1910.

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.

WORK OF THE MACKAY CENTRAL SUGAR EXPERIMENT STATION.

The report for this year will be a very brief one, as, owing to the necessity of restoring the bulk of the Experiment Station land after seven years of almost continuous cropping, no new experiments were commenced last year beyond those upon a small area devoted to the commercial testing of six Queensland Acclimatisation seedlings with two other varieties. The area under the ten Hambledon seedlings was again ratooned, and the results from the second ratoon crop appear in the following pages.

Owing to the relative smallness of the experimental area, a great deal of time could not be afforded to rest the land. In some cases the land has had six months' spell, while in others ten months have been allowed. The means adopted for restoring the land thrown temporarily out of cultivation have been :—

After ploughing out stools and removal (which latter operation is performed to prevent contamination of any succeeding crop) the land is deeply ploughed crossways with the swing plough to thoroughly break up and stir the soil, and to allow the sun and air to have full scope for their sweetening and restorative work.

The land is then ploughed lengthways with the swing plough, going down to a depth of 12 to 14 inches. This is followed by the subsoiler in the same furrow, which reaches a further depth of about 8 inches. We then have a perfectly fine, loose bed in first-class order and of a depth of from 18 to 20 inches.

Next, the sowing of a leguminous crop, to restore humus and nitrogen, takes place. The seed used in most of the land was the small, red Mauritius bean ; on other areas a mixture of black Mauritius bean and cowpea was used.

The work was commenced in October last after the stools from the previous crops had been removed. By the end of November the green crops were sown on most of the land and harrowed in. Good rains followed, combined with great heat, and in the course of under three months an immense crop of green fertiliser three feet high was ready for the plough. Portion of the crop was weighed on the land, and it was estimated that fully 22 tons of foliage per acre had been produced. The restoration of humus and nitrogen to the soil would therefore be very large.

On one area the land was not subsoiled till after the green crop had been ploughed in. The date of the sowing of the green manure was much later, and the ploughing-under did not take place till May. The subsoiling was therefore not done till almost immediately before planting in July.

The planting of these areas with new experiments will be set out under their respective heads.

A large amount of chemical work has been carried out by this Laboratory during the past year, in particular a number of fertilisers have been submitted. Other interesting analyses have been made, and the whole of this work has been carefully and conscientiously performed by Mr. L. C. McCready, who deserves the greatest credit for his painstaking work. Details of the analyses appear in a later portion of this report.

The time of the writer has been fully occupied by attending to office work and correspondence, which has greatly increased latterly. The demand for advice on cultivation and manuring questions comes in from all over the State. The compliance with requests from farmers for new cane varieties,

seeds, and other plants occupies a great deal of time. Visits have also been paid to the Rockhampton district in connection with the proposed establishment by the Alton Downs Sugar Cane League of the industry in that place. Nearly all the sugar districts, from Nerang in the far South to Mossman in the far North, have been visited and meetings of farmers held and addresses delivered in as many sugar centres as possible. Details of these visits are given hereafter. The cane lands and varieties of cane growing in the different localities were also inspected.

Due to the splendid rainfall experienced in most parts of the State, a particularly fine crop of cane is anticipated this year. Exceptions to this occur in the North Isis, Mulgrave, and Mossman districts.

The use of manure is largely spreading amongst our sugar farmers, and for this the Experiment Station considers that it can claim some of the credit. At every available opportunity the art of green manuring, cultivation, and fertilising are preached, and farmers are certainly beginning to catch on to these ideas, and numerous enquiries from various parts of the State on these subjects are dealt with every week.

Farmers' meetings have also been held at various places in Mackay, but due to the long and continued wet season there were not as many places visited as would otherwise have been the case had we had more settled weather.

A paper was prepared for the Second International Congress of Tropical Agriculture and Colonial Development, held in Brussels in May last. This was entitled, "Methods of Cultivation and Varieties of Sugar-cane at the Sugar Experiment Station, Mackay, Queensland."

Referring to the past season, it has to be said that it was a most abnormal one as far as heat and rainfall were concerned. From the commencement of December, 1909, to the end of June, 1910, between 110 and 120 inches of rain fell over various parts of the district. This has seriously retarded field operations, and kept a good deal of the March and April planted cane considerably back in growth. Advantage, however, has been taken of the comparatively mild winter obtaining up to the middle of July, and a good deal of May and June planting has been carried out.

Early in March there were two fine days and advantage was taken of them to plant some of the Experiment Station cane. Just after planting, about twenty-four inches of rain fell, the weather continuing wet till the end of March when it broke for another few days, when planting was resumed. The cane planted in the early part of March has made a wonderful growth and looks fully two months ahead of that planted after the heavy rains in March. It was unfortunate that all the planting could not have been done in the early part of March. In one experiment planted early in April with the cane known as Mauritius Malagache, the germination was so poor and so many canes died out owing to the wet conditions, that the whole experiment had to be ploughed out and replanted in July.

CONCLUSION OF EXPERIMENTS WITH TEN HAMBLEDON SEEDLINGS—SECOND RATOONS.

These experiments were planted out from sets raised from cuttings courteously supplied by the Colonial Sugar Refining Company, and were commenced in 1907, the results of the plant and first ratoon crop having already been published. The tests were undertaken for the purpose of determining the relative commercial value of these seedlings as croppers and sugar producers. They were selected by Dr. Reed, the then manager of Hambledon Plantation, Cairns, as being about the ten best of the exceedingly large number of seedlings raised by the company at that plantation.

The second ratooning of these experiments was commenced in September, 1909, immediately after the removal of the crop. The trash was burnt, and the middles split open with a swing plough to a depth of 10 inches. This was followed by the subsoiler, which stirred the soil in the open furrows to a further depth of 6 inches. The ground next to the cane was then turned over by the plough into the middles, and the subsoiler again followed. This ensured that all the ground between the cane rows had been thoroughly stirred and subsoiled to a depth of at least 16 inches. The row of hard ground containing the stools themselves was then loosened by means of fork hoes. This work can be quickly and cheaply carried out.

The mixed manures were then applied in the furrow next to the cane, which was at once ploughed back to cover the fertilisers. Subsequent cultivation consisted of the shallow stirring of the surface soil between the rows with a Planet Junior cultivator, fitted with three broad duck-foot hoes. This method, when a fine tilth has first been obtained by deep cultivation, is very much superior to using implements which dig or cut the ground, for the following reasons:—

1. Cutting implements are very apt to cut newly-formed roots which the cane is making, and thus throw the crop back.
2. The use of digging tynes tends to the loss of soil moisture.
3. The Planet Junior, with the broad hoes, breaks the fine capillary tubes which are leading water to the surface of the ground, and leaves a mulch of soil on the top which effectively protects the underground moisture during a dry spell. When showers fall during a dry period this method of cultivation is very important, for, when the top soil is damp, it leads to connection with the underground moisture, and much may be lost by evaporation, but if the fine tubes are again broken the moisture will be conserved. This surface cultivation need not at first be more than 3 inches deep, and should it be found that roots are being brought out on the hoes it may be reduced to 1 or 2 inches.

This is the method of cultivation practised on ratoon crops at the Station, and can be confidently recommended to farmers.

No irrigation was applied, and due to the excessive rainfall the fertilisers did not prove of as much benefit as they otherwise might have, very heavy falls of rain being experienced after the second application of nitrogen in December. The mixed fertiliser used on these experiments consists of the following ingredients:—Sulphate of ammonia, nitrate of soda, sulphate of potash and superphosphate. Formulas for useful mixtures, with quantities, will be found in another portion of this report.

The varieties were as usual submitted to analyses in June, July, and August, these being preliminary tests. The final examination, which is made on a bulk sample obtained by crushing all the cane growing on forty running feet of land, was carried out in September. Fibre determinations are also made in that month. The value of the preliminary and final tests are very great in the history of any variety, as they enable farmers and mill owners to determine the best time for cutting the cane and also establish whether the variety, if it commences as a sweet cane, retains its sweetness for any time.

The tables of analyses with the dates of arrowing, where arrowing took place, is appended below.

FIRST PRELIMINARY EXAMINATION OF TEN HAMBLEDON SEEDLINGS: SECOND RATOON CANE—JUNE, 1910.

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.
1	Queensland	Hambledon, Queensland 5	2-6-10	9 months	16·5	11·98	2·77	72·6
2	Do.	10	2-6-10	do. ...	18·5	15·78	1·50	85·2
3	Do.	11	2-6-10	do. ...	17·0	14·04	1·68	82·5
4	Do.	62	2-6-10	do. ...	17·4	13·86	2·14	79·6
5	Do.	114	2-6-10	do. ...	16·7	13·66	1·77	81·7
6	Do.	172	3-6-10	do. ...	20·0	18·27	·53	91·3
7	Do	222	3-6-10	do. ...	17·1	14·72	1·25	86·0
8	Do.	243	3-6-10	do. ...	8·9	3·51	4·04	39·4
9	Do.	285	3-6-10	do. ...	18·0	15·70	1·15	87·2
10	Do.	297	3-6-10	do. ...	18·4	16·50	·86	89·6

SECOND PROGRESSIVE EXAMINATION OF TEN HAMBLEDON SEEDLINGS: SECOND RATOON CANE—JULY, 1910.

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.
1	Queensland	Hambledon, Queensland 5	4-7-10	10 months	17·0	14·22	1·42	83·6
2	Do.	10	4-7-10	do. ...	19·0	16·85	·92	88·6
3	Do.	11	4-7-10	do. ...	18·1	16·44	·74	90·8
4	Do.	62	4-7-10	do. ...	17·1	14·58	1·30	85·2
5	Do.	114	4-7-10	do. ...	17·6	15·82	·74	89·8
6	Do.	172	4-7-10	do. ...	18·8	17·43	·40	92·7
7	Do.	222	4-7-10	do. ...	17·1	14·91	1·04	87·1
8	Do.	243	4-7-10	do. ...	13·1	8·97	2·65	68·4
9	Do.	285	4-7-10	do. ...	18·6	16·95	·56	91·1
10	Do.	297	4-7-10	do. ...	19·4	17·78	·42	91·6

THIRD PROGRESSIVE EXAMINATION OF TEN HAMBLEDON SEEDLINGS: SECOND RATOON CANE—AUGUST, 1910.

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.
1	Queensland	Hambledon, Queensland 5	1-8-10	11 months	18·3	15·63	1·19	85·4
2	Do.	10	1-8-10	do. ...	19·2	17·53	·62	91·3
3	Do.	11	1-8-10	do. ...	18·7	17·38	·38	92·9
4	Do.	62	1-8-10	do. ...	17·3	14·82	1·12	85·6
5	Do.	114	1-8-10	do. ...	17·8	16·07	·91	90·2
6	Do.	172	2-8-10	do. ...	21·1	19·94	·12	94·5
7	Do.	222	2-8-10	do. ...	16·0	13·28	1·59	83·0
8	Do.	243	2-8-10	do. ...	11·5	6·10	3·64	53·0
9	Do.	285	2-8-10	do. ...	18·7	17·05	·66	91·1
10	Do.	297	2-8-10	do. ...	19·8	18·23	·51	92·0

FINAL EXAMINATION OF TEN HAMBLEDON SEEDLINGS: SECOND RATOON CANE—SEPTEMBER, 1910.

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	Queensland	Hambledon, Queensland ... 5	7-9-10	12 mo's	19·2	17·56	·67	91·4	14·08	15·09	7 May
2	Do.	10	7-9-10	do.	21·3	19·99	·33	93·8	12·66	17·46	20 June
3	Do.	11	7-9-10	do.	18·5	17·60	·71	95·1	11·79	15·52	
4	Do.	62	7-9-10	do.	19·0	17·54	·65	92·3	12·95	15·27	20 June
5	Do.	114	8-9-10	do.	18·0	16·22	·76	90·1	12·58	14·18	
6	Do.	172	8-9-10	do.	19·8	17·86	·83	90·2	13·41	15·46	28 May
7	Do.	222	8-9-10	do.	18·4	16·91	·84	91·9	10·17	15·19	
8	Do.	243	8-9-10	do.	14·8	11·29	2·19	76·2	11·53	9·99	1 June
9	Do.	285	8-9-10	do.	18·0	16·01	·81	88·9	9·55	14·48	28 May
10	Do.	297	8-9-10	do.	19·1	16·21	·55	84·8	10·65	14·48	7 May

In September, 1910, the crop was cut and sent to Meadowlands Mill, where it was weighed. The weights are also checked on the Station weighbridge. From the count of the canes, the sugar in the cane, and the weight of the crop the results which follow were compiled.

CROP RESULTS—TEN HAMBLEDON SEEDLINGS—SECOND RATOONS, 1910.

No. of Plat.	Name of Variety.	Age of Cane.	No. 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	Hambledon, Queensland 5	12 months	39,494	2·6	46·5	15,746	7·0
2	10	do. ...	41,624	2·0	38·2	14,974	6·6
3	11	do. ...	37,558	2·1	36·4	12,679	5·6
4	62	do. ...	19,747	2·4	21·1	7,242	3·2
5	114	do. ...	29,427	2·9	38·2	12,133	5·4
6	172	do. ...	25,168	3·0	34·6	12,002	5·3
7	222	do. ...	33,299	2·3	34·6	11,792	5·2
8	243	do. ...	13,358	2·4	14·8	3,326	1·4
9	285	do. ...	31,944	2·6	38·2	12,390	5·5
10	297	do. ...	28,652	2·5	32·8	10,652	4·7

This experiment being now concluded the total results of the plant, first, and second ratoon crops are given. When these are compared with the results obtained by this Experiment Station from the best of the New Guinea varieties, which results have already been published in previous reports, it is at once seen that they do not for a moment compare with them. This has been recognised not only at Mackay, but also by growers in the North. It is probable, however, that some of these varieties may give better results in the Southern sugar districts to which they are now being sent by the Experiment Station.

The following is a brief description of each variety :—

H.Q. 5.—Healthy, makes a fine growth of moderately stout and long cane, colour brownish purple, good stooler, good ratooner. Semi-erect. Trashing somewhat difficult.

H.Q. 10.—Healthy, makes good growth of moderately stout long canes, colour dull green, good stooler and ratooner, trashing easy. Habit erect.

H.Q. 11.—Not healthy, many tops and sticks die out, colour purple, poor stooler and ratooner. Habit erect. Trashing easy.

H.Q. 62.—Not healthy. Growth small and short, colour olive green, poor stooler and ratooner. Habit erect. Trashing easy.

H.Q. 114.—Healthy, makes good growth of moderately stout cane, colour purplish, average stooler, ratoons well. Trashing easy.

H.Q. 172.—Not healthy, makes fair growth of moderately stout cane, colour brown to purple, average stoler and ratooner. Habit erect. Trashing difficult.

H.Q. 222.—Healthy, good growth of moderately stout cane, colour greenish, fair stooler and ratooner. Habit semi-erect. Trashing easy.

H.Q. 243.—Not healthy, makes fair growth at beginning, but numbers of sticks develop disease. Colour brownish purple, average stoler, fair ratooner, inclined to lodge. Trashes easily.

H.Q. 285.—Healthy, makes good growth, colour greenish with rosy blush, good stooler and ratooner. Habit erect. Trashing easy.

H.Q. 297.—Has healthy appearance, but gumming disease indicated. Good stooler and ratooner. Colour dark green. Erect. Trashing easy.

Below appear the results for the three years,

ANALYTICAL RESULTS OF THE TEN HAMBLEDON SEEDLINGS.

Name or Number of Variety.	PLANT CROP, 1909.				FIRST RATOON CROP, 1909.				SECOND RATOON CROP, 1910.				AVERAGE OF THE THREE YEARS.	
	Density of Juice (Brix.)	Per cent. Sucrose in Juice.	Per cent. Glucose in Juice.	Purity of Juice.	Density of Juice (Brix.)	Per cent. Sucrose in Juice.	Per cent. Glucose in Juice.	Purity of Juice.	Density of Juice (Brix.)	Per cent. Sucrose in Juice.	Per cent. Glucose in Juice.	Purity of Juice.	Sucrose.	Purity.
Hambledon, Queensland 5	18·2	15·03	1·34	82·5	19·1	16·92	·85	88·5	19·2	17·56	·67	91·4	16·50	87·7
10	20·6	19·07	·45	92·5	20·5	19·15	·28	93·4	21·3	19·99	·33	93·8	19·40	93·2
11	19·0	17·40	·55	91·5	17·2	16·02	·44	93·1	18·5	17·60	·71	95·1	17·00	93·4
62	18·1	15·90	·77	87·8	18·3	16·80	·51	91·8	19·0	17·54	·65	92·3	16·74	90·9
114	16·9	14·66	·97	86·7	19·3	17·93	·29	92·9	18·0	16·22	·76	90·1	16·27	90·3
172	19·5	17·46	·60	89·5	20·8	19·03	·35	91·4	19·8	17·86	·83	90·2	18·11	90·5
222	17·2	15·45	·69	89·8	18·1	16·60	·59	91·7	18·4	16·91	·84	91·9	16·32	91·1
243	15·0	11·68	1·89	77·8	16·8	13·90	1·15	82·7	14·8	11·29	2·19	76·2	12·29	79·2
285	17·6	15·81	·67	89·8	19·7	18·56	·19	94·2	18·0	16·01	·81	88·9	16·79	91·2
297	19·4	17·30	·43	89·1	19·5	17·60	·27	90·2	19·1	16·21	·55	84·8	17·03	88·2

CROP RESULTS OF TEN HAMBLEDON SEEDLINGS, 1908 TO 1910.

Name or Number of Variety.	Plant Crop.		First Ratoon Crop.		Second Ratoon Crop.		Total Yield—Three 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.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.
Hambledon, Queensland 5	61·8	8·2	47·6	7·0	46·5	7·0	155·9	22·2
10	57·1	9·6	34·7	5·9	38·2	6·6	130·0	22·1
11	53·1	8·2	22·4	3·1	36·4	5·6	111·9	16·9
62	41·7	5·8	29·9	4·4	21·1	3·2	92·7	13·4
114	46·5	6·0	36·0	5·6	38·2	5·4	120·7	17·0
172	49·5	7·7	27·8	4·6	34·6	5·3	112·0	17·6
222	34·0	4·6	36·0	5·4	34·6	5·2	104·6	15·2
243	49·6	5·1	35·3	4·4	14·8	1·4	99·7	10·9
285	44·8	6·0	43·5	7·2	38·2	5·5	126·5	18·7
297	39·9	6·1	40·8	6·3	32·8	4·7	113·5	17·1

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

The following seedling varieties were purchased from the Queensland Acclimatisation Society in 1907 :—Queensland 6, Queensland 30, Queensland 102, Queensland 116, Queensland 121, and Queensland 176.

Sufficient cane having been propagated from the sets originally purchased by the end of July, 1909, these varieties were planted out under experimental conditions at the end of that month. The treatment of the land was as follows :—After removal of stools and rubbish from the previous crop, the land was deeply ploughed to turn soil so as to admit sun and air. About two months afterwards the ground was again deeply ploughed and subsoiled. This was followed by the sowing of a crop of Mauritius bean in November, 1908. By the beginning of May, 1909, a splendid crop of green manure, standing 3 ft. high, was ploughed under, which crop took two months to thoroughly rot down below the surface. Two further cross ploughings were now given, and the cane was planted in drills 5 ft. apart, the plants having three eyes, and being placed 6 in. apart. These remarks also apply to the land for Mauritius Malagache and B 147 which was planted on the same area.

Subsequent cultivation took place with the Planet Junior cultivator fitted with the duck-foot hoes and worked precisely in the manner prescribed under the account of the Hambledon seedlings. No irrigation was used in the tests, and they were manured with the same mixture as the Hambledon seedlings. Half of the nitrogen was applied with the sulphate of potash and phosphoric acid in October, while the balance of the nitrogen was applied in December. The latter application, however, was followed by very heavy rain, and it is doubtful if the crop received from it the benefit it should have done. From the 1st August to the 20th October the crop passed through a very trying time. The weather was exceedingly dry, and during that period the relative humidity in the air was abnormally low. Towards the end of October rain began to fall in some quantity, which was followed by fair rains in November, and heavy falls in December and January, the rainfall registered for the latter month being over 36 inches. From that time on to the end of July the crop has never suffered from lack of moisture, rain being practically continual.

Of the Queensland seedlings, the subject of this experiment, it is perhaps too early to say a great deal. But it has to be remarked that they, in common with the majority of seedling canes tried on this Station, are mostly of delicate habit, and lack vigour, when compared with the older standard canes and the best of the New Guinea varieties. The best of the six, from an all-round point of view, is undoubtedly Queensland 116; it is a good upright cane, and has a good sugar content. It possesses one fault from a Northern farmer's standpoint, which is its very early arrowing. If Queensland 102 improves in its sugar producing powers, it should be a really fine cane, for the weight is there.

The Barbadoes 147 is a promising cane and appears healthier and stronger than other seedlings.

Mauritius Malagache has already been grown to some extent in the North; it is giving very fair results there.

The following brief description of each of the six Queensland seedlings may be subsequently of value:—

Queensland 6.—A yellow to purple cane, at times showing a striped appearance. Eye small and flat, pressed very closely into root ring. Internodes 3 to 5 inches long, pronounced waxy ring. Stout cane, habit erect, growth somewhat stunted. Foliage broad and inclined to wither as it approaches maturity. Trashes easily. Averages about five sticks per stool.

Queensland 30.—A purple cane. Eye somewhat prominent and sharply pointed, reposing in a groove. Internodes 5 to 5½ inches long. Moderately thin, inclined to lodge. Growth fair, foliage narrow. Trashes easily. Averages about eight sticks per stool.

Queensland 102.—A fine purplish black cane with pronounced waxy rings and slight waxy bloom. Eyes fairly large and full but not prominent. Internodes average from 4 to 5 inches in length. Stout cane somewhat inclined to lodge. Growth good, foliage broad and healthy. Trashes easily. Averages about six sticks per stool.

Queensland 116.—A blackish purple cane covered with a white waxy bloom giving sticks a bluish appearance. Eye somewhat flattened reposing in a slight groove. Internodes average 4 inches in length. Moderately stout, erect in habit. Growth good. Foliage medium width. Trashes easily. Averages between four and five sticks per stool. A very early arrower.

Queensland 121.—A brown cane with deeper brown lines. Eyes small and slightly rounded. Internodes average 5 inches. Medium thickness. Erect, poor in growth. Foliage erect and narrow. Trashes easily. Averages about six sticks per stool.

Queensland 176.—A claret-coloured cane with slight waxy bloom. Eye medium size reposing in a groove. Internodes about 3½ inches long. Cane moderately thin. Lodges. Makes poor growth. Foliage broad and healthy. Trashes moderately easily. Averages about eight sticks per stool.

Preliminary and progressive examinations were carried out upon these six Queensland seedlings and the Mauritius Malagache and Barbadoes 147 during the months of June, July, and August. The final determinations and estimation of fibre were made in September. The following tables contain all the chemical data as well as the dates of arrowing of those canes that flowered.

First Preliminary Examination of Queensland Seedlings, Barbadoes 147, and Mauritius Malagache, June, 1910.—Plant Crop.

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.
1	Queensland	Queensland 6	5-6-10	10 months	12·1	6·98	3·75	57·6
2	Do.	30	5-6-10	do.	15·3	11·99	1·96	78·3
3	Do.	102	5-6-10	do.	12·4	6·93	3·44	55·8
4	Do.	116	5-6-10	do.	16·4	12·91	2·12	78·7
5	Do.	121	5-6-10	do.	16·3	13·56	1·36	83·1
6	Do.	176	5-6-10	do.	12·2	5·61	3·98	45·9
7	Barbadoes	Barbadoes S. 147	6-6-10	do.	16·3	12·99	1·96	79·6
8	Mauritius...	Malagache	6-6-10	do.	18·0	15·18	1·50	84·3

Second Progressive Examination of Queensland Seedlings, Barbadoes 147, and Mauritius Malagache, July, 1910—Plant Crop.

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.
1	Queensland	Queensland 6	6-7-10	11 months	14·0	10·41	2·19	74·3
2	Do.	30	6-7-10	do.	17·0	14·97	·73	88·0
3	Do.	102	6-7-10	do.	10·4	4·14	4·25	39·8
4	Do.	116	6-7-10	do.	14·3	9·85	2·83	68·8
5	Do.	121	6-7-10	do.	16·2	14·17	·59	87·4
6	Do.	176	6-7-10	do.	13·2	7·92	3·35	60·0
7	Barbadoes	Barbadoes, S. 147	7-7-10	do.	17·6	15·99	·48	90·8
8	Mauritius	Malagache	7-7-10	do.	17·7	15·48	1·09	87·4

THIRD PROGRESSIVE EXAMINATION OF QUEENSLAND SEEDLINGS, BARBADOES, 147, AND MAURITIUS MALAGACHE, AUGUST, 1910.—PLANT CROP.

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.
1	Queensland	Queensland 6	4-8-10	12 months	12·0	7·55	2·83	62·9
2	Do.	30	4-8-10	do.	15·0	11·86	1·34	79·0
3	Do.	102	4-8-10	do.	9·1	2·70	4·25	29·6
4	Do.	116	4-8-10	do.	17·4	15·07	1·23	86·6
5	Do.	121	4-8-10	do.	18·0	16·36	·46	90·8
6	Do.	176	4-8-10	do.	12·6	6·80	3·64	53·9
7	Barbadoes	Barbadoes S. 147	4-8-10	do.	17·6	15·72	·87	89·3
8	Mauritius	Malagache	4-8-10	do.	19·1	17·06	·89	89·3

FINAL EXAMINATION OF QUEENSLAND SEEDLINGS, BARBADOES 147, AND MAURITIUS MALAGACHE, SEPTEMBER, 1910—PLANT CROP.

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 Arrowing.
1	Queensland	Queensland 6 ...	8-9-10	13 months	9·7	5·84	2·66	60·2	7·20	5·42	
2	Do.	30 ...	8-9-10	do.	17·6	16·01	·65	90·9	11·99	14·09	6 June
3	Do.	102 ...	8-9-10	do.	15·4	11·72	2·66	76·1	12·42	10·26	6 June
4	Do.	116 ...	8-9-10	do.	17·3	13·12	1·48	75·8	11·72	11·58	7 May
5	Do.	121 ...	9-9-10	do.	18·8	17·35	·34	92·2	9·80	15·65	
6	Do.	176 ...	9-9-10	do.	14·2	9·87	2·89	69·5	9·51	8·93	
7	Barbadoes	Barbadoes S. 147 ...	9-9-10	do.	19·2	17·86	·49	93 0	12·00	15·72	
8	Mauritius	Malagache ...	9-9-10	do.	18·0	15·76	1·45	87·5	10·72	14·07	20 June

In September the balance of the varieties was cut and weighed. The actual count of the canes, mill weights, and sugar in cane have been used in the framing of the following table, from which a comparison of the various canes can easily be made.

CROP RESULTS: QUEENSLAND SEEDLINGS, BARBADOES 147, AND MAURITIUS MALAGACHE.—PLANT CROP, 1910.

No. of Plat.	Name of Variety.	Age of Cane.	No. 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 S. 6	13 months	19,456	3·3	29·2	3,557	1·5
2	30	do.	42,108	2·6	50·5	15,957	7·1
3	102	do.	29,330	4·5	59·2	13,616	6·0
4	116	do.	28,749	3·2	42·0	10,895	4·8
5	121	do.	38,623	3·0	51·9	18,224	8·1
6	176	do.	44,140	2·2	43·8	8,765	3·9
7	Barbadoes S. 147	do.	28,168	4·0	51·0	17,986	8·0
8	Mauritius Malagache	do.	32,524	4·7	69·2	21,818	9·7

NEW EXPERIMENTS.

Two new sugar-cane experiments have been initiated this year, which will be carried out in duplicate.

(A.) Trashing Experiments.

The first of the new experiments is a series of plats to determine whether the trashing or stripping of the cane plant pays. As pointed out in last year's report, a number of experiments have been carried out at the Experiment Station, Hawaii, in which it had been clearly proved that the stripping or trashing of cane did not pay; in fact the practice resulted in a distinct loss, causing a lower yield of sugar and cane per acre. It was decided to carry out similar experiments at the Mackay Station in order to find out if the same results would hold good for Queensland. If it can be proved that stripping the cane is of absolutely no benefit to the crop but has an injurious effect on the yield, it will relieve many farmers, who now trash their cane under the belief that they are carrying out good work, of a great deal of labour and expense.

The piece of ground selected for these experiments was that upon which the distance experiments were previously carried out, and is perfectly uniform in nature. After ploughing out the stools the land was deeply ploughed to let in sun and air and then ploughed and subsoiled to a depth of 19 to 21 inches. A green crop of small red Mauritius bean was then sown and the resulting crop, which was a very fine one, was ploughed under. One half of the piece was laid out into five plats in March last, and the cane chosen for planting the experiment was New Guinea 24A. The cane was planted in drills five feet apart with six inches between the plants. Due to the very heavy rains experienced in the wet season, the ground got cold and somewhat sodden, and the germination and growth of the experiment was not nearly so good as usual at this time of year.

The second half, which will be the duplicate experiment, was not planted till July, and a different variety—namely, New Guinea 40—was used for plants. If the results from the two crops run on all fours during their currency as plant and ratoons, the verdict should be extremely trustworthy. The following are the details of treatment proposed to be applied to each plant in each series, it being, of course, strictly understood that all other conditions of cultivation, fertilising and treatment shall be exactly identical:—

Plat 1, will receive one early trashing.
Plat 2, will not be trashed.
Plat 3, one late trashing.
Plat 4, will not be trashed.
Plat 5, will receive one early and one late trashing.

(B) Ratoon Cultivation Experiments.

A good deal of controversy exists in Queensland as to the best and most profitable method of treating ratoon crops. The burning of the trash is largely advocated by a number as a means of getting rid of fungus and insect pests and leaving the ground clear for good cultivation. Others believe in relieving the trash in every other row and cultivating the alternate rows. A third party advocate the burying of the trash between the rows, while a fourth are clearly convinced that the proper method is to allow the trash to lie where it falls, and simply to let the succeeding ratoon crop volunteer. This latter course is much practised about Mackay.

In order to endeavour to solve this important question, the Experiment Station has this year laid down in cane two separate areas for a duplicate experiment. After the removal of the stools from the previous crops, the land was ploughed to expose the turned furrows to the action of the air and sun. This was followed on one area by ploughing and subsoiling, so carried out that all the ground was moved to a depth of from 19 to 21 inches. A green crop of small red Mauritius bean was then sown, and in three months a good, heavy crop of green manure was ploughed under and allowed to rot down. Cross ploughing followed, and four plats were then laid out and planted at the beginning of April, a mixture of New Guinea 15 and 24B being used in each row for plants.

The second area received somewhat different treatment. After the ploughing out of the stools and the ploughing for sweetening purposes, a green crop of mixed cowpea and Mauritius bean was put in. This also yielded a very large mass of green manure, and was subsequently ploughed under, the deep ploughing and subsoiling not being carried out till after the green crop had rotted. The plats for this duplicate experiment were laid out in July, and the planting was also done towards the end of July, the variety known as New Guinea 24B being used for the planting.

The rows in both these experiments have been placed at 6 feet apart so as to give plenty of room for dealing with the trash.

Should the results from both series be similar, then it is considered that great reliance can well be placed in the results.

The plats in the duplicate experiments will be treated as under—

On Plat No. 1 the trash will be left on the ground and the cane allowed to "volunteer."

On Plat No. 2 the trash will be burnt. The middles will be opened with the swing plough, followed by the subsoiler to a depth of from 16 to 18 inches. 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 ground between the rows being deeply ploughed and moved, and is the method of cultivating ratoons practised at the Experiment Station with excellent results.

On Plat No. 3 the trash will be buried between the rows.

On Plat No. 4 the trash will be put in every other space between the rows, the cleared spaces being cultivated with the plough. This is generally known as "relieving."

Of course as these are to be ratoon cultivation experiments the results will not be available till 1912.

EXPERIMENTS WITH GREEN MANURE SEED BY INOCULATION WITH PROFESSOR BOTTOMLEY'S NITRO-BACTERINE CULTURE.

Part of an area which had been continuously under cane for six years, and on which a plant and five ratoon crops had been grown, was selected as the area for the above experiments. After the stools and rubbish had been carted away from the last fifth ratoon crop, the land was sweetened by the application of one ton of lime to the acre. The lime was broad-casted and then ploughed under. After an interval of two and a-half months the land was deeply ploughed and subsoiled, and again cross ploughed.

It was determined to have three experiments with the seeds of different leguminous varieties, and seed of the Iron Age cowpea, small red Mauritius bean, and large black Mauritius bean were set aside for the tests.

The seed of these varieties, which was of good uniform quality, with a high percentage of germination, was divided into two parts. One half was very carefully inoculated by dipping same in Professor Bottomley's nitro-bacterine culture, the solution being prepared in the exact manner set out in the formula accompanying the packages of the culture, the latter being that recommended for peas and beans. The other half of the seed was not treated in any way.

After the seed had been properly dried as directed, the whole of the inoculated and not inoculated seed was sown. In order that outside rows might not influence the result in any way, all the experiments, both with inoculated and with not inoculated seed, were sown in rows between guard rows. The experiments were laid out in three sections or plats. The first was occupied by the Iron Age cowpea, the second by the small red Mauritius bean, and the third by the large black Mauritius bean. Each experiment occupied a space of 112 feet by 50 feet. The rows were five feet apart and the seed was placed most carefully at four inches apart in the row.

Rather heavy rain followed about a fortnight after the planting, which was succeeded by a long continued wet season. The crops, however, made very good growth and soon commenced to vine and cover the ground. To the eye there appeared little or no difference between the rows that had been planted with inoculated seed and those that had been planted with seed not so treated.

The harvesting of the Iron Age cowpea took place early in June, the results being in favour of the inoculated seed, which produced 1·39 tons more per acre than did the not inoculated.

On 12th July the large black Mauritius bean was harvested, the results in this case being in favour of the not inoculated seed, which produced 1·62 tons per acre more crop than did the inoculated seed.

On 27th July the last of the crops—namely, the small red Mauritius bean—was cut. Here the inoculated seed slightly beat the not inoculated by a little over half a ton per acre.

Analyses were made of samples taken from the inoculated and not inoculated crops, and here a decided advantage of using the culture became apparent, the percentage of nitrogen found being uniformly higher in the inoculated crops than in the not inoculated.

The following tables give the crop results, the percentage of nitrogen found in the crops, and also the weight of nitrogen per acre.

CROP RESULTS NITRO-BACTERINE EXPERIMENTS.

Name of Crop.	Tons per Acre from Inoculated Seed.	Tons per Acre from Not Inoculated Seed.
Iron Age Cowpea	17·28	15·91
Large Black Mauritius Bean	9·72	11·34
Small Red Mauritius Bean	13·50	12·96

ANALYTICAL RESULTS.

Name of Crop.	Percentage of Nitrogen in Inoculated Crop.	Percentage of Nitrogen in Not Inoculated Crop.
Iron Age Cowpea	0·611	0·549
Large Black Mauritius Bean	0·704	0·663
Small Red Mauritius Bean	0·763	0·721

POUNDS OF NITROGEN PER ACRE.

Name of Crop.	Inoculated.	Not Inoculated.
Iron Age Cowpea	236·5	195·6
Large Black Mauritius Bean	153·2	168·4
Small Red Mauritius Bean	230·7	209·3

The cost of the culture is 7s. 6d. per packet, and one packet contains enough to make sufficient solution to inoculate seed for more than an acre.

Apart from the experiment itself, these figures are very instructive, and show the large amount of nitrogen that can be ploughed in per acre by means of raising a green crop of fairly good tonnage from the legumes. The nitrogen contained in the first experiment, even in the not inoculated crop, is equal to nearly half a ton of sulphate of ammonia, the cost for which would be, roughly, taking freight and application into consideration, about £7 10s. The cost of the green manure seed and sowing expenses would not be more than £1 per acre.

INSPECTION OF VARIETIES GIVEN OUT IN DISTRICTS SOUTH OF MACKAY.

In order that a personal inspection of the different varieties of cane, given out from the Mackay Sugar Experiment Station during the past few years, might be made, the Director, in April and May last, visited all the sugar-growing districts south of Mackay. This inspection was principally undertaken to determine if the best of the New Guinea canes, which have given such excellent results in the Northern sugar districts, were likely to prove of promise and value to the Southern sugar-growers, or whether newer types of seedling canes, of earlier maturing capacity, would be better suited to the colder and drier conditions of the South. Upon this matter more will be said later on; in the meantime, the following details as to germination, appearance, and growth are given, it being understood that the notes from which the remarks are copied were made upon the spot in the various localities.

BUNDABERG DISTRICT.

Soils: Deep volcanic, with alluvial areas. Average rainfall for past ten years, about 40 inches.

Gooburrum Sub-district.

New Guinea 15, or Badila.—Germination good, appearance healthy, but growth very poor. Not considered suitable for district.

New Guinea 24, 24A, and 24B.—Germination good, but all backward, and showing poor results compared with the seedling known as D. 1135.

New Guinea 64.—Producing fine long sticks, but in many cases not more than one or two to a stool.

Trinidad Seedling, No. 60.—Germination and growth poor.

Qunaba Sub-district.

New Guinea 15, or Badila.—At Qunaba this cane had germinated excellently, and its appearance was healthy and vigorous. A magnificent crop of 18 months old plant cane on drained land was noted, most of the cane being so heavy that it had fallen.

New Guinea 24, 24A, and 24B were all found to be giving excellent results. These varieties are considered of value and will continue in cultivation.

New Guinea 64.—Generally poor, and will not be persevered with.

The first four of the above canes were also seen in the second ratoon crop, and were giving every promise of a fine crop by crushing time.

Spring Hill Sub-district.

New Guinea 15 (Badila) doing fairly well; germination had been good, but growth rather slow.

24A and 24B.—Both these canes were promising.

Reports were also received from other parts of the Woongarra Scrub that Badila or New Guinea 15 was becoming acclimatised, and giving very fine results, particularly in the Pemberton Sub-district.

Bingera Sub-district.

New Guinea 15.—This cane was doing very well at this plantation and was considered very promising. A very good crop was noted, and the variety is evidently becoming acclimatised to Southern conditions.

New Guinea 24, 24A, and 24B, were all found healthy and giving good results.

New Guinea 40 has been planted out on a larger scale, and its germination and growth were excellent.

Invicta Sub-district.

New Guinea 15.—A first ratoon of this variety was inspected and found to be producing a fine vigorous crop.

New Guinea 24.—A first ratoon crop of this variety six months old was in splendid order and should produce a maximum yield.

GIN GIN DISTRICT.

New Guinea 15.—Germination good, appearance healthy, but considered too slow a grower.

New Guinea 24, 24A, and 24B.—Germination good, but on the whole growth not quite so good as the standard varieties in the district.

New Guinea 47, 48, and 54.—These three canes were found to be doing remarkably well. The two former, as is their Northern habit, were producing thick heavy canes, clean and pleasant to handle. They are rapidly becoming strong favourites, and, if they continue as well as they have begun, should prove a decided acquisition to the district.

B. 208.—This cane, although of fair promise in some localities, was not generally cared for as being too delicate in constitution.

New Guinea 8A and Mauritius Bois Rouge have been practically abandoned.

CHILDERS AND ISIS DISTRICTS.

New Guinea 15.—This cane was found to be doing fairly well on certain farms, and farmers are advised to continue it in cultivation, as the probabilities are that when it has become acclimatised, large crops will result.

New Guinea 34.—This cane doing remarkably well. Germination and stooling power excellent.

New Guinea 24A.—Small crops of this variety were seen in several places. On Mr. Broadhurst's farm at Childers a really magnificent crop of this cane was inspected.

New Guinea 24B.—This cane was also giving fairly good results, both at the Company's nursery and in other places.

New Guinea 47.—Fine thick upright cane of this variety seen in several parts of the district.

Mauritius Malagache.—Very good crops of this variety were seen on various farms, and the cane appears to be a promising one for the district.

Mauritius Bois Rouge.—Backward and slow in growth. Very little grown, and what there is will not be continued.

Mauritius Settlers.—This cane did remarkably well at first at Childers, but is not now being grown to any extent.

A variety which gives great promise of being a suitable cane for the Isis district, and of which a fairly large quantity is now being grown, is the Mauritius 1900 Seedling. Both as plant and ratoon this variety looked healthy and strong. It produces a very thick black stick, erect, and an average number of sticks per stool. In the North it produces a thick stick of great length and lodges badly.

PIALBA DISTRICT.

Soils: Mostly dark and light loams, with clay subsoils.

NIKENBAH SUB-DISTRICT.

New Guinea 15.—This cane was doing very well as a stand-over crop, but evidently requires good land and a period of from eighteen months to two years to mature in.

New Guinea 24, 24A, and 24B.—These varieties were found to be doing well, and were regarded favourably. At time of inspection they had produced good crops of stand-over cane.

TAKURA SUB-DISTRICT.

New Guinea 15 was not doing particularly well.

New Guinea 24.—Giving good results.

New Guinea 24A.—Producing a fine growth of cane, and considered the best of the New Guinea canes sent out.

New Guinea 24B.—Also giving fine results.

Mauritius Bois Rouge and Malagache.—Not doing well; the former cane will be discarded, while the latter will be given further trial.

The Demerara 1135 was also strongly in evidence in the Pialba district, and was giving good results both as plant-cane and ratoons.

MT. BAUPLE DISTRICT.

New Guinea 8A.—Germination poor and growth too slow. Not considered of sufficient promise to retain, and will be discarded.

New Guinea 15.—This cane, though producing a healthy crop, was very backward, and even as a stand-over crop had not produced any great amount of cane. It may, however, do better when thoroughly acclimatised.

New Guinea 22.—Giving fair results only.

New Guinea 24, 24A, and 24B.—Of these three canes the New Guinea 24 (or Goru) was the only one giving good results, both as plant and ratoon. The other two were well spoken of as plant croppers, but were condemned as ratooners.

New Guinea 48.—This variety was producing a fine thick heavy stick, and is well liked.

The Demerara 1135 is also being largely grown in this district, and the crops of it inspected were healthy and making good cane.

NAMBOUR DISTRICT.

New Guinea 15.—Several very fine crops (stand-over) of this variety were inspected.

New Guinea 24.—On the hillsides, this variety is doing remarkably well. It is considered by Mr. Murtagh, one of the directors of the Moreton Mill, to do better than any other cane as a cropper. Several fine crops both of plant cane and ratoons were seen.

New Guinea 24A and 24B.—Neither of these canes were seen at any of the farms visited, but fresh supplies will be sent to Nambour Mill for distribution.

New Guinea 54.—This variety was also very promising.

BEENLEIGH DISTRICT.

Soils: Alluvial river banks.

Average rainfall about 42 inches.

In this district, owing to the heaviest frost known in the district in the year 1908, a number of the varieties sent from the Mackay Station died out. The bulk of the cane grown is of the Striped Singapore and Rappoe varieties. Of the New Guinea varieties only 24 (or Goru) and 64 were seen. The former is grown to some extent and spoken favourably of. New Guinea 64 is also a favourite with many growers, as it produces a long healthy thick stick of cane, and appears to do better in this particular locality than in any other district in which it is grown.

NERANG DISTRICT.

This is the most Southern sugar district of Queensland, being in fact on the border of New South Wales. It was found here that the New Guinea varieties sent from Mackay were in nearly every case giving fine results, and the writer saw some very beautiful cane of the New Guinea 15, 24, 24A, 24B, and 47 varieties. It is confidently expected that those canes will, to a very large extent, take the place of the canes now grown at Nerang, which are largely Striped Singapore and Rose Bamboo, and which are giving evidence of becoming exhausted. Some of the sticks of the above varieties were 17 feet long, being of course eighteen months and two years old cane. New Guinea 54 was also showing good cane, and was well liked by many farmers.

SUMMARY.

On the whole, it is anticipated that New Guinea 15, 24, 24A, 24B, 47, 48, and 54 will, when they become thoroughly acclimatised, give very good results. At the same time, the lighter seedling classes of cane seem to be preferred in many places in the South, and steps are being taken to meet this demand by the sending to applicants of the best of the Hambledon Queensland Seedlings, Queensland Seedlings, and the lighter of the New Guinea canes, such as New Guinea 26 and 40.

INSPECTION OF VARIETIES GIVEN OUT IN THE DISTRICTS NORTH OF MACKAY.

Following the visit to the Southern sugar districts the Director in June and July visited all the Northern sugar centres (except Proserpine and Mourilyan.)

Of the varieties distributed in 1906 the following have proved totally unsuited to the North. New Guinea 8A, 64, Mauritius Bois Rouge and (excluding Burdekin) Trinidad Seedling No. 60.

At the Lower Burdekin district the following varieties were found to be giving first rate results, and large areas had been planted out and were being cut for the mill:—

New Guinea 15, 24, 24A and 24B, also Trinidad Seedling No. 60.

This latter cane proved a great surprise when compared with its behaviour in other places to which it had been sent. Under the influence of the drier soils and irrigation it has developed into a fine upright thick cane and is greatly favoured by a large and increasing number of growers, and it was frequently mentioned to the writer that there was no stooler on the Burdekin equal to Trinidad 60 and Badila. It is rather slow in coming up, but grows a fine healthy crop, and is liked very much by the cutters. Some of the sticks measured were 12 feet long and over 6½ inches in circumference.

New Guinea 15 is also a great favourite.

During last year the variety known as Mauritius Malagache was sent to the Farmers' Association at Burdekin. This was taken care of and planted out by Mr. Geo. McKersie, the secretary. The plants germinated well and produced healthy, long, and vigorous cane, and will now be distributed generally through the district.

HERBERT RIVER, JOHNSTONE RIVER, CAIRNS AND MOSSMAN DISTRICTS.

In these districts the varieties known as Goru and Badila, although introduced by the Department of Agriculture from New Guinea, were not distributed directly from the Mackay Sugar Experiment Station. They were originally sent to Kamerunga State Nursery at the same time as they were brought to the then Mackay State Nursery. The Colonial Sugar Company, at Hambledon, made a large number of tests of the New Guinea varieties, and selected the two named, which now form by far the larger part of all the cane grown in the North. The companion canes to 24, (or Goru)—namely, 24A and 24B—were, however, sent out by the Mackay Experiment Station in 1906, and in previous reports will be found full particulars as to their behaviour. They are now rapidly coming into favour, and wherever tried are being planted out on a large scale. The New Guinea 24A is, in the writer's opinion, a superior cane to the 24 or Goru; it is generally richer in sugar, and it does not arrow so early as the Goru. The 24B is also a good cane, and where Goru is not giving satisfaction the replacement of it by these two canes is recommended. On the Herbert River the New Guinea canes are not planted out so largely as they are at the Johnstone River, Cairns, and Mossman. As already pointed out in other reports, the variety known as B. 208, which is a Barbadoes Seedling, is grown very largely on the Herbert, and around Macnade it is estimated that fully 40 per cent. of the cane grown there will be of this variety. It is, without doubt, a remarkably fine grower and an excellent sugar-cane in this district, but it gives results not nearly so good in other parts of Queensland, and is therefore not generally grown. At Macnade, where a keen interest in varieties is taken by the manager, Mr. Waring, the Hambledon Seedling No. 426 was considered to be giving the best results of all the Hambledon Seedlings which were raised, and the manager evidently considers this to be a cane of very high promise. Through his courtesy the Station received some of this variety last year, which was planted out to provide seed for further experiments.

On the Johnstone River the universal favourite was New Guinea 15, or Badila. Fully 80 per cent. of the total cane grown on the Johnstone is this standard variety. There can be no doubt, to any person examining the crops in this district, that here we have the true home of the Badila cane. The heavy rains and good drainage obtaining, appear to suit it in every respect, while as to the sugar content, analysis in June showed 18 per cent. of sugar.

Very little Goru is grown, and only small areas of 24A and 24B, but these latter canes are highly esteemed where tried, and larger areas are being planted out every year. At Goondi Mill these two varieties were well spoken of and were going to be planted out further.

At Cairns the Mulgrave district was first visited. Here the favoured cane has been for many years past New Guinea 24, or Goru, and it is estimated that 70 per cent. of the cane will be this variety. Badila, however, is coming strongly into prominence, about 25 per cent. being now grown. A higher price is offered by the mill for Badila, owing to its high sugar content. This variety will largely increase in the future. Very little 24A and 24B is in evidence, but early this year many growers applied to the Station for cuttings, so that it is now being again propagated. When last sent a great portion was destroyed by grubs, while horses, goats, and cattle accounted for most of the balance.

At Hambledon 24A and 24B are being grown on a somewhat larger scale.

At the Mossman district the varieties 24A and 24B were giving excellent results, and the areas planted out are constantly increasing. The following canes were sent to the Mill Nursery by the Experiment Station this year:—Hambledon, Queensland 10, 114, New Guinea 24A, 24B, and 40. These had all germinated well and were looking healthy. The 24A had made the best growth.

A greater variety of canes are grown at Mossman than on the two districts immediately below it, but on the whole the Goru and Badila predominate largely.

VISITS TO SUGAR DISTRICTS OUTSIDE MACKAY.

During the latter half of April and first half of May, the writer, with the approval of the Department of Agriculture, carried out a visit to the Southern sugar districts, calling at as many centres as was possible during the somewhat limited time. Leaving Mackay on 12th April, the Director arrived at Bundaberg on the 13th. On the 14th Fairymead Plantation was visited in order to observe the germination of various canes supplied by the Mackay Experiment Station, and to inspect some West Indian seedlings imported by the Messrs Young Bros., and which were stated to be giving good results. The writer was given every opportunity to see all that was of interest, and he was much pleased with the growth and behaviour of many of the canes he saw, and which are considered eminently suitable to Southern conditions. The Demerara 1135, originally introduced by Messrs. Young Bros., and which in the Bundaberg district is variously called "D. 11," "Frost Resister," and "Fairymead" is called "Bundaberg" at Mackay. This cane has obtained a fine reputation in the South, and quite 60 to 80 per cent. of the cane grown around Bundaberg consists of this variety. Other Demerara canes doing well and holding out promise for the future were D. 102, D. 625, and D. 1483.

The varieties sent by this station to Fairymead in March last were New Guinea 4, 26, and 40; Hambledon (Queensland), 5 and 285. These had all germinated, and it is hoped they will prove successful. They are all canes of thin to moderately thick habit, large stoolers, and it is thought they will be better adapted to Southern conditions than they are in the North, where thicker canes are the favourites.

The next place visited was Gooburrum, in which place a certain amount of mixed farming is being carried on with success. The varieties sent to this place from Mackay were inspected, but they were not showing particularly good results.

The following day was spent in the Woongarra Scrub. The soils here are deep red volcanic, and were at one time most prolific. Of late years the yield has been steadily decreasing, and an experiment station, or a series of farmers' plats, is a matter of great urgency in order to deal with the problems awaiting the soil investigator, and which are of a totally different nature to those existing at Mackay. The writer feels assured that lack of sufficient rainfall and humid hot conditions generally have a great deal to do with the matter, but proper soil handling, and the trial of various fertilisers and green manures, would do a great deal to remedy the very serious state of affairs existing on the Woongarra.

Various parts of the Scrub were visited and it was satisfactory to note that many of the New Guinea varieties were commencing to give good returns after their period of acclimatisation. Some particularly fine Badila, Goru, 24A and 24B were seen.

On the 16th the writer visited Bingera Plantation, and found crops and soil looking in good condition, and a long crushing was anticipated. Here manures, green soiling, and subsoiling are largely practised with most beneficial results. Fine Goru and Badila were inspected, and the 24A and 24B were also doing well. Dr. Arthur Gibson kindly took the writer in charge and showed him everything worth seeing on this large and up to date plantation.

Gin Gin was the next place called at, and as many of the cane fields visited as possible on the one day at command. Striped Singapore, Rose Bamboo, and D. 1135 were the principal varieties grown here, though some particularly good Mauritius canes introduced by the manager of the Gin Gin Mill, Mr. Desplace, were looked at. Good thick standing cane of the varieties New Guinea 22, 47, 48, and 54, sent from the Mackay Station were also seen. Some of the cane seen at various farms were showing what appeared to be very similar to the West Indian root disease, especially where the Rose Bamboo and Striped Singapore had been grown on the same land for many years. The symptoms observed were a matting of the trash round the base of the cane, interspersed with the white threads of mycelium, a pinching in of the cane at its junction with the ground, often causing the stick to fall. The affected stick frequently appears higher than the surrounding cane, and throws out poor withered attenuated foliage. Dr. Cobb, lately of the Hawaiian Experiment Station, considers that there is some connection between the fungus known as "Coral Stinkhorn," and the root disease, and this fungus was stated to have been very plentiful about the fields at Gin Gin. The remedies suggested by the Experiment Station at Hawaii are the burning of the trash, stoles, and all rubbish whatsoever lying about, and the absolute removal by carting off of anything that may be left. This is followed by the application of lime to the soil, the disinfection of all cane to be used for replanting with Bordeaux mixture, and the removal and destruction of all coral stinkhorn where detected. A meeting of cane farmers, which was largely attended, was held at Gin Gin. A short address was delivered on the maintenance of soil fertility, which was followed by a conversational discussion.

On the following day portion of the time was spent in a second inspection of the Woongarra, while at night a very large and enthusiastic meeting of farmers was held at the Ashfield Hall, Woongarra, nearly ninety farmers putting in an appearance. The address was listened to with great attention and farmers were then encouraged to put any difficulties before the Director, and a very profitable discussion ensued.

The next day was spent at Invicta Plantation, where by the courtesy of Mr. H. Buss, the Director was driven through many of the cane fields and enabled to note the fine growth of cane resulting from good cultivation.

On the 21st of May the fine district of Childers was next seen. The panoramic view of the magnificent areas of cane in this district is very impressive. It was very much regretted that owing to fixtures having been made ahead, that little more than one day could be spared in this centre. During that time as much as possible of the land and varieties of cane were inspected as possible. A large amount of the Mauritius 1900 Seedling was seen hereabouts, growing a fine heavy straight stick of cane, quite different to its habit in the North, where it lodges badly. Two other Mauritius canes, the names of which were not known, were also promising. In the evening a small meeting of North Isis growers was held in Mr. Adie's house. The next day the cane immediately around the town of Childers was inspected; and while at North Isis a maximum crop was not expected, at Childers it was considered that a heavy crop would be cut.

Leaving Childers, the Takura and Nikenbah centres, in the Pialba district, were visited. The disease seen at Gin Gin, resembling root disease, was here largely in existence on a number of farms. It was stated that the crop was affected to an extent of about 10 per cent The coral stinkhorn fungus has also been seen here in some numbers. It was recommended to growers to try a change of variety of cane, for the old Rose Bamboo and Striped Singapore which is still grown in this district to a very large extent is now, in common with other parts of Queensland, exhibiting a good deal of disease and a certain amount is actually dying out. As the New Guinea canes 24A and 24B, sent to this centre some time ago are doing remarkably well, growers should be well advised to plant out more of these varieties. D. 1135 is also coming into prominence as a useful cane, and is being adopted to some extent by growers.

After leaving the Pialba district the writer went on through Brisbane to Beenleigh. Here a number of small mills are in operation, all being privately owned. To these mills 6,000 (six thousand) tons of cane would be a very large crushing. The rollers are small, and as they are not equipped with up-to-date plants the extraction is relatively low. The owners therefore cannot afford to pay a good price for cane. A meeting of the Beenleigh growers was held, but it was very difficult to get the farmers interested in cultivation or indeed in any other subject than the price of cane. Considering how the price paid compares with that paid to their more favoured brethren in the North a good deal of sympathy can be felt for them. This district and the Nerang were the only places seen where there was no young plant cane visible, the reason being that the whole of the planting for next year is done in August.

At Nerang, which was the next stopping place, a good meeting was held in the mill, and a number of growers attended. Considerable interest was shown in the subjects of green manuring, cultivation subsoiling and fertilising, a number of questions being put on these points. At this, the most southerly sugar-growing district of Queensland, as good cane was seen as anywhere in the North, only it was from eighteen months to two years old, as against twelve months in the North.

The writer then returned to Brisbane, where a day was spent on official business and a visit to the Queensland Acclimatisation Society's Gardens, to arrange for the transport of a large number of Queensland Seedlings, which the Society have presented to the Queensland Government, for trial and experiment at Mackay.

On the way back to Mackay the Nambour district was visited, and although a scattered one, still a great deal of the country and cane was seen through the courtesy of the manager of the mill, Mr. Cowley, placing a locomotive at the disposal of the Director to run over the lines. The New Guinea 24 (Goru) was seen to be giving very fine results, and it was thought by many growers that it was, as a cropper, better than any other variety they grew. Good third ratoons of this cane were inspected.

Proceeding nearer home, the Mt. Bauple district was called at. Here the cane is taken by the Government Central Mill, which is under the management of Mr. J. J. Cran. He very kindly arranged for a meeting of growers, which was largely attended, many topics of interest to cane growers being dealt with.

The Director then left for Mackay, calling in at Bundaberg to deliver a short address to the South Kolan farmers.

The object of the visit was principally to personally inspect the soils of the Southern sugar districts, and to learn how the varieties of cane from time to time given out by the Mackay Experiment Station to growers in the South were progressing, so that canes could be in future selected which were adapted to Southern conditions.

It was also very much desired to come into touch with the sugar-growers in the South and discuss with them matters of mutual interest. The delivery of short non-technical and non-formal addresses at the various centres was highly appreciated, and the conversational discussions by which these addresses were followed were of the utmost interest. As one question follows another and is discussed, the most retiring farmer can usually think of some point on which he requires enlightenment, and it is not long before the larger part of those present are taking part in the proceedings.

During the latter part of June and up to the middle of July a similar visit was carried out to the sugar districts to the north of Mackay, omitting Proserpine, which it was intended to visit separately at a later date. This visit is the seventh annual one paid by the writer; and, to show the general wetness of the North, it was the first dry trip he has ever made, only one wet day, at Burdekin, being experienced. Even at Geraldton, where it is said to be always raining, the weather remained absolutely fine.

Proceeding by steamer to Townsville, the first place called at was Ayr, the capital of the flourishing and prosperous district of the Lower Burdekin, and which, in the writer's opinion, possesses more factors for the successful growth of cane than any other district in Queensland. On arrival it was found that the crushing season had already commenced, and this was highly necessary, seeing that some 180,000 tons of cane are anticipated to be put through the rollers. This centre is particularly favoured inasmuch as it has no pests, and the growers are independent of rainfall owing to their large and cheap supply of underground water which enables them to apply water to the cane at the very time it most requires it. The Burdekin district, according to the Government Statistician, easily tops all others in weight of cane and yield of sugar produced per acre. There can be no doubt that irrigation always pays very much better where the natural rainfall is small than in places where it is relatively large. The irrigation of the dry belts in Hawaii are sufficient proof of this, and it is also the experience on the Burdekin.

A drive through many of the cane-fields with the secretary of the Lower Burdekin Farmers' Association occupied the first day; and it was satisfactory to find that two of the varieties sent from the Mackay Station—namely, New Guinea 24 or Goru and Trinidad Seedling 60—were stated to be giving the heaviest weights, some of the older varieties cutting out rather lightly.

A well-attended meeting of cane-growers was held the same evening at the Queen's Hall, Ayr. During discussion it was elicited that about 6 inches of water were applied at each irrigation, and that generally three irrigations during the season were sufficient. Thanks to the recent satisfactory rains, it was considered that the underground water supply had been so replenished that there was no fear of its running low for the next ten years. The water was applied in furrows between the cane rows.

On Monday, 27th June, the writer left for the Herbert River, arriving at Ingham on Monday evening. During Tuesday and Wednesday as much of the district as was possible was visited. The areas under 24A and 24B sent from this station were found to be increasing, and much satisfaction was expressed by growers as to these canes. A good deal of new land is being opened up on the Herbert River which is being tapped by extensions of the Colonial Sugar Company's tramlines. A fine crop of somewhere about 160,000 tons was expected by the two mills—Victoria and Macnade; but planting operations for next year were very much behind and might seriously influence the amount of cane for next year.

On Wednesday evening a meeting, which was well attended by growers, was held in the Shire Hall, Ingham. During conversation with growers it was ascertained that, thanks to the Colonial Sugar Refining Company, the cane-suppliers in this district had been in the past enabled to get green manure seed at the low price of 7s. 6d. per bushel. The Director pointed out that from 12s. 6d. to 17s. 6d. had to be paid in Mackay.

Next day Macnade and Halifax were visited. Good crops of Goru, 24A and 24B, were seen here; while the B208 does remarkably well in this locality. A good deal of Badila is also grown. At the Macnade Nursery, Hambledon, Queensland 426 and D1483 were highly spoken of as being possibly the future canes. Mauritius Settlers, a cane sent by this station to the Herbert River, was also well liked. A meeting at Halifax was held that evening, which, however, lapsed owing to general apathy causing a remarkably poor attendance. It was resolved in future to hold the meeting at Macnade.

Leaving Lucinda Point shortly after midnight, Geraldton should have been reached early on the Saturday. Unfortunately, owing to low tides, the tender coming out to the "Mourilyan" could not cross the bar, and the "Mourilyan," being in a hurry to land passengers at Cairns, would not wait. The writer, in common with other passengers, was therefore over-carried to Cairns, and was not landed at Geraldton till the return of the ship from Cairns that night. It was very disappointing, because a large number of growers had turned out from all parts of the district to meet the Director on the Saturday afternoon. It was necessary to postpone the meeting till Monday, but, as crushing operations were in full swing, the growers could not afford the loss of another day, and in consequence only a limited number of farmers put in an appearance.

The fact that 80 per cent. of Badila is grown in this district does not leave much room for other varieties, but in many parts of the Geraldton district 24A and 24B are being tried on increasing areas, and they are favoured as suitable canes by the Goondi mill. This district was the first in which the disc plough was seen being used for drilling for cane-planting, but farmers assured the writer that it worked capitally, provided a certain make of plough was used. A small increase in the yield over last year was anticipated, which is largely due to the amount of cane coming in from the new lands on the north side of the river at Daradgee. The older lands were not giving good results, and a portion was actually going out of cultivation. The decrease on the older lands is, however, attributed by some growers to the strike of last year and consequent late cutting. The operations for next year were generally backward, and field work had been greatly retarded owing to the long-continued wet season this year.

The next place of call was the Mulgrave district at Cairns. The ravages of the grub pest were here very serious. The early estimate of the crop has had to be considerably cut down, and, while a certain amount of the loss is due to excessive rain and areas going out of cultivation, yet the grubs have played an important part in the actual decrease. This pest is to some extent held in check by a system of catching beetles and grubs, and destroying them by burning in the mill furnaces. It is stated that last season no less than 14 tons of beetles were paid for and destroyed. It appears that 150 beetles to the pound is a conservative estimate, so that taken on this basis the astounding number of 4,704,000 beetles were burnt. Besides this, 4 tons of grubs were also destroyed.

A similar meeting to those held in other places was conducted at Mulgrave and largely attended. This was followed by a meeting held at Aloomba on the following evening.

The last place visited was the Mossman, the most Northerly sugar-producing district in the State; and when one has visited every sugar district on the vast coast line from Nerang to Mossman, he gets a fair idea of what the sugar industry is worth to the State and to Australia.

The crop here was also found to be short, and this fine up-to-date mill, capable of treating 100,000 tons of cane, only expected to put about 60,000 tons through the rollers. The deficiency is due largely to the same reasons as exist at the Mulgrave—namely, excessive wet, grubs, and lands going out of cultivation. The fact of the matter is that the average cane farmer attempts too much; and if he were satisfied to treat one-half of the land he has under cultivation in a proper manner, he would get more off half the land than he does at present from double the quantity. Tons to the acre and not acres to the ton are what is needed.

Many enterprising farmers, however, are firm believers in fertilising on the Mossman, and where this is combined with good cultivation payable results have been obtained. Very little green manuring, however, is practised.

While at Mossman the Director had an opportunity of seeing a small part of the work that has recently been carried out by two entomologists attached to the Hawaiian Experiment Station. The beetle, or weevil borer, in Hawaii is becoming a very serious pest and causing a good deal of damage. It was apparently known that a fly existed in New Guinea which deposited its eggs in the larvæ of the beetle. These flies were brought to Mossman, and specially constructed cages of wooden frames and mosquito nets erected in which fresh cane with portions of the tops were set upright and bored with a gimblet. The larvæ of the beetles were introduced in the holes, the flies liberated, and the work of laying the eggs by the flies commenced. The larvæ were ultimately destroyed, fresh flies were constantly being bred, and these latter were shipped to Hawaii in cages designed for the purpose. On arrival at Hawaii they will be liberated in the cane fields, and it is confidently anticipated that the weevil borer will soon be a thing of the past. By somewhat similar means the Leap Hopper pest of sugar-cane has been completely got rid of by the energetic and enterprising staff of the Hawaiian Experiment Station.

At the meeting of growers held at Mossman these facts were plainly stated, and it was considered that it would soon pay the Mossman and Mulgrave farmers to engage a thoroughly trained sugar-cane entomologist to take the matter in hand and see if a parasite for the grub pest could not be discovered, bred, and liberated in some such fashion as already described. The Mossman directorate informed the writer that steps were being taken to that end.

From Mossman the Director proceeded back to Mackay, which he reached on the 16th July.

NOTES ON THE MAINTENANCE OF SOIL FERTILITY, FORMULAS FOR FERTILISERS, Etc

The following notes comprised a large part of the addresses delivered to farmers in various parts of the State. The writer has been several times requested to embody it in the report, so that it might be available for reference:—

In considerating the maintenance of soil fertility in our cane soils we have specially to remember that plant food is only one essential of fertility. Other controlling factors are the depth of the soil, its moisture content, warmth, aeration, texture, and fitness; also, the amount of soil organisms that are present must be taken into account, especially nitrifying bacteria. Therefore manures are not a cure-all, nor are they a substitute for proper soil handling.

Soils may become infertile due to the long-continued use of acid fertilisers, such as sulphate of ammonia and superphosphates, rendering the soil acid. Soils may also lack humus, or have too much. Moisture conditions may be faulty; and a state of things that very frequently occurs—the soil texture and tilth—may be unsatisfactory. One of the most important elements necessary to all soils producing crops is humus, and this can best be defined as decayed vegetable matter in the soil. It benefits the soil chemically by supplying nitrogen directly, and by furnishing phosphoric acid, potash, and lime indirectly. Further, it benefits the soil physically by augmenting its water-holding capacity and increasing its warmth, at the same time being especially beneficial in the production of fine friable soil. It also betters its texture and prevents erosion, the latter being a most important point when we consider the violence of many of our tropical rainfalls. Humus benefits soils in dry spells by affording shade to the ground, and so conserving soil moisture. It is also good from a biological standpoint, as affording food for micro-organisms.

Humus in the soil is lowered by the continued growth of crops which are removed from the ground, by bare fallowing and by the long-continued use of commercial fertilisers.

The best manner of increasing the supply of humus in the ground is by what is known as the practice of green soiling—that is, by growing a green crop and ploughing it under. The best possible crops to grow for this purpose are what is known as leguminous crops. These comprise the Velvet bean; Soya, Mauritius, Cow pea; and others. There appears to be a certain amount of difficulty in many parts of Queensland in obtaining seeds of these legumes, and it would pay Southern farmers very well to cater for the large demand that is now arising. It was necessary last year to import a good deal of seed from Japan and elsewhere.

Soil nitrogen may be increased by green manuring, owing to the property possessed by leguminous plants of capturing aerial nitrogen and fixing same.

With regard to the part to be played by ploughing in the upkeep of soil fertility, it must be remembered that deep ploughing is most essential. So long as none of the clay subsoil was brought to the surface, farmers could plough as deeply as they could; and if a proper subsoil plough was used, the subsoil could be stirred and a deep body of fine earth prepared for the plants. Subsoiling had proved of the greatest advantage at the Sugar Experiment Station, where from 9 to 20 tons more cane per acre had been obtained from the mere act of subsoiling alone, irrespective of irrigation and fertilisers.

Farmers should always endeavour to get their tilth *before* planting, so that surface cultivation only could be carried out. The importance of using the Planet Jr. fitted with the broad hoes has been already drawn attention to in another part of this Report, and does not need repetition. In dry times, which frequently occur over the Southern sugar districts of the State, the conservation of soil moisture can be more readily practised by the use of shallow cultivation with the implement described.

Before leaving the subject of ploughing, it may here be said that bare fallowing for any length of time is not to be recommended. After stools are ploughed out, it is necessary to throw up the land in such a manner that the sun and air may have the best chance of sweetening it and bringing it back to a clean wholesome state for the next crop. But this fallow should not continue more than three months. After that, a green manure crop should be got in as quickly as possible. It has been repeatedly proved that, as one well-known writer puts it, "Bare fallowing is soil robbery"; and exact experiments have determined that a soil allowed to remain in bare fallow for twelve months loses 5 per cent. of its total nitrogen.

The next point we have to bear in mind in dealing with the keeping up of our fertility is that of fertilising. It is of the highest necessity that we should maintain the plant elements in our soils; at the same time in manuring we should think of the application of fertilisers as applied to the crop rather than to the soil. A crop of cane removes a very large amount of mineral matter and nitrogen from the soil; and, strange to say, it has been found that the leaves of the cane take more from the soil than does the cane itself.

Dealing with the different forms of plant food we find that nitrogen as found in commercial fertilisers is not equally available for plants. Its most soluble form is in nitrate of soda, where, as a nitrate, it is immediately ready to be absorbed by the crop. If nitrogen is applied as nitrate of soda it will often show its effects in a week or two, producing a rich dark green colour in the foliage.

Nitrate of soda is very easily leached from the soil, hence it should never be applied during the wet season. When applying this form of nitrogen it is better to give the crop two small dressings during the dry time of the year. Applied in this way it has often been found to add such strength and vigour to plants that the power of getting other mineral food such as phosphoric acid and potash from the natural stores in the soil is largely augmented.

Nitrogen occurs in sulphate of ammonia, dried blood, meatworks fertiliser, etc., but has to go through certain chemical changes and be converted into nitrates before it is ready to feed plants. These changes require time, and hence the latter materials are not so quick in action as the nitrate of soda, but their effects last longer and they are often capable of furnishing nitrogen to a crop during its entire growth. Of the three the sulphate of ammonia is the most readily converted, and hence is generally recommended for sugar-cane plants, except in the very wettest localities of the North, where it is considered that it is better to have a certain proportion of the nitrogen in the form of meatworks manure.

The best form in which to buy potash for manuring sugar-cane is in sulphate of potash. Approximately half its weight is pure potash.

For phosphoric acid a superphosphate containing a high percentage of water soluble phosphoric acid should be chosen, except where meatworks manure is preferred for climatic reasons.

THREE FORMULAS FOR SUGAR-CANE FERTILISERS.

The following mixtures have been found to give good payable results where they have been tried. The first seems well suited to lands about Mackay, Proserpine, Burdekin, and the Herbert River. For Geraldton, Cairns, and Mossman, the second, containing meatworks manure, may be preferred.

Number 1—

250 lb. Sulphate of ammonia containing about 50 lb. of nitrogen.
100 lb. Sulphate of potash, containing about 50 lb. of potash, and
300 lb. Superphosphate, containing about 45 lb. of water soluble phosphoric acid.

650 lb.—The 650 lb. of mixed fertiliser to be applied per acre.

On a percentage composition this mixture would contain approximately:—

Nitrogen	7·7 per cent.
Potash	7·7 per cent.
Water soluble phosphoric acid	7·0 per cent.

This mixture would be more useful still if only half the nitrogen were applied with the rest of the manure as a first dressing, putting the remaining half of the nitrogen on as a top second dressing at an interval of two to three months.

Mixed fertilisers are best applied to the sugar-cane plant crop by applying the same in drills 4 to 5 inches deep on each side of the row, and about 6 inches from the row, when the plants are from 12 to 18 inches high, and then covering the drills in.

For ratoons when the land is being worked between the rows, as it always should be, the manures can be dropped in the furrow ploughed away from the stools, and covered when ploughing back to the row. This should be done immediately after the application, so as to prevent loss. Thorough cultivation is essential in order to obtain the best results from fertilising, and subsoiling is especially valuable. The growth and ploughing in of a leguminous crop every time rift or stales are ploughed out should be imperative.

Number 2—

Sulphate of ammonia	150 lb.
Sulphate of potash	150 lb.
Meatworks fertiliser	300 lb.

The 600 lb. to be applied per acre. The sulphate of ammonia should be divided, the first half being applied in the drill with the sulphate of potash and meatworks fertiliser, the second half being applied on the surface around the cane about two months later. The directions as to application to plant cane and ratoons are the same as in the case of Number 1.

Farmers who have tried fertilising with the Number 1 mixture, and who are satisfied with the result, could very advantageously use the mixture given hereunder, which contains more nitrogen and potash per acre. A mixture similar to this one has given, at the Experiment Station, an increase of just over sixteen tons more cane per acre from third ratoons over the yield obtained from similar third ratoons not so treated.

Number 3—

200 lb. Nitrate of soda containing about 30 lb. of nitrogen.
200 lb. Sulphate of ammonia containing about 40 lb. of nitrogen.
150 lb. Sulphate of potash containing about 75 lb. of potash.
300 lb. Superphosphate containing about 50 lb. of water soluble phosphoric acid.

Here also the nitrogen could be advantageously divided, one-half being applied with the other ingredients and a second dressing of the other half at an interval of from two to three months, provided it was not too close to the wet season. In this second application the scattering of the nitrate of soda and sulphate of ammonia on the surface near the stools will suffice, as it rapidly becomes absorbed by the soil.

THE APPLICATION OF LIME.

Lime is found in the ashes of all plants, and must therefore be considered an essential plant food. Lime acts on dormant mineral plant food and renders available phosphoric acid and potash which would otherwise remain inert; it also acts on the vegetable organic matter and converts part into nitrogenous compounds available for the plant.

Should the soil become acid through long-continued use of artificial fertilisers, as pointed out on an earlier page, there is no more effective way of sweetening the soil than by the ploughing in of lime. It is also of the greatest use as an insecticide and fungicide. In rendering stiff soils friable its use is well known, and Mr. Hall, the director of Rothamstead Station, England, has stated: "It is difficult to exaggerate the improvement that lime effects in the dryness and workability of strong soils, which in many cases would not be fit for arable cultivation had they been not so treated."

The application of lime, therefore, in moderate quantities greatly helps the beneficial processes always going on in fertile soils due to the activity of bacteria, and "thus helps the conversion of compounds containing nitrogen derived from decaying organic matter and nitrogenous fertilisers into nitrates, the form in which plants mainly, if not entirely, utilise nitrogen."

The application of one ton of lime per acre every four or five years is to be strongly recommended to our cane-farmers. The high cost of lime at present in many of the coastal districts is a bar to its being used more extensively; but lime is very plentiful in North Queensland, and arrangements should certainly be made by farmers' associations and other bodies interested in sugar-cane cultivation for the supply to farmers on moderate terms.

In applying lime, growers should bear in mind never to mix sulphate of ammonia or lime together, nor to apply sulphate of ammonia to limed ground until some two or three months have elapsed.

PROPOSED RE-ESTABLISHMENT OF THE SUGAR INDUSTRY AT ROCKHAMPTON.

Acting under instructions from the Hon. the Secretary for Agriculture, the writer, early in January of the present year, visited the Alton Downs District, near Rockhampton, where a Cane Sugar Growers' League has been established. The object of this visit was to advise growers if their lands were suitable for the growth of cane, and if so to give them as much help as possible, both by supplying cane for small experiments and to show them the best methods of cultivation, preparation of land, etc.

The Director was received by the president and secretary of the League and every opportunity for looking at the various types of the soil in the Alton Downs district was afforded. After very careful inspection the conclusion was arrived at that the lands in question were well fitted to grow cane, providing the rainfall was sufficient. This amounts to 40 inches per annum on the average, but there have been years when it has got down as low as 15 inches. The soils, however, hold moisture well, and appear capable of standing a good deal of dry weather, so that it would only be a very occasional year in which the rainfall would be too low for a successful growth. Of course the large crops which are the outcome of heavy tropical rains and great humid heat cannot be expected, but results as good or even better than the Bundaberg district should be secured. The district is not without experience in sugar-growing, as many years ago particularly good crops were grown for the Pandora Sugar Mill, and while the lands are new to cane good results should be assured.

On 6th January a large meeting of proposed growers was held, and the question of the proposed growth of cane and the establishment of a mill was thoroughly gone into. The whole operations of getting the land ready, drilling, planting, and subsequent cultivation was explained in detail, as well as the harvesting of the crop and the sending of same into a mill. Advantage was taken of the Department's offer to send some of the best varieties from the Mackay Station, and it was resolved that experiments should be undertaken, and that further supplies of cane should be ordered from the South.

In the month of March a crate of special varieties was accordingly sent to the Alton Downs Sugar-cane League, and on his way to Mackay from the South, in May, the Director called at Rockhampton to see what progress the experiments had made. The growth of cane was found to be good; it had all germinated well, and on the scrub soils the growth was excellent.

Other sub-districts about Rockhampton are, the writer understands, joining in the movement, and if the industry can be successfully established at Rockhampton it will undoubtedly mean a very great deal to that centre.

Analyses of the black and scrub soils of Alton Downs have been made, and will appear in the chemical section of this report.

DISTRIBUTION OF CANE VARIETIES.

During the past year a great number of cane varieties have been distributed. Applications have been received from practically every sugar-growing district in the State. Where requests from individual growers have been received, these have been dealt with by sending cane through the parcels post, this being the quickest and most readily available method of reaching applicants as well as the most economical. Farmers' associations and large plantations have been sent cane packed either in bundles of tops or else in specially constructed wooden crates.

Applications were received from and cane supplied to growers in Beenleigh, Bundaberg, Lower Burdekin, Cairns, Childers, Geraldton, Gin Gin, Herbert River, Mossman, and Mooloolah. Besides the older New Guinea varieties, the best of the Hambledon seedlings—such as Hambledon Queensland 5, 10, 114, 222, 285, and 297—have been sent out, as well as Mauritius Malagache, B147, and a fair amount of Queensland 116. The usual distribution of cane in the Mackay district was carried out in April; but, due to the long continued wet season and the great difficulty experienced in planting, applicants were not as numerous as usual.

SUBSIDIARY CROPS.

The growth of subsidiary crops, principally to raise seeds and trees for distribution to cane-growers, is still being continued in a small way. There are so many new varieties of sugar-cane coming in, however, that the area to be devoted to other crops may have to be restricted to some extent.

SORGHUMS.

The different varieties of American and local sorghums have been continued in cultivation, both for the providing of feed for station horses, and also for the distribution of various seeds to farmers.

COTTON.

No further experiments have been made with cotton. The land formerly occupied by the Caravonica experiments has now been put under cane.

FRUIT TREES.

Some particularly fine paw paw trees have been grown from seed brought from Cairns. These were planted last year, and the trees have been producing fruit for some time. The fruit is large and well formed and of good flavour. Many of them when weighed scaled upwards of seven pounds. Seed of these have been distributed to applicants. A number of seedlings from the imported mango trees have also been given out.

GRAPE VINES AND PINEAPPLES.

The usual treatment of vines with lime and sulphur paint has been carried out, and the vines are now in very fair order. A number of new plants have been set out. A regular demand for cuttings exists, and this is supplied in the pruning season. Pineapple suckers have also been given away.

BANANAS.

A number of plants known as "Gros Michel" have been imported by the Department of Agriculture from Jamaica. About 100 of these have been sent to this Experiment Station, and are being propagated. These will be available for distribution later on.

GRASSES.

The *Paspalum dilatatum*, Rhodes grass, and *Panicum muticum* continue to do well; and a fair demand for these grasses exists.

GREEN MANURE SEEDS.

The following green manure crops have been or are now being grown for the purpose of supplying the Station with seeds for green manure crops:—Velvet bean, black Mauritius bean, green Mauritius bean, small red Mauritius bean, giant cow pea, iron age cow pea, and horse bean. Small quantities of these are from time to time available at the Station for distribution, and a number of small packages have already been given out.

NEW VARIETIES INTRODUCED.

The varieties introduced last year—namely, Hambledon Queensland 426 and 452, Mauritius 1900 Seedling, B. 208 (reintroduced), Mauritius 189, and Couve—were propagated, and, with the exception of Hambledon Q. 452, which died out, have germinated and done well. They have now been planted out on a larger scale to provide seed for future experimental work.

Since the publication of last year's report, the following varieties have come to hand:—

Direct from Mauritius, received 17th November, 1909:—Mauritius 779, 1201, 55, 87, 1237, 1022, 998, 1474, and 89. Of these numbers 1201 and 1237 did not germinate after the long sea voyage, but the remainder have made fairly good growth, and will be planted out this year to provide seed for new work.

Direct from Louisiana, received 18th March, 1910:—D. 117, D. 604, Louisiana Striped, T. 211, and Louisiana Purple. All the above canes were received in very poor condition, due to the length of time occupied in transit. When they did ultimately arrive at Mackay, they were not allowed to be opened until they had been sent to Brisbane for examination by the Federal Quarantine officer. The only two varieties which germinated were T. 211 and Louisiana Striped. These two are at present very backward, and it will be some considerable time before they can be planted out.

From Owen's Creek, Mackay, the New Guinea varieties—15, 24A, 24B, 47, and 48—have been reintroduced, so as to get fresh stock of these varieties from new land.

The Queensland Acclimatisation Society have also presented a large number of their seedlings to the Queensland Government. These were forwarded to the Mackay Sugar Experiment Station in July of this year, and have been planted out. The canes were received in very poor condition, with short stunted joints and the eyes badly damaged. Borer was also very prevalent. The following are the names of the new varieties received, but it is extremely doubtful if a large number will germinate:—Queensland 1046, 1048, 1049, 1052, 1070, 1071, 1074, 1078, 1079, 1084, 1086, 1092, 1095, 1098, 1102, 1103, 1133, 1121, 1115, 1113, 1112, 1110, 1108, 865, 866, 881, 884, 886, 887, 889, 891, 899, 900, 903, 918, 979, 977, 976, 1035, 970, 1025, 1023, 962, 1019, 1013, 1009, 1004, 1001, 999, 997, 995, 992, 928, 987, 803, 811, 812, 813, 815, 820, 822, 830, 840, 849, 854, 855, 795, 794, 793, 792, 787, 779, 777, 768, 767, 764, 763, 750, 748, 747, 745, 682. 684, 694, 695, 698, 704, 717, 719, 721, 794, 795, 115, 112; Barbados 176; D224, D115, D145, D1135, D306, D1483, B3747, B1529, B3142, B6450, B3922; Queensland 162, 155, 137; Hybrid No. 1, 558, 554, 437, 430, 363, 452, 422, 365, 328, 285, 59, 64, 65, 58, 286, 303, 307, 80, 103, 126, 135, 153, 8, 25, and 45. These, or what survive, will be ultimately planted out on a larger scale and tested under experimental conditions to determine their relative value as commercial sugar-canes.

REPORT OF CHEMICAL WORK AT THE MACKAY SUGAR EXPERIMENT STATION.

Mackay, 1st September, 1910.

To the Honourable the Secretary for Agriculture, Brisbane.

SIR,—I have the honour to submit the following report on the chemical work carried out at this Station, during the past year, ending 30th June.

I have, &c.,
LIONEL C. McCREADY,
First-Assistant Chemist.

LABORATORY WORK.

On account of the frequent absences of the Director, the work of the laboratories has been much interfered with, as on such occasions a large amount of extra work was entailed by my having to assume the field control in addition to the chemical work. The following table will show the work carried out during the year:—

ANALYSES MADE AT THE MACKAY SUGAR EXPERIMENT STATION, FROM 1ST JULY, 1909, TO 30TH JUNE, 1910.

Material.	Method of Analysis.	No. of Samples.	No. of Analyses.
Soils (Hatton)	Agricultural Method	6	12
„ (Alton Downs)	„ „	4	8
„ (Special)	„ „	1	2
„	Nitrogen (Special)	13	26
„	Humus (Special)	13	26
„	Mechanical Analysis	13	13
„	Aspartic Acid Method	13	13
Waters	For Irrigation	3	6
Manures	„ Fertilisation Uses	14	28
Sawdusts	„ „ „	3	6
Canes and Juices	Polarisation Tests	345	690
Canes	Fibre	72	144
Fodders	Complete Analysis	1	2
Green Manures	Nitrogen	3	9
Brix Spindles	Standardising	7	21
Total	... ...	511	1,006

Analysis of Canes for Farmers.

In addition to the canes analysed for the Station, particulars of which appear under a different heading, the following analyses have been carried out for individual farmers :—

Name of Grower.	Residence.	Variety of Cane.	Date of Analysis.	Per cent. Total Solids (Brix).	Per cent. Sucrose in Juice.	Purity of Juice.
J. McDonald	Rocklea	Malabar	7-9-09	17·7	14·84	83·8
Do.	do.	do.	7-9-09	17·7	13·96	78·8
Do.	do.	do.	7-9-09	16·0	12·16	76·0
Do.	do.	do.	8-9-09	17·5	14·76	84·3
Do.	do.	do.	8-9-09	17·9	14·78	82·5
A. Knight	Hatton	Mavoe	9-9-09	18·1	15·23	84·1
Do.	do.	Louisiana...	9-9-09	18·3	16·29	89·0
Do.	do.	New Guinea 41	9-9-09	20·0	16·04	80·2
Do.	do.	do. 48	9-9-09	17·0	15·94	93·7
Do.	do.	do. 54	10-9-09	17·2	13·37	77·7
Do.	do.	do. 40	10-9-09	17·5	16·28	93·0
Do.	do.	do. 22	10-9-09	23·7	22·82	96·2
Do.	do.	do. 38	10-9-09	20·2	17·97	88·9
N. P. Peterson	Homebush	do. 24	25-9-09	21·7	20·64	95·1
Do.	do.	Malagache	25-9-09	20·0	18·61	93·0
J. McDonald	Rocklea	Bois Rouge	16-10-09	20·2	19·06	94·3
P. Clausen	Homebush	Malagache	19-10-09	22·0	20·58	93·5
Do.	do.	New Guinea 24	19-10-09	21·8	20·76	95·2
Do.	do.	do. 24	19-10-09	22·1	20·03	90·6
Do.	do.	Malagache	25-10-09	21·2	18·98	89·5
N. P Peterson	do.	New Guinea 24	15-11-09	22·8	21·72	95·2
Do.	do.	Malagache	15-11-09	21·7	19·83	91·3
Do.	do.	Otaniité	31-5-10	14·3	11·01	76·9

Soil Analysis.

During the year the analyses of soils collected from the Hatton district were completed. The complete results are as follows:—

Analyses of Hatton (Mackay) Soils.

Laboratory Number.	Total Elements in Soil.				Available Elements in Soil.		
	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
1	1·405	0·164	0·224	0·249	0·1453	0·0198	0·0026
2	1·663	0·445	0·607	0·197	0·1319	0·0153	0·0008
4	1·433	0·265	0·319	0·107	0·1098	0·0134	0·0011
5	0·812	0·211	0·235	0·120	0·0859	0·0111	0·0007
6	1·383	0·311	0·524	0·161	0·0911	0·0116	0·0014
8	1·517	0·282	0·466	0·177	0·2350	0·0083	0·0057
9	1·243	0·359	0·498	0·111	0·1515	0·0073	0·0048
10	1·377	0·332	0·390	0·097	0·1262	0·0162	0·0057
11	1·450	0·362	0·268	0·152	0·1400	0·0054	0·0034
12	0·430	0·239	0·198	0·161	0·1260	0·0075	0·0029
13	0·360	0·255	0·204	0·180	0·0569	0·0032	0·0024
14	0·390	0·177	0·217	0·152	0·0843	0·0039	0·0013
15	0·580	0·205	0·230	0·133	0·1008	0·0032	0·0012
16	0·420	0·188	0·211	0·155	0·0528	0·0033	0·0015
17	0·500	0·231	0·153	0·122	0·0860	0·0033	0·0021
19	0·600	0·272	0·166	0·149	0·1533	0·0041	0·0033
20	0·740	0·310	0·268	0·191	0·1666	0·0056	0·0022
21	0·860	0·330	0·211	0·214	0·1834	0·0046	0·0032
22	0·440	0·098	0·179	0·115	0·1052	0·0028	0·0029
23	0·600	0·235	0·179	0·133	0·1173	0·0081	0·0025
24	0·630	0·155	0·160	0·141	0·0728	0·0053	0·0021
25	0·660	0·233	0·204	0·188	0·1331	0·0120	0·0019
26	0·480	0·149	0·128	0·102	0·0800	0·0078	0·0022
27	0·980	0·334	0·051	0·130	0·1525	0·0082	0·0007
28	0·960	0·224	0·149	0·144	0·1430	0·0034	0·0004
29	1·230	0·190	0·256	0·169	0·1913	0·0052	0·0011
30	1·140	0·338	0·256	0·152	0·1976	0·0076	0·0011
Means	0·8995	0·264	0·261	0·152	0·1268	0·0077	0·0023

These soils compare favourably with those of other sugar districts. In regard to total elements they are for the most part well up to standard, though the available potash is rather low in most cases. This, however, is a matter which may improve on cultivation, as the total amount is quite up to standard, and apparently only requires being made available. Farmers whose soils have been analysed may obtain copies and advice on application.

ANALYSES OF HATTON (MACKAY) SOILS—*continued.*

Hatton (Mackay) Soils.	Total Pounds per Acre.				Available Pounds per Acre.		
Laboratory Number.	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
1	35,125	4,100	5,600	6,225	3,632	495	65
2	41,575	11,125	15,175	4,925	3,297	382	20
4	35,825	6,625	7,975	2,675	2,745	325	27
5	20,300	5,275	6,375	3,000	2,147	277	17
6	34,700	7,775	13,100	4,025	2,277	290	35
8	37,925	7,050	11,650	4,425	5,875	207	142
9	31,075	8,975	12,450	2,775	3,787	182	120
10	34,425	8,300	9,750	2,425	3,155	405	142
11	36,250	9,050	6,700	3,800	3,500	135	85
12	10,750	5,975	4,950	4,025	3,150	187	72
13	9,000	6,375	5,100	4,500	1,422	80	60
14	9,750	4,425	5,425	3,800	2,107	97	32
15	14,500	5,125	5,750	3,325	2,520	80	30
16	10,500	4,700	5,275	3,875	1,320	82	37
17	12,500	5,775	3,825	3,050	2,150	82	52
19	15,000	6,800	4,150	3,725	3,832	102	82
20	18,500	7,750	6,700	4,775	4,165	140	55
21	21,500	8,250	5,275	5,350	4,585	115	80
22	11,000	2,450	4,475	2,875	2,630	70	72
23	15,000	5,875	4,475	3,325	2,932	2 2	62
24	15,750	3,875	4,000	3,525	1,820	132	52
25	16,500	5,825	7,350	4,700	3,327	300	47·5
26	12,000	3,725	3,200	2,550	2,000	195	55
27	24,500	8,350	1,275	3,250	3,812	2·5	17·5
28	24,000	6,100	3,500	3,600	3,650	85	10
29	30,750	10,000	6,400	4,225	4,782	130	27·5
30	28,500	8,450	6,400	3,800	4,940	190	27·5
Means	22,487	6,600	6,525	3,800	3,170	192	57·5

COMPARISON WITH OTHER DISTRICTS.

In order that a comp arison may be made between the Hatton and the Alton Downs soils, and those from other localities of the Central district, the following table of data is inserted :—

ANALYSIS OF ALTON DOWNS (ROCKHAMPTON) SOILS.

Laboratory Number.	Total Elements in Soil.				Available Elements in Soil.		
	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
1365	1·600	0·159	0·153	0·101	0·3380	0·0026	0·0010
1366	1·480	0·145	0·128	0·106	0·3020	0·0029	0·0010
1367	1·820	0·390	0·230	0·227	0·8152	0·0141	0·0093
1368	1·180	0·605	0·153	0·165	0·3914	0·0093	0·0039
Means	1·520	0·325	0·166	0·150	0·4616	0·0072	0·0038

Laboratory Number.	Total Pounds per Acre.				Available Pounds per Acre.		
	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
1365	40,000	3,975	3,825	2,525	8,450	65	25
1366	37,000	3,625	3,200	2,650	7,550	72	25
1367	45,500	9,750	5,750	5,675	20,380	352	232
1368	29,500	15,125	3,825	4,125	9,785	232	97
Means	38,000	8,125	4,650	3,750	11,540	180	95

Of these, Nos. 1365 and 1366 represent forest soils ; whilst Nos. 1367 and 1368 represent soil from scrubs. The forest soils are somewhat low in necessary plant foods, though the lime is good. In regard to the scrub soils the results are good, and in the case of 1367 are excellent.

SOILS OF THE MACKAY OR CENTRAL DISTRICT.

MACKAY.	TOTAL ELEMENTS IN SOIL.				AVAILABLE ELEMENTS IN SOIL.		
Localities and Subdistricts.	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Homebush	0·480	0·185	0·193	0·082	0·0591	0·0182	0·0013
River Banks	0·501	0·171	0·149	0·096	0·0748	0·0136	0·0014
North Eton	0·606	0·212	0·121	0·090	0·0760	0·0200	0·0009
Plane Creek	1·290	0·133	0·106	0·136	0·1170	0·0079	0·0015
North of River	1·300	0·375	0·290	0·204	0·1876	0·0207	0·0017
Farleigh Estate	0·910	0·176	0·181	0·132	0·1037	0·0276	0·0009
Sunnyside	0·676	0·246	0·172	0·119	0·0969	0·0246	0·0011
Proserpine	0·784	0·166	0·185	0·139	0·1277	0·0330	0·0011
Burdekin	0·916	0·344	0·188	0·103	0·1650	0·0344	0·0078
Hatton	0·899	0·264	0·261	0·152	0·1268	0·0077	0·0023
Alton Downs	1·520	0·325	0·166	0·150	0·4616	0·0072	0·0038

MACKAY.	TOTAL POUNDS PER ACRE.				AVAILABLE POUNDS PER ACRE.		
Localities and Subdistricts.	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
Homebush	12,000	4,625	4,825	2,050	1,477	455	32
River Banks	12,525	4,275	3,725	2,400	1,870	340	35
North Eton	15,150	5,300	3,025	2,250	1,900	500	22
Plane Creek	32,250	3,325	2,650	3,400	2,925	197	37
North of River	32,500	9,375	7,250	5,100	4,690	517	42
Farleigh Estate	22,750	4,400	4,525	3,300	2,592	690	22
Sunnyside	16,900	6,150	4,300	2,975	2,422	615	27
Proserpine	19,600	4,150	4,625	3,475	3,192	825	27
Burdekin	22,900	8,600	4,700	2,575	4,125	860	195
Hatton	22,475	6,600	6,525	3,800	3,170	192	57
Alton Downs	38,000	8,125	4,150	3,750	11,540	180	95

Analysis of Sawdust.

Three samples of sawdust were received for analysis with the object of obtaining their value as fertilisers. The results, which are given below, show that, calculated roughly on their unit values, they would only be worth about 5s. per ton, and therefore of little value chemically, though possibly of slightly greater value than this on account of their mechanical effects in restoring humus to the soil. This, however, would not compare with the results of the ploughing-in of a green crop.

Analyses of Sawdusts, May, 1910.

Constituent.	1 Sawdust 3 Years Old.	2 Sawdust 5 Years Old.	3 Sawdust over 10 Years.
Moisture	72·155	68·230	73·286
Volatile and organic	26·388	28·730	23·731
Phosphoric acid	·048	·198	·049
Lime	·360	·710	·367
Potash	·037	·061	·077
Nitrogen	·208	·298	·180

Analysis of Panicum muticum.

With the object of determining the value of the above grass for fodder purposes, an analysis was carried out. This grass is very common in some of the Northern districts, and is much relished by stock of all kinds, who seem to prefer it to any other grass.

Analyses of Panicum muticum Growing at Sugar Experiment Station.

Constituent.	Green Substance.	Dry Substance.
Moisture	75·339	...
Dry substance	24·670	100·000
Crude fibre	8·270	33·525
Total nitrogen	·204	·825
× 6·25 = to proteids	1·275	5·156
Albumenoid nitrogen	·197	·797
× 6·25 = to proteids	1·231	4·975
Amide nitrogen	·007	·028
Asparagine	·037	·151
Ether extract	·487	1·975
Carbohydrates (less fibre)	12·609	51·122
Total ash	2·036	8·253
Soluble ash	1·881	7·626
Nutritive value	14·979	60·721
Nutritive ratio	1 : 10·8	1 : 10·8

Comparison with Paspalum dilatatum.

For purposes of comparison, a copy of an analysis of *Paspalum dilatatum* made in 1907 is here inserted :—

Analysis of Paspalum dilatatum growing at Sugar Experiment Station.

Constituent.	Green Substance.	Dry Substance.
Moisture	66·731	...
Dry substance	33·269	100·000
Crude fibre	10·167	30·560
Total nitrogen	·169	·509
× 6·25 = to proteids	1·056	3·181
Albumenoid nitrogen	·141	·424
× 6·25 = to proteids	·881	2·650
Amide nitrogen	·028	·085
Asparagine	·150	·455
Ether extract	1·550	4·660
Carbohydrates (less fibre)	17·814	53·547
Total ash	2·704	8·128
Soluble ash	2·568	7·720
Nutritive value	22·357	67·213
Nutritive ratio	1 : 20·1	1 : 20·1

Analysis of Waters from Alton Downs.

With a view to determining the quality of the following waters in respect to their uses for irrigation purposes, an analysis was made early in March. The results are as follows :—

Analysis of Waters from Alton Downs.

	Per cent.	Grains per Gallon.
Water from Deep Creek—		
Chlorine	·005	3·50
Equivalent to salt (NaCl)	·0082	5·74
Total solids	·0336	23·52
Mineral solids	·0172	12·04
Organic solids	·0164	11·48
Water from Fitzroy River—		
Chlorine	·0030	2·10
Equivalent to salt (NaCl)	·0049	3·43
Total solids	·0176	12·32
Mineral solids	·0112	7·84
Organic solids	·0064	4·48
Water from Lagoon—		
Chlorine	·0025	1·75
Equivalent to salt (NaCl)	·0041	2·87
Total solids	·0200	14·00
Mineral solids	·0104	7·28
Organic solids	·0096	6·72

These results show that the above waters are of good quality and well suited for irrigation. A qualitative examination of these waters showed that the mineral solids consisted largely of lime, with a small portion of magnesia; sulphates being entirely absent.

H. T. EASTERBY,
Assistant Director.

Mackay, 6th August, 1910.

Price 10*d*.

By Authority: Anthony James Cumming, Government Printer, William street, Brisbane.