties. This block, together with a half-acre block of first ratoons, should next year give us an ample supply of cane to supply all demands.

The varieties distributed consisted of the older New Guinea varieties, the best of the Hambledon Seedlings—namely, Nos. 5, 10, 114, 426—as well as Mauritius Malagache, Barbadoes 147, Mauritius 189, and 1900 Seedling, Queensland Nos. 116 and 121.

SUBSIDIARY CROPS.

Owing to the limited area of land at the Station, and the increased area required for new experiments, and for distribution canes, the growth of subsidiary crops is only being continued in a small scale. As already noted, the whole of the land previously under sisal hemp and cassava has been cleared, brought into cultivation, and is now growing cane.

REPORT OF CHEMICAL WORK AT MACKAY STATION.

As in past years, the laboratory at the Station has been kept busily engaged dealing with the samples of soils, fertilisers, sugar-canes, &c., which samples are from time to time submitted for analysis. In connection with the above work it may here again be stated that the laboratories are prepared to carry out analyses, free of cost, of any agricultural product submitted by a *bonâ fide* cane-grower.

The whole of the chemical work, together with the analytical data of the Station experiments, has been well and conscientiously carried out by the Assistant Chemist, Mr. M. B. Davis, who has exhibited industry and interest in the work.

Appended is a table which details the chemical work carried out during the past year:—

Materials.	Number of Samples Analysed.	Number of Analyses.
Soils—		
Agricultural Method	12	24
Nitrogen Determinations	12	24
Humus	10	20
Mechanical Analyses	12	12
Aspartic Method	10	10
Fertilisers	1	2
Limes, complete analyses	1	2
Limestones, complete	8	16
Sugars	1	2
Canes and Juices	138	276
Sugar-cane Fibres	22	44
Brix Spindles (standardising)	3	6
Total	230	438

In addition to the above analyses all chemical work required in the districts below Mackay, by the Sugar Bureau is now carried out in Brisbane by the Agricultural Chemist, Mr. J. C. Brünnich. During the last year the following analyses have been performed:—

Materials.	Number of Samples Analysed.	Number of Analyses.
Soils, agricultural method	77	154
Soils, available constituents	77	77
Sugar-canes	54	108
Total	208	339

The thanks of the Bureau are due to Mr. Brünnich for the large amount of valuable information afforded in the above analyses.

Bonâ-fide cane-growers, south of Mackay, are reminded that analyses of soils, fertilisers, and sugar-canes will be made free of charge on sending such materials to the Agricultural Chemist, Brisbane. Freights will be paid by the Department of Agriculture.

ESTABLISHMENT OF EXPERIMENTAL PLATS IN THE NORTHERN AND SOUTHERN SUGAR DISTRICTS OF QUEENSLAND.

In last year's report my predecessor mentioned that a large number of small plats were to be established in leading centres throughout the sugar districts of the State.

During the last twelve months such a series of plats have been inaugurated. They number fourteen, and were laid down—

- To test green manuring, subsoiling, use of lime and fertilisers upon varying soils.
- To test approved varieties of sugar-cane in different localities.
- To provide for the distribution of the approved varieties in such districts, thus avoiding the cost of carriage and the time necessarily lost between the time of cutting at Mackay and the receipt of such canes by farmers in far-away districts.

Unfortunately, in laying out these experimental plots the Bureau has struck a bad year. Not only has the weather been of the driest and most unfavourable nature to cane crops that has been experienced for many years past, but the labour difficulties have become most acute. The remuneration fixed by the Federal authorities in connection with the cultivation of sugar cane is having a very prejudicial effect upon cultivation work, and this feature has already caused the abandonment of some of the farmers' plats.

Another drawback is the fact that many farmers are not equipped with sufficient horses and implements to carry out the subsoiling as deeply as is desired, and the hard soil this year has prevented the depth accomplished being as great as it would otherwise have been.

The existing plats were selected by the Chemist in Charge of the Mackay Station, Mr. McCready, who has supplied the following particulars and remarks:—

The fact that sugar is grown practically all along the Queensland seaboard, between the 16th and 28th parallels of latitude, renders the conditions of soil and climate in this State unique and not approached by those of any other sugar-growing country in the world. When the fact is taken into consideration that sugar-cane is grown in, say, the Bundaberg district, with a red volcanic soil and an average rainfall of 40 in., and is also grown in the Mossman district, on an alluvial soil with an average rainfall of 170 in., it becomes obvious that no hard and fast principles of working can be laid down. For these reasons the finding of the different plots should prove of some value. The working of the plots for some time will be confined to the endeavour to demonstrate the benefits of deep cultivation, green and mixed manuring. This point having been reached, it is intended to further experiment with different mixtures of fertiliser in order to try and arrive at the best mixture for each locality. This mixture may then be used as a basis, subject, of course, to modifications to suit the seasons.

In addition to the above the plots will be made use of as a means of introduction and distribution of new varieties. Cane varieties will first be grown and tested at the Head Station at Mackay, and all canes proved of commercial value and free from disease will then be sent to the different plots, and from there distributed to the surrounding farmers.

The plots have, except where otherwise mentioned, been laid out into eight plats.

Plats 1 and 2 have been reserved for the introduction of new varieties, one plat being planted and the other held in reserve to supply cane when the first has run out. By this means, we will always have one plat under cane, and one in reserve.

The remaining six plats have been laid out in experiment, as follows:—

Plat 3.—Lime and green manure.

Plat 4.--Lime, green manure, and mixed manure.

Plat 5.—Lime only.

Plat 6.—Lime and mixed manure.

Plat 7.—No manure, to be subsoiled.

Plat 8.—No manure, ordinary cultivation.

The following is a list of the different plots and details of the work done up to date. As these plots have only been planted, no results can be expected before the next year.

Mossman District.

Two plots have been established in this district, and are being worked respectively by Mr. Geo. W. Muntz, of Mossman, and Mr. Jas. Soutter, of Saltwater Creek.

Mr. Geo. W. Muntz's Plot.

This plot, the area of which is 3 acres, is situated on the main road, within half a mile of the town. The type of soil is typical of the district and of medium quality.

The treatment of the plot was as follows:—After harvesting the standing crop, the trash was burnt, and the land broken up and harrowed down; a dressing of 1 ton per acre of lime was then applied broadcast, and the land crossploughed, and again harrowed. It was then sown with a crop of small red Mauritius bean. For some reason, however, in all probability insufficient moisture when planting, this crop proved a failure, and the land had again to be sown. This second sowing was placed in drills, the seed used being the large black Mauritius bean. The second attempt proving successful, the crop when matured was ploughed under with the disc plough and allowed time to rot. The land was then ploughed and subsoiled as deeply as possible under somewhat dry conditions. It may here be stated that, owing to the heavy nature of the ground and the dry conditions prevailing, it was not possible to obtain the state of tilth to be desired before planting.

The manurial portion of the plot was now laid out and planted with New Guinea 24 (Goru). The cane was planted in 5 ft. drills, using three-eye plants and spacing 6 in. apart in the rows.

Plat 1, as before explained, was planted with varieties from this Station, as follows:—

Variety of Cane.	Number of Drills.
New Guinea 24A	4
„ 24B	4
„ 40	4
„ 26	3
Malagache (Mauritius)	3
Mauritius 189	3
Barbadoes 147	2
Hambleton 5	3
„ 114	3
„ 426	2
Demerara 1135	2

Mr. Jas. Soutter's Plot.

This plot, the area of which is 2 acres, is situated on a low-lying portion of the district, known as Saltwater Creek.

A large area of land having gone out of cultivation on account of the soil having become impoverished by continuous cropping, the present plot has been laid out to endeavour to ascertain whether cane can still be raised successfully and at the same time find a general fertiliser to suit the locality.

The treatment of the land was as follows:—The ground was first broken up and harrowed. Being of a somewhat sour nature, a dressing of 50 cwt. per acre of lime was then applied broadcast and the land cross-ploughed and harrowed. A crop of green manure was then planted, and when mature was ploughed under and allowed to rot. The land was then ploughed and subsoiled as deeply as possible. The soil being of a somewhat stiff and shallow nature, the total depth of this ploughing and subsoiling was only about 15 to 16 in. in depth. The land being in a fair state of tilth, was then planted with Barbadoes 147, in rows 5 ft. apart, using three-eye plants, spaced 6 in. apart, and divided up into six plats, containing 40 running chains of cane each.

These plats will now be treated as follows:—

Plat 1.—Manured with 68 lb. meatworks manure, 34 lb. sulphate of potash, applied in drill when planting. To be followed later by surface dressing of 34 lb. sulphate of ammonia.

Plat 2.—68 lb. dried blood, 34 lb. sulphate of potash, and 34 lb. meatworks manure, in drill when planting.

Plat 3.—34 lb. each dried blood, superphosphate, and potash sulphate in drill when planted, to be followed with surface dressing of 34 lb. sulphate of ammonia when cane is about 2 ft. high.

Mr. H. Burn, Northern Cane Instructor, reports that both Mr. Muntz's and Mr. Soutter's plats are looking fairly well.

Mr. A. J. Draper's Plot, Nelson.

This plot, the area of which is 3 acres, is situated on a typical piece of Mulgrave red volcanic soil. Owing to the plot, when taken over, being under a crop of green manure, the application of lime did not take place, and the detail of experiment in this case had to be altered considerably.

The treatment of this plot was as follows:—The land, as stated, having been sown with green manure, the crop was allowed to mature, then ploughed in and left to rot. It was then ploughed and subsoiled, and, later, received a further ploughing with a disc plough. The plot was then marked out into eight plats. Plats 1 and 2 were reserved for the introduction and distribution of fresh canes, as has been already explained; the remaining plats, from 3 to 8 inclusive, being planted with New Guinea 24 in rows 5 ft. apart, using three-eye plants, spaced 6 in. apart. These latter plats were then treated as follows:—

Plat 3.—Manured with 51 lb. meatworks manure, and 13 lb. sulphate of potash, placed in drill when planting. To be followed about November with surface dressing of 39 lb. of nitrate of soda.

Plat 4.—Same treatment as plat 3, but to be followed with 39 lb. sulphate of ammonia, in place of nitrate of soda.

Plat 5.—Manured with meatworks manure alone in drills when planting, using 102 lb., equivalent to 4 cwt. per acre.

Plat 6.—102 lb. mixed fertiliser applied in two dressings, on surface. First portion when cane is 18 in. high, balance just previous to cane getting out of hand.

Plat 7.—Manured with lime at 1 ton per acre, in conjunction with green manure.

Plat 8.—Green manure only.

Plat No. 2 will be held in reserve for further varieties, whilst Plat 1 has been planted with canes from this Station, as follows:—

Variety of Cane.		Number of Drills.									
New Guinea	24A	..	..	..	..	..	..	..	..	..	3
"	24B	..	..	..	..	..	..	..	..	..	3
"	26	..	..	..	..	..	..	..	..	..	3
"	40	..	..	..	..	..	..	..	..	..	3
Hambleton	426	..	..	..	..	..	..	..	..	..	1
Mauritius	Malagache	..	..	..	..	..	..	..	..	..	2
"	189	..	..	..	..	..	..	..	..	..	2
Barbadoes	147	..	..	..	..	..	..	..	..	..	2
Hambleton	5	..	..	..	..	..	..	..	..	..	2
"	114	..	..	..	..	..	..	..	..	..	2

This plat was inspected by the General Superintendent upon his recent visit North. The variety cane from Mackay was up and doing splendidly, but the experimental plats planted with N.G. 24 had not germinated well. This was attributable to wire worms and to a cold snap following planting. The misses will be supplied in the hope of getting a fair stand.

Owing to an unavoidable error in the sowing of the green crop, the plan of experiment in the manurial section had to be altered somewhat. The six plats, which have been planted with New Guinea 24A, will be treated as follows:—

Plat 3 will be manured in the drill when planting with 81 lb., equivalent to 4 cwt. per acre, of meatworks manure.

Plat 4 will be manured with 31 lb. sulphate of ammonia, 13 lb. of sulphate of potash, and 37 lb. superphosphate, divided into two portions, and applied—first half when cane is from 18 in. to 2 ft., and balance just previous to cane getting out of hand.

Plat 5 will be manured with 46 lb. sulphate of ammonia, 14 lb. of sulphate of potash, and 21 lb. superphosphate; to be applied as in Plat 4.

Plat 6 will be treated with lime and green manure, such having been already applied.

Plat 7.—Green manure alone.

Plat 8.—No manure (check plat).

Mr. W. Webster's Plot, Proserpine.

This plot, the area of which is 2 acres, is situated within half a mile of the town and is representative of the ordinary forest lands in that locality.

The preparation of the land before planting was carried out in a similar manner to the preceding plots, the various plats being laid out as in the cases of the Mossman, Goondi, and Ingham plots.

The manurial plats were planted as in the above cases, the cane used being Mauritius Malagache.

The variety plat was divided, one portion held in reserve, and the remainder planted with canes from this Station, as follows:—

Variety of Cane.	Number of Drills.
New Guinea 24A	2
„ 24B	2
„ 40	2
Mauritius Malagache	2
Barbadoes 147	1
Hambledon 5	2
„ 114	1
„ 426	1
Mauritius 189	1
Queensland 116	1

Mr. Jas. Clark's Plot, Woongarra, Bundaberg.

This plot, the area of which is 3 acres, is situated in a central portion of the Woongarra Scrub, and is fairly representative of the red scrub soils in that locality.

The preparation of the land was carried out on the same lines as the plots already dealt with, though work was somewhat hindered by the prevailing dry weather.

The manurial portion of the plot was planted up early in the year with the variety of cane known as D1135, under the usual conditions, the cane being manured at the time of planting by sowing broadcast, in the drills, of Shirley's £ s. d. mixture at the rate of 2 cwt. per acre.

The variety plot, as in the former cases, has been divided, one half held in reserve, and the remainder planted up with canes from this Station, as follows:—

No. of Row.	Variety of Cane Planted.
1 and 2	New Guinea 24B
3	New Guinea 40
4 and 5	New Guinea 24A
6	New Guinea 40
7	Hambledon 114
8	Barbadoes 147
9	Hambledon 5
10 and 11	Queensland 116
12	B 147, Q 116, New Guinea 24B
13, 14, and 15	Hambledon 10
16	Hambledon 10 and New Guinea 26
17 and 18	New Guinea 26
19	New Guinea 26 and Malagache
20	Malagache
21	Malagache and Hambledon 5

The Instructor in Cane Culture, appointed for the Southern sugar districts of Queensland, who has the carrying out of the operations upon these plats under directions from headquarters, reports as to Mr. Clark's experiment, that owing to the dry weather the crop of beans was very insignificant, and that the subsoiling was only done to a depth of from 13 in. to 14 in. Owing to the loose nature of the soil it was found necessary to use a cane-planting machine, as it was impossible to get a close deep drill with the ploughs available.

operation.

Mr. W. Hockings' Plot, Gin Gin.

flats or low lands in this locality.

with the variety of cane known as D 1135.

The remainder of the plot is taken from this Station, as follows:—

Variety of Cane.								Number of Drills.
New Guinea	24A	..	..	..	..	..	..	2
"	24B	..	..	..	..	..	..	2
"	40	..	..	..	..	..	..	2
"	40	..	..	..	..	..	..	2
Hambleton	5	..	..	..	..	..	..	2
"	114	..	..	..	..	..	..	2
"	285	..	..	..	..	..	..	1
Mauritius	Malagache	..	..	..	..	..	..	2
Barbadoes	147	..	..	..	..	..	..	2
Queensland	116	..	..	..	..	..	..	1

The Cane Inspector remarks upon this plot that when the plot was acquired an old crop of cane, eighth ratoon, had been recently ploughed out. The varieties from Mackay were a long time in transit and did not arrive in very good order. Great care, however, was taken in selecting the plants.

Mr. C. Stollznow's Plot, Gin Gin.

This plot, the area of which is 2 acres, is situated on a representative piece of soil typical of the high lands in this locality.

The land was prepared as in former cases, the manurial portion being planted with D 1135.

The remainder of the plot was divided into two plots, one plot held in reserve, and the remainder planted up with canes from this Station, as follows:—

Variety of Cane.									Number of Drills.
New Guinea	24A	..	..	..	..	..	..	..	2
"	24B	..	..	..	..	..	..	..	2
"	26	..	..	..	..	..	..	..	2
"	40	..	..	..	..	..	..	..	3
Hambledon	5	..	..	..	..	..	..	..	2
"	10	..	..	..	..	..	..	..	2
"	285	..	..	..	..	..	..	..	2
"	114	..	..	..	..	..	..	..	2
Mauritius Malagache		..	..	..	..	..	..	..	2
Barbadoes	147	..	..	..	..	..	..	..	2

A crop of fifth ratoon cane was cut off this land in 1911, after which it grew up again to the height of about 3 ft. before operations were commenced, and was finally cut up with disc harrows before preparation of the ground. The soil is red volcanic, and contains gravelly fragments of basaltic material. The Mackay varieties were shipped at the same time as those for Mr. Hockings' plat and were subject to the same disadvantages.

Mr. J. Broadhurst's Plot, Childers.

This plot, the area of which is 2 acres, is situated on a piece of land typical of the red volcanic scrub soils of this locality.

The land received the same treatment and preparation as in former plots, the manurial portion being planted with D 1135.

The remainder of the plot was divided into two plats, one of which was planted up with canes from this Station, as follows:—

Variety of Cane.									Number of Drills.
New Guinea	24A	..	..	..	..	..	..	..	2
"	24B	..	..	..	..	..	..	..	2
"	40	..	..	..	..	..	..	..	2
Barbadoes	147	..	..	..	..	..	..	..	2
Mauritius	Malagache	..	..	..	..	..	..	..	2
Queensland	116	..	..	..	..	..	..	..	2
Hamilton	5	..	..	..	..	..	..	..	2
"	10	..	..	..	..	..	..	..	3
"	114	..	..	..	..	..	..	..	2
"	285	..	..	..	..	..	..	..	2

The land was lying in bare fallow when it was acquired for experimental purposes. The plot was ploughed in September, 1911, dry weather prevailing until January, 1912. The beans were then sown, but as the rainfall continued scanty, only a very small crop was obtained, and the beans, owing to the dryness of the soil, took a considerable time to rot down. The plots 3 to 8 were planted on the 30th August, and the Mackay varieties on 3rd September. Very little cane had germinated by 3rd October.

Mr. A. Adie's Plot, Cordalba.

This plot, the area of which is 2 acres, is situated on a typical piece of red volcanic scrub soil, and is well representative of the land in this locality.

The plan of working has been the same as in other plots. Owing to the extremely dry weather prevailing in this district, however, all attempts to secure a green crop for ploughing under have proved unsuccessful. It has therefore been decided that the planting of the manurial portion of the plot should be held over, and a further attempt made to plant early in the coming year.

The portion held for the introduction and distribution of new varieties has had one portion planted with canes from the Station, as follows:—

Variety of Cane.		Number of Drills.							
New Guinea	24A	..	..	..	..	..	..	..	2
"	24B	..	..	..	..	..	..	..	2
"	40	..	..	..	..	..	..	..	3
Barbadoes	147	..	..	..	..	..	..	..	2
Mauritius Malagache		..	..	..	..	..	..	..	2
Hambledon	5	..	..	..	..	..	..	..	2
"	10	..	..	..	..	..	..	..	3
"	285	..	..	..	..	..	..	..	3
Queensland	116	..	..	..	..	..	..	..	2
"	121	..	..	..	..	..	..	..	2

The above varieties were planted on the 3rd September, 1912.

Mr. C. Popp's Plot, Pialba.

This plot, the area of which is 2 acres, is situated on a typical piece of soil, and is representative of the bulk of the Pialba sugar lands.

Owing to the dry weather, this plot fared no better than the preceding one at Cordalba, the manurial portion of it will therefore not be planted till early in the coming year.

The portion held for the introduction and distribution of new cane varieties has, as in former cases, been divided, and one portion planted with canes from this Station, as follows:—

Variety of Cane.		Number of Drills.							
New Guinea	24A	..	..	..	..	..	..	..	2
"	24B	..	..	..	..	..	..	..	2
"	40	..	..	..	..	..	..	..	2
Barbadoes	147	..	..	..	..	..	..	..	2
Mauritius Malagache		..	..	..	..	..	..	..	2
Queensland	116	..	..	..	..	..	..	..	2
Hambledon	5	..	..	..	..	..	..	..	2
"	10	..	..	..	..	..	..	..	2
"	114	..	..	..	..	..	..	..	2
"	285	..	..	..	..	..	..	..	3

It was originally intended in laying out these farmers' field trials that they should be identical in treatment. Owing, however, in some cases, to local conditions and in others to errors that were made in carrying out the preparation and fertilising, they are not all uniform, and, therefore, only a few of them can be used for comparative purposes.

SOUTHERN SUGAR LANDS.

The following remarks have been extracted from a report by Mr. H. T. Harvey, an officer appointed to supervise the Southern experiment plots, and to give advice to beginners in cane cultivation:—

"So far as the sugar areas of Southern Queensland are concerned, the volcanic soils are by far the most important; probably three-quarters of the entire cane lands being of volcanic origin. These soils are usually very different, both chemically and physically, from those of alluvial character found in various places along the valleys of rivers. Perhaps the most distinct difference, from the practical farmer's point of view, is the greater porosity of the volcanic material. In the Bundaberg district the most important sugar area is the Woongarra, which is a large tract of purely volcanic soil in the Kalkie and Barolin parishes. Much of the ground has been producing cane for a considerable time. The soil has peculiarities of its own not found in the soils of other districts. The best and most abundant is the red soil, which is usually deep and free from boulders and stones. It is, as a rule, very porous, and its chief fault is that it quickly suffers from drought. There is also a fair amount of light-brown and yellowish soils, which contain more boulders than the red soil and generally have a rather impervious

subsoil. It is probable that these soils have been derived from a different kind of lava to that which has given rise to the red soil. It is said by farmers who have lived on this land for a long time that in early years this yellow soil was the most productive in the district, but that is certainly not the case now. There are also patches of black and shotty soil. It is very evident that the Woongarra district does not produce the cane that it did in former years, though some of it is still very fertile. Some of the farmers have tried fertilising, and say they have obtained beneficial results. Others, again, say the results were not satisfactory. No doubt one very important factor connected with the falling off of fertility is that the store of humus has become scanty.

"Until a few years ago the principal cane grown in this district was Rappoe. At present, however, the cane known as D 1135 is by far the most extensively planted.

"The Gooburrum and Oakwood cane farms are of a different type: most of the soil is sandy and varies in colour from red to grey. The soil is generally poorer in mineral plant food than the volcanic soils of the Woongarra, owing to the fact that they contain a high proportion of silicate. These farms are not yielding very heavy crops of cane, and should with average rainfall benefit from the application of fertilisers.

"At Bingera there is a considerable area of red volcanic soil, although it is different in texture from that of the Woongarra. It is not nearly so porous, and settles down much closer. A large part of it has also been intermixed with fine sand. On some of the Bingera soils, especially those which contain sand, manures give good results.

"In the Gin Gin area there is a great diversity of soils. On the river it is rich alluvial, capable of growing almost anything, but it has the drawback of being subject to frost. Even this year, mild as the winter has been, a good deal of cane was killed. Most of the country away from the river is red volcanic. Some of it is very hilly, and, consequently, suffers rather quickly from dry weather. There are also patches of black soil, which are heavy and sticky. At Fairy Hills the soil is of quite a different nature, consisting of earth formed from the crumbling and weathering of slaty rock. It is rich soil, but will not continue to grow cane, as it is steep country, and so cannot be cultivated very intensely. Practically no manuring is done on Gin Gin farms. Diseases are very much in evidence in some of the cane. Nematodes are probably responsible for some of these, but a fungus disease which attacks the roots is the most prevalent. This disease is a serious menace, and I know of one farm where it has utterly destroyed 8 or 9 acres of cane. Rappoe and Striped Singapore are still being largely grown at Gin Gin and thrive well, especially on the newer land. On the red soil, however, the farmers were going in more for D 1135.

"The Isis cane district is undoubtedly the largest and richest cane area of South Queensland. The soil is all of a dark-red volcanic formation. It is less open and porous than the Woongarra soils. Some of the land, however, is too hilly and steep, and many of the hillsides are becoming less productive. Where the land is level, however, it is very fertile, and splendid crops are grown. It is no uncommon thing for blocks of cane to be cut out at 40 tons to the acre. A little experimenting has been done by some of the farmers with manures during the last few years, but with no very definite results. A great number of varieties of cane are grown in the Isis district, especially by the farmers who supply the C.S.R. Company's mill. They are paid according to the sugar contents of their cane, and are consequently greatly interested in knowing which varieties will bring the best price. The principal cane grown is D 1135, but there is a considerable amount of 1900 Seedling and also of other varieties, such as Lahania, Mahona, B 208, Black Innis, M 33, White St. Louis, &c.

"Goodwood.—This is a small cane area on the Gregory River, lying between Bundaberg and the Isis. It is an isolated block of red soil similar in appearance to that of the Isis. The land is mostly high-lying, and the same remarks apply to it as were made about the Isis hillsides.

"In the Pialba cane district there is a marked difference in the soil from that of any other district yet mentioned. Most of the soil is grey in colour and has been formed from the underlying rocks. Much of the land after growing a few crops is turned into pasture; the soil is in places shallow, with a rocky bottom, and becomes very wet and boggy if there is a great quantity of rain. It retains the moisture very well, however, if worked up. There are a number of varieties of cane being grown in this district, the principal being Rappoe, Batoe, Striped Singapore, D 1135, and a cane known as Green Seedling. There is also a little Goru, M1900, and others.

"Yerra, on the Gayndah Line, about 4 miles from Mungar Junction, has just opened up to sugar growing. There are about 180 acres now under cane, and it is expected that about 100 acres will be planted before next season. There is a large area of scrub land not yet touched.

"Waterloo is a small sugar area which has been developed in the parish of Littabella. It is about 9 miles west of Yandaran railway station. It is rangy country, formerly covered with scrub. There are about 400 acres under cane, much of which is hilly country.

"Baffle Creek Settlement.—This place, which is about 9 miles from Rosedale, has only recently been established as a sugar district. During last October, when the mill was in course of erection, there were about 250 acres under cane, most of the settlers having from 4 to 10 acres. Good crops were

growing, some of which would yield about 30 tons per acre. The soil is partly scrub land and partly alluvial flats along the creek. The scrub soil is in places very stony, though the soil is good. The alluvial flats are rich, though rather subject to flood. The cane is nearly all Rappoe, but there is also a little Cheribon on each farm."

DIVISION OF ENTOMOLOGY REPORT.

As previously stated, an entomologist of high standing, in the person of Mr. A. A. Girault, has been appointed during the year. Mr. Girault is stationed at Nelson, near Cairns, and is at present engaged in investigations relating to the grub pest. He has furnished the following report of his work to date:—

"1. Breeding cages, stocked with grubs of all kinds, occurring in cane fields or in any way connected therewith, have been and are now being established as rapidly as possible. At first, these are being kept under control indoors, but as the work enlarges next year the additional cages will be established out of doors. These cages, according to their size, contain from about three to forty grubs. A second series of smaller cages, containing but a single grub, is in about the same stage of progress; that is to say, there are about forty of each series now under observation, and all indoors. It is proposed to continue this work until several thousand grubs are under control, so that a chance of obtaining at least a percentage of them through to maturity should be good. Already we have obtained a number of chrysalids from these grubs. In the meanwhile preparations are being made to capture mating adults and from them obtain another series of progeny, to be reared to maturity from the egg. All of this work will be accomplished necessarily by field observations committed to notes and preserved material. This work is performed to the end that the details concerning the development and habits of the grubs may be definitely known, and will include all sorts of experimental evidence gathered on such important matters as the food habits of the grub and so on.

"2. It has been planned and inaugurated, gradually to open up the subject of the introduction of parasites of grubs allied with the cane grub, from abroad, for instance, from Porto Rico and North America. It is hoped that this can be consummated without the necessity of a visit abroad. It has also been planned to make a thorough survey of insect parasites in Australia.

"3. As time has allowed, it has been filled in with observations upon and collections of miscellaneous cane insects, and the related fauna of the cane field, such as birds.

"4. Pursuant to the commencement of actual remedial work, it has become necessary to bring together at first all of the literature dealing with the destruction of grubs in general in all countries, and this is now under way.

"5. No practical remedial operations, other than those now in vogue, are as yet in sight."

FUTURE WORK.

The work of the Mackay Experiment Station will be carried on along lines similar to those in previous years. New experiments in fertilisation, chiefly with the different forms of nitrogen now upon the market, are proposed, also experiments with different methods of cultivation. The subsequent cultivation of cane—i.e., after the crop is up—is a matter worthy of serious attention. 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."

The method of doing this work at the Mackay Experiment Station is by the use of broad duck-feet hoes fitted to the cultivator. Different kinds of tynes, however, will be used in the experiment to be initiated.

A strong feature of the experimental work will be, as in the past, the procuring and raising of new varieties, to test under rigorous conditions their commercial value as sugar yielders and crop producers.

INTRODUCTION OF NEW VARIETIES.

A long-standing promise to introduce fresh varieties from New Guinea is now being redeemed. Some little time ago Mr. T. H. Wells, of Childers, was commissioned to proceed to New Guinea and despatch to the Mackay Station as many new varieties of the cane indigenous to that island as he was able to procure in the somewhat limited time at his disposal. A portion of the varieties have now arrived at Mackay, numbering in all twenty-five, and a further shipment is expected and will in all

probability have arrived before the publication of this report. One or two of the new canes resemble varieties in Tryon's collection, but this will not be definitely known until they mature. Following on with the numbers of the canes introduced by Mr. Tryon in 1895, the new canes will start as New Guinea 67, and so on.

It is anticipated that out of this importation one or more canes may be secured that will at least equal New Guinea 15 and 24 (Badila and Goru), which were comprised in the last series of canes collected by Tryon and introduced by the Department of Agriculture in 1895.

The incalculable benefit that Northern cane-growers in particular have derived from the introduction of Badila is shown by the fact that 97 per cent. of the cane grown in the Johnstone River District is that variety, and that from this cane, so rich in sucrose and low in fibre, a ton of sugar was manufactured from 7 tons of cane.

The new canes will be carefully tended and reared, and as soon as sufficient seed is procured will enter into field and analytical trials. As soon as they have passed through these the varieties that show high promise will be made available for distribution.

It is also intended to obtain other leading canes from sugar-producing countries, so as to keep the Experiment Station engaged in the selecting and testing of new varieties for issue to farmers.

It is also hoped to plant out varieties of cane in the Atherton district, particularly some of the older varieties, such as Rappoe and Striped Singapore, with the view of ascertaining whether benefit will follow the replanting of these canes, brought from higher to lower levels. It is generally concluded that such a course would be most advantageous.

SEEDLING WORK.

In addition to the above it has been determined to carry out experiments in the raising of seedling canes at the Kamerunga State Nursery, Cairns. It will be remembered that previous experiments in this direction at Mackay have always resulted in failure. This is not so at Cairns, where all conditions appear favourable, both for the formation of seed in the arrows and their subsequent propagation. A piece of land at Kamerunga is to be prepared, and in March or April next choice varieties of cane will be forwarded to the Cairns Nursery for planting out. The following year a large number of seedlings should be ready for pricking out into pots. From that stage they will be transferred back to Mackay, to be grown to produce seed for further experiments in the usual way. It is hoped that by continuing this method a few good new canes may be obtained.

In the history of seedling work it has been found that many thousands of plants have to be produced and destroyed before even two or three good varieties can be obtained. In Barbadoes over one million seedlings have been raised, and yet the number of Barbadoes seedlings of value do not amount to many more than four.

Of the number of Demerara seedlings raised there are about seven in commercial use. Of these, D 1135 is the favourite in the Bundaberg district, where it is very largely grown, and has secured general approval as suitable both for farmers and mill.

It is thus seen that the work of securing and selecting new varieties entails a good deal of labour. Fortunately, however, the raising of large numbers of seedlings involves little monetary outlay.

NEW STATIONS.

It is hoped eventually, should the condition of the sugar industry in Queensland warrant the same, that new experimental sub-stations will be established in the districts to the north and south of Mackay.

ECONOMICS.

The sugar crop for 1911 fell considerably short of its predecessor, the tons of sugar at 94 net titre being produced amounting to 173,296, as against 210,756 for the previous year. This season's output will also be considerably behind, due largely to the very dry season.

The tons of cane per acre for the whole State, crushed in 1911, according to the Government Statistician, were 16.02. The amount of sugar per acre for the whole State was 1.81 ton. In this latter production the Ayr and Ingham-Mourilyan districts lead, with averages of 2.36 and 2.28 tons of sugar per acre respectively. On the average, 8.85 tons of cane were required per ton of sugar. Ingham and Mourilyan, in which is included the Johnstone River district, lead the way in this respect, it only requiring in those districts 7.06 tons of cane per ton of sugar. This can be largely attributed, no doubt, to the superior varieties of sugar-cane grown, varieties rich in sugar and low in impurities, and which are eminently adaptable for those particular districts. The statistics show a falling off in the area under cane, between 1910 and 1911, of 11,403 acres.

The outlook at the present time is, on the whole, of not too favourable a kind. The rains in June last, following a long period of dry weather, filled the farmers with encouragement, and large plantings of cane took place. Another dry spell then set in, and when the writer visited the North in October he found the industry considerably depressed, not only on account of the dry weather, but also in regard

to the present uncertainty of the industry as regards labour. Fortunately rains have fallen in the Bundaberg and Mackay sugar districts, and it is hoped the more northern localities will benefit shortly to a like extent.

FERTILISERS, AND GREEN MANURING.

The use of fertilisers is undoubtedly increasing in Queensland amongst cane-growers, and a number of formulæ have been from time to time supplied by the Experiment Station. It is interesting to note that the Hawaiian Experiment Station, after a very large number of experiments, are now recommending a formula consisting of 8 per cent. nitrogen, 7 per cent. potash, and 7 per cent. phosphoric acid. This is almost identical with a formula given out by the Mackay Experiment Station in 1909, consisting of 7.7 per cent. nitrogen, 7.7 per cent. potash, and 7 per cent. phosphoric acid.

The art of green manuring is also becoming popular and is being largely practised. The price of seed at the present time is a drawback, and it is regretted that Queensland farmers do not grow cowpea and other legumes to provide seed for sugar farmers. Such an industry should pay well.

HARRY T. EASTERBY,
General Superintendent

Brisbane, 29th October, 1912.

Price, 10d.]

By Authority: ANTHONY JAMES CUMMING, Government Printer, William street, Brisbane.