

1908.  
QUEENSLAND.

# ANNUAL REPORT OF THE BUREAU OF SUGAR EXPERIMENT STATIONS.

Presented to both Houses of Parliament by Command.

TO THE HONOURABLE THE MINISTER FOR AGRICULTURE.

Brisbane, 21st November, 1908.

SIR,—I have the honour to submit the Eighth Annual Report upon the Sugar Experiment Stations, as required by "*The Sugar Experiment Stations Act of 1900.*"

It is hereby explained that in view of the present Director retiring from the Directorship on 30th April, 1909, he has, during the past year, given all possible advice and assistance to the Assistant Director, Mr. H. T. Easterby, in preparing himself for carrying on the work of the Mackay Station, and in the preparation of reports. The part relating to the Mackay Station of this report has been prepared by Mr. Easterby, under the usual instructions. In respect of the Assistant Director, the Director has again to advise the Honourable the Minister of the able and excellent service rendered by Mr. Easterby during the past seven years, and of his loyal devotion to the work and to the State.

I have, &c.,  
WALTER MAXWELL, Director.

BUNDABERG LABORATORIES.  
FIRST ASSISTANT CHEMIST'S REPORT.

Material.	Method of Analysis.	Number of Samples Analysed.	Number of Analyses.
Soils	Agricultural Method	1,131	2,262
Ditto	Maxwell's Aspartic Acid Method	1,052	1,052
Ditto	Soluble Silica (Special)	118	236
Ditto	Nitrogen (Special)	1,194	2,388
Ditto	Humus (Special)	1,041	2,082
Ditto	Insoluble Residue (Special)	98	196
Ditto	Mechanical Analysis	1,200	1,200
Ditto	Absorptive and Retentive Power of Soils for Water	753	753
Ditto	Solubility Tests	12	48
Waters	Irrigation Waters	436	872
Manures	For Fertilisation Uses	99	198
Limes	ditto	35	70
Canes and Juices	Polarisation Tests	453	906
Sugar	ditto	13	26
Molasses	Complete Analysis	44	88
Sugar	ditto	62	124
Water	Complete Analysis, Total Solids	50	100
Basalts	Complete Analysis	10	20
Miscellaneous Analyses	...	195	390
		7,996	13,011

The analyses by the agricultural method comprise eleven constituents; by the aspartic method three constituents are determined.

Great credit is due to Messrs. McCready, Bennett, and Pringle, who have done excellent work.

GEORGE R. PATTEN,  
First Assistant Chemist.

Samples of cane juice have been received from three millowners in the Bundaberg district. The purpose of the analyses was to test the quality of the farmers' cane which was badly frosted. The samples were taken at the rollers in the presence of the owners of the cane.

58 samples received from Mr. H. A. Cattermull, Sunnyside Mill, Kalkie.

28 " " " Mr. Chas. Buss, Ashfield Mill, Kalkie.

12 " " " Buss Bros., Bonna Mill, near Bundaberg.

ANALYSES OF SUGAR-CANES GROWN BY FARMERS.

Name of Sender.	Address.	Variety of Cane.	ANALYSIS OF JUICE.		
			Brix.	Sucrose	Purity.
			Per cent.	Per cent.	Per cent.
Buss, C. W.	Ashfield	Rappoe	17.9	15.66	87.5
Ditto	ditto	ditto	15.4	13.16	85.4
Ditto	ditto	ditto	17.8	15.55	87.3
Ditto	ditto	Striped Singapore	16.0	14.23	88.9
Ditto	ditto	ditto	14.6	11.2	76.7
Anderson, E.	North Kolan	Rappoe (plant)	14.6	10.7	73.2
Ditto	ditto	ditto (4th ratoon)	19.8	18.75	94.6
Noakes, E. J.	Springhill	ditto (plant)	16.6	14.72	88.7
Ditto	ditto	ditto (ratoon)	18.1	17.14	94.7
Stollznow, P.	Goodwood	ditto (plant stand over)	14.9	12.36	82.9
Ditto	ditto	Rappoe (ratoon)	17.5	14.36	82.0
Neilsen, Hon. C. F.	Woongarra	Batoe	12.3	8.76	71.2
Faulkner, C.	Woodlands, near Burnett Heads	Black Java	15.2	10.91	71.7
Ditto	ditto	Rappoe	17.0	16.16	93.3
Ditto	ditto	ditto	16.1	15.02	93.2
Ditto	ditto	ditto	16.6	15.56	93.7
Haig, A. C.	Bemersyd, Kolan River	ditto	13.2	10.0	75.7
Dahl, A.	Barolin	...	15.7	12.3	78.3
Ditto	ditto	Striped Singapore	13.3	10.33	77.6
Ditto	ditto	Rappoe	16.0	14.7	91.8
Ditto	ditto	ditto	16.6	14.16	85.3
Koppen, W.	Kalkie	ditto	17.7	16.0	90.5
Christsen, Mrs. H. T.	Bundaberg	Striped Singapore	13.2	8.05	61.0
Ditto	ditto	...	17.6	14.92	84.7
Ditto	ditto	Black Java	16.0	11.32	70.7
Smith, D.	Barolin	Rappoe	14.9	11.56	77.5
Swensen, G. N.	ditto	ditto	12.8	10.3	80.4
Paterson, A.	Paddy's Ireland, near Bundaberg	ditto	15.9	13.38	84.1
Ditto	ditto	ditto	13.8	9.63	69.7
Ditto	ditto	ditto	14.9	11.08	74.3
Ditto	ditto	Frost-resisting cane	15.7	11.62	74.0
Johnson, E.	New Bundaberg...	Rappoe	16.9	15.63	92.4
Buss, C. W.	Ashfield	ditto	18.0	15.26	84.7
Ditto	ditto	Seedling cane (12 months)	11.8	7.82	66.2
Ditto	ditto	ditto	11.5	4.89	42.5

ANALYSES OF SUGAR-CANES GROWN BY FARMERS—*continued.*

Name of Sender.	Address.	Variety of Cane.	ANALYSIS OF JUICE.		
			Brix.	Sucrose.	Purity.
			Per cent.	Per cent.	Per cent.
Skyring, H. S.	Barolin	Rappoe	14.4	12.01	83.4
Glasgow, R.	Burnett Heads	ditto (plant)	15.5	13.06	84.2
Ditto	ditto	ditto (3rd ratoon)	17.2	15.9	92.4
Ditto	ditto	Fairymead cane	17.8	15.73	88.3
St. Ledger, James	Arranmore, Bonna	Rappoe	17.8	16.46	92.4
Ditto	ditto	ditto	17.7	15.89	89.7
St. Ledger, B.	Silvergrove, Bonna	ditto	17.4	15.53	89.2
Ditto	ditto	ditto	19.1	17.58	92.0
Ditto	ditto	ditto	17.8	16.13	90.6
Quin Bros.	Barolin	ditto	16.4	14.82	90.3
Thoms, Chas.	Abby Green Farm, Springfield road	ditto	18.0	16.63	92.4
Larsen, Oscar	Rappoe	ditto	15.3	13.08	85.4
Ditto	ditto	ditto	14.9	11.50	77.1
Paris, H.	Kolan River South	ditto	14.0	11.0	78.5
Ditto	ditto	ditto	15.5	13.16	84.9
Ditto	ditto	ditto	16.1	14.26	88.5
Jorgensen, —	ditto	Fairymead cane	13.0	8.86	68.1
Holland, T.	Seaview	Rappoe	15.5	12.76	82.3
Ditto	ditto	ditto	16.2	13.17	81.3
Coates, —	Rubyana	ditto	18.1	16.5	91.1
Lücke, H. A. F.	Bucca, Kolan River	Frost-resisting cane	19.8	15.66	79.1
Ditto	ditto	Rappoe	19.2	14.61	76.1
Harte, Ed.	Golmoy, Kolan River	Striped Singapore (low land)	19.1	18.10	94.7
Ditto	ditto	Rappoe (high land)	18.0	16.5	91.6
Ditto	ditto	ditto (low land)	17.4	15.79	90.7
Seabert, —	Millbank	Striped Singapore	16.7	14.53	88.5
Rickart, Mrs.	Burnett Heads	Black Java	17.9	13.73	76.7
Ditto	ditto	Rappoe	14.7	12.47	84.8
Blisset and Hart	Goodwood	ditto	17.7	16.04	90.6
Stehbens, W. C.	Bullyard	ditto	16.1	13.84	85.9
Ditto	ditto	ditto	16.9	14.75	87.3
Ditto	ditto	Striped Singapore	12.6	9.69	76.8
Keiser, A.	Kalkie	Rappoe	14.9	12.26	82.2
Ditto	ditto	ditto	16.4	15.13	92.2
Haig, A. C.	Bemersyd, Kolan River	ditto (low land)	12.7	10.41	81.9
Ditto	ditto	ditto (high land)	14.1	11.97	84.8
Hendy, Mrs. E. C. C.	North Kolan	Rappoe	21.9	20.65	94.2
Farquhar, M.	Hummock, Bunda- berg	Trinidad Seedling No. 60 (1st ratoon)	20.5	18.22	88.3
Ditto	ditto	New Guinea No. 15 (plant)	22.0	19.71	89.6

ANALYSES OF SUGAR-CANES GROWN BY FARMERS—*continued.*

Name of Sender.	Address.	Variety of Cane.	ANALYSIS OF JUICE.		
			Brix.	Sucrose.	Purity.
			Per cent.	Per cent.	Per cent.
Farquhar, M.	Hummock, Bundaberg	Mauritius Bois Rouge (plant sucker)	15·6	12·48	81·7
Ditto	ditto	Black Seedling (plant)	20·2	17·88	88·5
Ditto	ditto	New Guinea No. 24 (plant sucker)	18·8	15·95	84·8
Ditto	ditto	New Guinea No. 24A (1st ratoon)	21·0	18·87	89·8
Ditto	ditto	Demerara 1135 (plant)	20·1	17·75	88·3
Ditto	ditto	New Guinea No. 24B (1st ratoon)	21·0	18·48	88·0
Ditto	ditto	New Guinea No. 8A (1st ratoon)	21·4	19·37	90·5
Ditto	ditto	Green Malabar (plant)	20·1	17·80	88·5
Ditto	ditto	New Guinea No. 64 (1st ratoon)	17·6	15·08	85·6
St. Ledger, Jas.	Arranmore, Bonna	...	19·5	18·14	93·0
Haig, A. C.	Bemersyd, Kolan River	Striped Singapore	14·8	12·41	83·8
St. Ledger, B.	Silvergrove, Bonna	Rappoe ...	17·8	15·71	88·2
Allsop, W.	Bullyard ...	Striped Singapore (plant)	21·7	20·57	94·8
Ditto	ditto	Black Java (1st ratoon)	20·6	18·68	90·6
Ditto	ditto	Black Java (plant)	19·9	17·83	89·6
Holland, Thos.	Seaview, Sandhills	Black Java ...	12·8	8·43	65·0
St. Ledger, Jas.	Arranmore, Bonna	Rappoe ...	18·7	17·43	93·2
Quinn Bros.	Barolin ...	ditto ...	18·8	17·8	95·1
Christsen, H. P.	Bullyard ...	ditto ...	21·4	20·27	94·7
Ditto	ditto	...	22·9	21·47	93·7
Hawkins, R. S.	Newbury Farm, Tatura, Pialba	Burnt cane ...	18·1	15·36	84·8
Quinn Bros.	Barolin ...	D. 1135 ...	21·0	19·17	91·3
Weller, E.	Maroondan ...	Rappoe (plant cane)	20·4	19·46	95·3
Ditto	ditto	ditto (3rd ratoon)	22·4	21·26	94·9
Allsop, W.	Bullyard ...	Black Java ...	19·9	17·69	88·9
Ditto	ditto	Striped Singapore	21·3	20·18	94·7
Hall, H.	Bundaberg ...	Rappoe ...	17·5	15·76	90·0

Bureau of Sugar Experiment Stations,

Brisbane, 24th October, 1908.

The Director, Bureau of Sugar Experiment Stations, Brisbane.

SIR,—I have the honour, as instructed, to submit herewith a report upon the work of the Mackay Sugar Experiment Station during the past twelve months.

I have, &amp;c.,

HARRY T. EASTERBY, Assistant Director.

## WORK OF THE MACKAY CENTRAL SUGAR EXPERIMENT STATION.

The chief work of the Sugar Experiment Station at Mackay during the past twelve months has been carried out on similar lines to those originally laid down by the Director.

New experiments have been conducted with ten of the best seedling canes raised at Hambledon Plantation, Cairns, also with the Barbadoes Seedling 208, and an unknown cane from South Africa.

The continuation of the quadruple tests of the ten best varieties (selected from the experiments with canes from different countries) as a second ratoon crop—of experiments for determining the most advisable distances between the plants in the row, and the distances between the rows—the further ratooning as a fifth crop of these varieties (all from New Guinea) which were continued in cultivation from the original large experiment with sixty-eight varieties from different countries, has also engaged much attention. Further work has consisted in the analysis of soils, fertilisers, molasses, feeding stuffs, sugar-canes, &c., in the laboratory; a visit by the Assistant Director to sugar centres north of Mackay to report upon the varieties of cane sent out in 1906; the further distribution of selected varieties of cane to different parts of the State; and the growth, observation, and distribution of subsidiary crops, such as sisal hemp, sorghums, grasses, green manures, &c., likely to be of commercial value to growers.

CONTINUATION OF EXPERIMENTS WITH THE VARIETIES RESERVED FOR A FOURTH RATOON CROP.

The report for the year 1905-6 gave the final results from the whole of the sixty-eight varieties from different countries for the plant, first ratoon, and second ratoon crops. This experiment was originally planted in 1903, and in 1906, those varieties which were found to be of little or no value, from a sugar producer's standpoint, were ploughed out, and their cultivation abandoned. Others, originally of high promise, had contracted disease, and were separated altogether from healthy varieties by being planted on a new piece of ground called the station "hospital." The remainder were continued in cultivation, and were, at that date, allowed to go on as a third ratoon crop. The results from this latter crop were deemed so satisfactory, that, as none of them had, up to that time, contracted any disease, they were permitted to again ratoon—this being the fourth ratoon crop. As pointed out by the Director at the time, the principal reason for this continued ratooning was that the scarcity and cost of labour were becoming more and more controlling factors in sugar production. This still remains true of the sugar industry as a whole, for though labour has been obtainable for the cutting of the crop it is still difficult, and even impossible in some districts, to obtain labour for purely agricultural operations in the cutting season. This being granted, it is useful for growers to know that these varieties will yield good ratoon crops for little labour. The manure advised is not expensive, and returns a large profit per acre. This is strikingly shown in the experiments with the ten best varieties.

It will be said, of course, that the cultivation of these ratoons, as practised at the station—namely, ploughing and subsoiling between the rows of cane, cannot be carried out by farmers during the cutting season. This is no doubt true to a great extent in many districts at the present time, and in the Mackay district a number of farmers never touch their ratoons at all, but simply allow them to "volunteer," or come up through the trash. Nevertheless, it is strongly recommended that these methods should be followed where possible, and farmers would be surprised at the results obtained.

It is not uncommon to hear the station methods condemned as theoretical and impracticable, chiefly by farmers who have never tried them. These growers never visit the experiment station to see what is being done or to find out if any useful lessons may be learnt.

The cultivation of the fourth ratoon crop then, consisted of ploughing and subsoiling between the rows, followed by light cultivation with a Planet Junior cultivator, fitted with broad shallow cutting hoes. Mixed fertilisers were applied to all the varieties. The weather, prior to ratooning, and for six weeks afterwards, was abnormally dry, but for the remainder of the period of growth the rainfall was good (even somewhat excessive at times) and the cane made fast progress.

Preliminary and progressive analysis of these ratoons were carried out by Mr. McCreedy, Assistant Chemist, during the months of June, July, and August, and the results appear in the following tables:—

FIRST PRELIMINARY EXAMINATION OF FOURTH RATOON CROP OF THE VARIETIES—JUNE, 1908.

Serial No.	Country.	No. or Name of Variety.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
28	New Guinea	New Guinea 4	17-6-08	9 months	15.6	12.10	1.73	77.5
32	Do.	8A	19-6-08	do.	18.0	15.26	1.06	84.8
35	Do.	15	19-6-08	do.	19.0	17.19	.71	90.4
40	Do.	24	19-6-08	do.	17.8	15.66	.87	87.9
41	Do.	24A	19-6-08	do.	16.4	12.99	1.98	79.2
42	Do.	24B	19-6-08	do.	15.5	11.83	2.08	76.3
43	Do.	26	19-6-08	do.	15.3	11.96	1.76	78.1
46	Do.	37	19-6-08	do.	17.3	13.88	1.64	80.2
47	Do.	38	22-6-08	do.	15.9	12.35	1.52	77.6
49	Do.	40	22-6-08	do.	14.6	11.55	1.66	79.1
59	Do.	64	22-6-08	do.	14.7	11.23	1.71	76.4
61	Do.	66	22-6-08	do.	14.8	9.70	2.40	65.5

## SECOND PROGRESSIVE EXAMINATION OF FOURTH RATOON CROP OF THE VARIETIES—JULY, 1908.

Serial No.	Country.	No. or Name of Variety.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
28	New Guinea	New Guinea 4	17-7-08	10 months	18.6	16.61	.57	89.3
32	Do.	8A	17-7-08	do.	18.6	15.89	1.09	85.4
35	Do.	15	17-7-08	do.	19.6	18.05	.48	92.1
40	Do.	24	17-7-08	do.	17.6	13.61	.64	77.3
41	Do.	24A	17-7-08	do.	18.7	16.29	1.04	87.1
42	Do.	24B	20-7-08	do.	17.5	14.35	1.54	82.0
43	Do.	26	20-7-08	do.	17.0	14.57	1.07	85.7
46	Do.	37	20-7-08	do.	17.7	14.54	1.40	82.1
47	Do.	38	20-7-08	do.	17.8	14.46	1.52	81.2
49	Do.	40	20-7-08	do.	17.0	14.30	1.23	84.1
59	Do.	64	21-7-08	do.	16.6	13.87	1.28	83.5
61	Do.	66	21-7-08	do.	16.9	12.51	1.85	74.0

## THIRD PROGRESSIVE EXAMINATION OF FOURTH RATOON CROP OF THE VARIETIES—AUGUST, 1908.

28	New Guinea	New Guinea 4	12-8-08	11 months	20.3	19.15	.23	94.3
32	Do.	8A	12-8-08	do.	20.4	19.07	.34	93.4
35	Do.	15	12-8-08	do.	21.1	19.85	.24	94.0
40	Do.	24	12-8-08	do.	19.8	18.61	.28	93.9
41	Do.	24A	12-8-08	do.	20.7	18.54	.38	89.5
42	Do.	24B	12-8-08	do.	19.0	17.03	.85	89.6
43	Do.	26	12-8-08	do.	18.7	17.09	.52	91.4
46	Do.	37	14-8-08	do.	18.9	16.61	.72	87.8
47	Do.	38	14-8-08	do.	19.0	16.82	.71	88.5
49	Do.	40	14-8-08	do.	17.6	15.59	.69	88.6
59	Do.	64	14-8-08	do.	17.2	15.10	1.06	87.8
61	Do.	66	14-8-08	do.	19.8	15.93	1.56	80.4

The final analysis of the juice, and determination of fibre, were made by Mr. McCready, assisted by Mr. H. S. Burn, at the beginning of September, and the data are given below. As usual, the juice was crushed for analysis from all the cane from each variety growing upon 40 running feet:—

## FINAL EXAMINATION OF FOURTH RATOON CROP OF THE VARIETIES—SEPTEMBER, 1908.

Serial No.	Country.	No. or Name of Variety.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Acidity per 100 Juice Pressed in cc. N/10 NaOH.	Fibre in Cane.	Sucrose in Cane.	Date of Arrowing.
28	New Guinea	N. G. 4	1-9-08	11½ mo's	19.3	17.74	.35	91.9	5.0	10.41	15.89	
32	Do.	8A	1-9-08	do.	21.3	19.63	.28	92.1	6.0	9.32	17.80	
35	Do.	15	1-9-08	do.	22.1	20.71	.21	93.7	4.5	10.15	18.61	
40	Do.	24	1-9-08	do.	19.9	18.53	.28	93.1	6.3	9.82	16.71	
41	Do.	24A	1-9-08	do.	20.9	19.32	.39	92.4	4.0	9.95	17.39	
42	Do.	24B	1-9-08	do.	20.4	18.83	.46	92.3	5.0	9.87	16.97	
43	Do.	26	1-9-08	do.	18.1	16.49	.51	91.1	5.0	10.31	14.79	
46	Do.	37	1-9-08	do.	19.0	17.09	.49	89.9	4.0	12.47	14.96	
47	Do.	38	1-9-08	do.	19.7	18.00	.56	91.3	6.0	9.01	16.38	18th June
49	Do.	40	1-9-08	do.	18.2	16.71	.36	91.8	5.0	12.03	14.70	
59	Do.	64	1-9-08	do.	18.3	16.32	.71	89.1	4.5	10.81	14.55	
61	Do.	66	1-9-08	do.	20.8	18.16	.79	87.3	7.0	8.94	16.54	1st Aug. (im'ature)

The remainder of the crop was now cut, and each variety weighed separately, first over the station weighbridge, and then again at Meadowlands Mill, to which company the cane was sold. In the table next appearing the crop results are shown, being prepared from a count of the canes, the actual weighings, and the analytical data:—

FOURTH RATOON CROP—RESULTS OF THE VARIETIES, CONTINUED IN EXPERIMENT, 1908.

Serial No.	Country.	No. or Name of Variety.	Age of Cane.	Number of Canes per Acre.	Average Weight of the Sticks in Pounds.	Weight of Cane per Acre in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
28	New Guinea	New Guinea 4	11½ months	56,682	1·6	41·9	14,946	6·6
32	Do.	8A	do.	38,550	2·1	37·7	15,055	6·7
35	Do.	15	do.	35,120	2·1	34·0	14,211	6·3
40	Do.	24	do.	41,888	3·2	61·6	23,057	10·2
41	Do.	24A	do.	32,670	2·8	42·1	16,404	7·3
42	Do.	24B	do.	29,729	2·9	39·4	14,984	6·6
43	Do.	26	do.	54,648	1·5	38·6	12,804	5·7
46	Do.	37	do.	41,327	1·7	32·7	10,962	4·8
47	Do.	38	do.	27,116	1·7	21·4	7,863	3·5
49	Do.	40	do.	38,223	2·3	40·6	13,386	5·9
59	Do.	64	do.	17,478	3·8	30·0	9,803	4·3
61	Do.	66	do.	91,966	1·2	52·8	19,585	8·7

It now remains to furnish a statement covering the yields of cane and sugar per acre for the five crops—namely, plant, first, second, third and fourth ratoons, 1904 to 1908.

TOTAL RESULTS OF THE VARIETIES CONTINUED IN EXPERIMENT AS A FOURTH RATOON CROP TO DATE: COVERING PLANT, FIRST RATOON, SECOND RATOON, THIRD RATOON, AND FOURTH RATOON CROPS, 1904-1908.

Serial No.	Country.	No. or Name of Variety.	Total Cane per Acre, English Tons (Five Crops).	Total Sugar per Acre, Pound (Five Crops).	Total Sugar per Acre, English Tons (Five Crops).
28	New Guinea	New Guinea 4	230·5	76,915	34·2
32	Do.	8A	220·6	83,863	37·4
35	Do.	15	232·2	96,029	42·8
40	Do.	24	263·9	99,487	44·3
41	Do.	24A	230·6	87,819	39·1
42	Do.	24B	223·5	82,085	36·5
43	Do.	26	212·5	67,330	30·0
46	Do.	37	182·6	59,345	26·4
47	Do.	38	167·7	61,784	27·5
49	Do.	40	229·9	75,269	33·3
59	Do.	64	188·0	60,798	27·0
61	Do.	66	268·7	92,346	41·1

From the above table of results it will be noticed that New Guinea 8A, 15 (or Badila), 24 (or Goru), 24A, and 24B are still maintaining their rank as sugar-producers, while New Guinea 4, 26, 40, and 66 have also done well. These latter varieties, however, are not as a rule fancied by growers, on account of the thinness of stick rendering them somewhat unsuitable for white labour conditions. The high yield of sugar per acre from New Guinea 24, or Goru, as a fourth ratoon crop—namely, ten tons—is at least remarkable, and it is greatly to be regretted that, owing to the exigencies of space, this plot has had to be ploughed out, and cannot go on with the others to a fifth ratoon crop. It is, however, hoped that it will show to good advantage in the other experiments.

As pointed out in previous reports, the Director has frequently stated that ratooning over the second or third ratoon crop is, agriculturally speaking, bad practice. It has, however, been determined by the Director to allow the crop to go forward for a further ratoon—namely, the fifth—for the following reasons :—

- (a) The reason of scarcity and cost of labour set forth above.
- (b) The uncertainty of the future of the Experiment Station, which at the present moment precludes the initiation of further experimental work upon large lines, and renders it necessary to merely keep the present series of experiments going on as economical lines as possible.
- (c) The varieties to be continued as a fifth ratoon crop are in a healthy state and have not so far contracted disease.

CONTINUATION OF EXPERIMENTS WITH THE TEN BEST VARIETIES FROM DIFFERENT COUNTRIES TO DETERMINE THEIR RESPECTIVE AGRICULTURAL AND COMMERCIAL VALUES.

SECOND RATOON CROP, 1908.

This series of experiments was commenced in 1905, the ten best canes from the larger experiment with sixty-eight varieties from different countries, being selected for final competition. The results of the plant and first ratoon crops have already been published, and we deal this year with the results of the second ratoon crop.

This experiment has for its purpose the comparison and determination of the final commercial value of these varieties as croppers and sugar producers; but instead of limiting the experiment to a single and simple comparison, the series have been carried out in quadruplicate, and are intended to exhibit the producing values of the varieties under the following four sets of conditions :—

1. Irrigation.—Mixed manures: other conditions of cultivation being equal.
2. Irrigation.—No manures: other conditions of cultivation being equal.
3. No irrigation.—Mixed manures: other conditions of cultivation being equal.
4. No irrigation.—No manures: other conditions of cultivation being equal.

The second ratoon crop received the following cultivation :—On the non-irrigated plats the middles were split open with the swing plough, followed by the subsoiler to a depth of 18 in. Those furrows next the cane were then ploughed away from the rows, and similarly subsoiled, thus ensuring all ground between the rows being thoroughly moved and subsoiled. The mixed fertilisers were then applied to those plats which were to be fertilised, in the furrow next to the cane, which were then closed by the plough, this act also taking place with the plough on the non-manured plats, so as to secure uniformity of cultivation. The Planet Junior cultivator, fitted with broad hoes, was then run over all the ground between the stoles to level same down, and this implement was used for subsequent shallow cultivations while the cane was young.

On the irrigated plats the cultivation was the same on all the plats, but was done by hand, while mixed fertilisers were applied to those plats receiving manures.

The weather for some months before the ratooning, and for five weeks thereafter, was abnormally dry; and the ground, besides being hard, had an exceedingly poor moisture content. For the five weeks immediately following the ratooning the irrigated plats received 4 in. of irrigation water, and the cane on these plats came away very vigorously, especially upon the manured plats. The non-irrigated plats remained behind for some considerable time, but with good rains and the superior cultivation, they finally forged ahead, and though they barely caught up to the irrigated plats where manure was used in both cases, yet on the unmanured beds the non-irrigated cane very slightly led the way. These results bear out the deductions drawn from previous experiments—namely, that irrigation, in the average of years, does not pay at Mackay; and that, given good cultivation in normal years, results equal to if not better than those obtained by the use of irrigation may be secured.

The rainfall from the end of the dry spell already mentioned to the time of harvesting was plentiful, and at times too much, so that no further irrigation became necessary. With the exception of the month of January, 1908, good growing weather was experienced, although the rough gales of March, 1908, caused a certain amount of damage.

Preliminary and progressive chemical examinations of the quality of the juice during the progress of the canes to maturity were made during the months of June, July, and August, and are shown below:—

FIRST PRELIMINARY EXAMINATION OF IRRIGATED SECOND RATOON CANE: PLATS WITH MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JUNE, 1908.

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.
16	New Guinea	N. Guinea 24	10-6-08	7½ months	16.5	13.05	1.81	79.1
17	Do.	24A	10-6-08	do.	16.9	13.64	1.54	80.7
18	Do.	24B	10-6-08	do.	14.9	10.56	2.40	70.8
19	Trinidad	Trinidad S. 60	11-6-08	do.	13.6	10.11	1.76	74.3
25	New Guinea	N. Guinea 4	11-6-08	do.	16.0	12.96	1.45	81.0
26	Mauritius	Bois Rouge	12-6-08	do.	16.9	14.06	1.66	83.2
27	Do.	Settlers	12-6-08	do.	17.0	14.55	1.16	85.6
28	New Guinea	N. Guinea 8A	12-6-08	do.	15.7	11.96	1.92	76.1
29	Do.	15	12-6-08	do.	19.1	17.01	.89	89.9
30	Do.	64	15-6-08	do.	15.7	12.85	1.39	81.8

SECOND PROGRESSIVE EXAMINATION OF IRRIGATED SECOND RATOON CANE: PLATS WITH MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JULY, 1908.

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.
16	New Guinea	New Guinea 24	10-7-08	8½ months	16.9	13.93	1.30	82.4
17	Do.	24A	10-7-08	do.	18.2	15.34	1.31	84.3
18	Do.	24B	10-7-08	do.	15.3	11.19	2.29	73.1
19	Trinidad	Trinidad S. 60	10-7-08	do.	15.7	12.91	1.10	82.2
25	New Guinea	New Guinea 4	13-7-08	do.	16.7	13.96	1.40	83.6
26	Mauritius	Bois Rouge	13-7-08	do.	18.7	16.26	1.05	86.9
27	Do.	Settlers	13-7-08	do.	18.3	16.78	.60	91.7
28	New Guinea	New Guinea 8A	14-7-08	do.	18.5	15.84	1.23	85.6
29	Do.	15	14-7-08	do.	20.4	18.88	.46	92.5
30	Do.	64	14-7-08	do.	17.6	15.45	1.02	87.7

THIRD PROGRESSIVE EXAMINATION OF IRRIGATED SECOND RATOON CANE: PLATS WITH MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—AUGUST, 1908.

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.
16	New Guinea	New Guinea 24	7-8-08	9½ months	20.3	18.75	.38	92.3
17	Do.	24A	7-8-08	do.	18.8	16.71	.85	88.8
18	Do.	24B	10-8-08	do.	18.1	15.82	1.04	87.4
19	Trinidad	Trinidad S. 60	10-8-08	do.	17.9	14.82	.77	87.1
25	New Guinea	New Guinea 4	10-8-08	do.	18.8	16.95	.61	90.1
26	Mauritius	Bois Rouge	10-8-08	do.	20.1	18.21	.51	90.6
27	Do.	Settlers	10-8-08	do.	19.3	17.98	.43	93.1
28	New Guinea	New Guinea 8A	10-8-08	do.	18.5	16.21	.82	87.6
29	Do.	15	11-8-08	do.	20.6	19.46	.28	94.4
30	Do.	64	11-8-08	do.	18.6	16.69	.73	89.7

FIRST PRELIMINARY EXAMINATION OF IRRIGATED SECOND RATOON CANE: PLATS, NO MANURES;  
ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JUNE, 1908.

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.
16A	New Guinea	New Guinea 24	10-6-08	7½ months	17.2	14.36	1.30	83.4
17A	Do.	24A	10-6-08	do.	17.8	15.18	1.25	85.2
18A	Do.	24B	10-6-08	do.	17.1	14.38	1.33	84.1
19A	Trinidad	Trinidad S. 60	11-6-08	do.	16.6	14.20	1.12	85.5
25A	New Guinea	New Guinea 4	11-6-08	do.	17.0	14.92	.71	87.7
26A	Mauritius	Bois Rouge	12-6-08	do.	18.4	16.80	.72	91.3
27A	Do.	Settlers	12-6-08	do.	16.1	13.66	1.06	84.8
28A	New Guinea	New Guinea 8A	12-6-08	do.	18.8	16.76	1.08	89.1
29A	Do.	15	15-6-08	do.	19.2	17.22	.85	89.7
30A	Do.	64	15-6-08	do.	15.4	11.91	1.69	77.3

SECOND PROGRESSIVE EXAMINATION OF IRRIGATED SECOND RATOON CANE: PLATS, NO MANURES; ALL  
OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JULY, 1908.

16A	New Guinea	New Guinea 24	10-7-08	8½ months	18.1	15.79	1.08	87.2
17A	Do.	24A	10-7-08	do.	18.7	16.48	1.00	88.1
18A	Do.	24B	10-7-08	do.	18.0	15.95	1.05	88.6
19A	Trinidad	Trinidad S. 60	13-7-08	do.	17.8	16.01	.60	89.9
25A	New Guinea	New Guinea 4	13-7-08	do.	18.1	16.52	.52	91.2
26A	Mauritius	Bois Rouge	13-7-08	do.	20.0	18.31	.39	91.5
27A	Do.	Settlers	14-7-08	do.	18.7	17.04	.51	91.1
28A	New Guinea	New Guinea 8A	14-7-08	do.	19.9	17.97	.58	90.3
29A	Do.	15	14-7-08	do.	20.4	18.72	.51	91.7
30A	Do.	64	14-7-08	do.	17.7	15.34	1.20	86.6

THIRD PROGRESSIVE EXAMINATION OF IRRIGATED SECOND RATOON CANE: PLATS, NO MANURES; ALL  
OTHER CONDITIONS OF CULTIVATION BEING EQUAL—AUGUST, 1908.

16A	New Guinea	New Guinea 24	7-8-08	9½ months	20.7	19.55	.29	94.4
17A	Do.	24A	10-8-08	do.	19.7	18.19	.49	92.3
18A	Do.	24B	10-8-08	do.	20.0	18.31	.56	91.5
19A	Trinidad	Trinidad S. 60	10-8-08	do.	19.4	18.16	.31	93.6
25A	New Guinea	New Guinea 4	10-8-08	do.	20.1	18.58	.14	92.4
26A	Mauritius	Bois Rouge	10-8-08	do.	20.4	19.10	.32	93.6
27A	Do.	Settlers	10-8-08	do.	19.4	18.16	.24	93.6
28A	New Guinea	New Guinea 8A	11-8-08	do.	20.8	19.37	.17	93.1
29A	Do.	15	11-8-08	do.	21.3	20.41	.15	95.8
30A	Do.	64	11-8-08	do.	18.4	16.24	.99	88.2

FIRST PRELIMINARY EXAMINATION OF NON-IRRIGATED SECOND RATOON CANE: PLATS WITH MIXED  
MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JUNE, 1908.

1	New Guinea	New Guinea 24	5-6-08	7½ months	15.0	10.75	2.66	71.6
2	Do.	24A	5-6-08	do.	15.8	11.94	2.15	75.5
3	Do.	24B	8-6-08	do.	14.4	9.91	2.19	68.8
4	Trinidad	Trinidad S. 60	8-6-08	do.	13.6	9.76	1.92	71.7
10	New Guinea	New Guinea 4	8-6-08	do.	14.8	11.02	2.36	74.4
11	Mauritius	Bois Rouge	8-6-08	do.	16.4	13.26	2.01	80.8
12	Do.	Settlers	9-6-08	do.	13.8	10.25	1.98	74.2
13	New Guinea	New Guinea 8A	9-6-08	do.	16.6	12.99	1.81	78.2
14	Do.	15	9-6-08	do.	16.2	12.56	2.31	77.5
15	Do.	64	9-6-08	do.	13.2	8.96	2.91	67.8

SECOND PROGRESSIVE EXAMINATION OF NON-IRRIGATED SECOND RATOON CANE: PLATS WITH MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JULY, 1908.

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	New Guinea	New Guinea 24	7-7-08	8½ months	16.0	12.08	1.94	75.5
2	Do.	24A	7-7-08	do.	18.0	14.99	1.34	83.3
3	Do.	24B	7-7-08	do.	17.3	13.82	1.66	79.9
4	Trinidad	Trinidad S. 60	7-7-08	do.	13.8	10.55	1.61	76.4
10	New Guinea	New Guinea 4	8-7-08	do.	16.5	13.66	1.48	82.8
11	Mauritius	Bois Rouge	8-7-08	do.	16.8	13.07	2.10	77.8
12	Do.	Settlers	8-7-08	do.	15.7	12.31	1.85	78.4
13	New Guinea	New Guinea 8A	9-7-08	do.	17.9	14.59	1.54	81.5
14	Do.	15	9-7-08	do.	18.0	15.42	1.40	85.7
15	Do.	64	9-7-08	do.	15.2	11.26	2.33	74.1

THIRD PROGRESSIVE EXAMINATION OF NON-IRRIGATED SECOND RATOON CANE: PLATS WITH MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—AUGUST, 1908.

1	New Guinea	New Guinea 24	6-8-08	9½ months	18.9	16.84	.82	89.1
2	Do.	24A	6-8-08	do.	18.5	16.03	1.08	86.6
3	Do.	24B	6-8-08	do.	18.7	16.03	1.29	85.7
4	Trinidad	Trinidad S. 60	6-8-08	do.	17.0	14.87	.76	87.4
10	New Guinea	New Guinea 4	6-8-08	do.	18.8	17.35	.45	92.2
11	Mauritius	Bois Rouge	6-8-08	do.	17.8	15.02	1.59	84.3
12	Do.	Settlers	7-8-08	do.	18.6	17.52	.26	94.2
13	New Guinea	New Guinea 8A	7-8-08	do.	20.0	18.34	.51	91.7
14	Do.	15	7-8-08	do.	19.8	18.08	.55	91.3
15	Do.	64	7-8-08	do.	16.2	13.55	1.61	83.6

FIRST PRELIMINARY EXAMINATION OF NON-IRRIGATED SECOND RATOON CANE: PLATS, NO MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JUNE, 1908.

1A	New Guinea	New Guinea 24	5-6-08	7½ months	16.1	12.61	2.15	78.3
2A	Do.	24A	8-6-08	do.	15.9	12.59	1.73	79.1
3A	Do.	24B	8-6-08	do.	15.9	12.46	1.92	78.3
4A	Trinidad	Trinidad S. 60	8-6-08	do.	13.4	9.07	2.45	67.7
10A	New Guinea	New Guinea 4	8-6-08	do.	14.8	11.35	1.66	76.7
11A	Mauritius	Bois Rouge	9-6-08	do.	17.3	13.53	1.17	78.2
12A	Do.	Settlers	9-6-08	do.	14.5	10.77	1.95	74.2
13A	New Guinea	New Guinea 8A	9-6-08	do.	18.5	16.06	1.13	86.8
14A	Do.	15	9-6-08	do.	18.6	16.61	1.16	89.3
15A	Do.	64	10-6-08	do.	15.5	11.86	2.31	76.5

SECOND PROGRESSIVE EXAMINATION OF NON-IRRIGATED SECOND RATOON CANE: PLATS, NO MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JULY, 1908.

1A	New Guinea	New Guinea 24	7-7-08	8½ months	18.5	13.58	1.57	80.8
2A	Do.	24A	7-7-08	do.	18.1	15.69	1.02	86.7
3A	Do.	24B	7-7-08	do.	16.9	13.83	1.72	82.1
4A	Trinidad	Trinidad S. 60	8-7-08	do.	18.5	14.14	1.23	85.2
10A	New Guinea	New Guinea 4	8-7-08	do.	17.2	15.0	.82	87.2
11A	Mauritius	Bois Rouge	8-7-08	do.	18.5	16.28	1.66	87.9
12A	Do.	Settlers	9-7-08	do.	15.9	13.31	1.20	85.7
13A	New Guinea	New Guinea 8A	9-7-08	do.	19.9	17.60	.82	88.4
14A	Do.	15	9-7-08	do.	18.8	17.75	.65	94.4
15A	Do.	64	9-7-08	do.	16.5	13.56	1.75	82.2

THIRD PROGRESSIVE EXAMINATION OF NON-IRRIGATED SECOND RATOON CANE: PLATS, NO MANURES;  
ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—AUGUST, 1908.

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.
1A	New Guinea	New Guinea 24	6-8-08	9½ months	18·3	16·21	·94	88·5
2A	Do.	24A	6-8-08	do.	20·3	18·80	·48	92·6
3A	Do.	24B	6-8-08	do.	19·8	17·97	·61	90·7
4A	Trinidad	Trinidad S. 60	6-8-08	do.	17·3	15·56	·54	89·9
10A	New Guinea	New Guinea 4	6-8-08	do.	19·4	17·98	·25	92·6
11A	Mauritius	Bois Rouge	7-8-08	do.	19·8	18·02	·56	91·0
12A	Do.	Settlers	7-8-08	do.	18·9	17·72	·29	93·7
13A	New Guinea	New Guinea 8A	7-8-08	do.	21·1	19·74	·26	93·5
14A	Do.	15	7-8-08	do.	20·4	19·28	·34	94·5
15A	Do.	6	7-8-08	do.	17·5	14·89	1·30	85·0

The estimation of the fibre and final analyses of these varieties were carried out in September by Mr. L. C. McCready, to whom credit is due for careful analyses and accuracy of results. Mr. McCready was assisted by Mr. H. S. Burn, who also carried out his duties satisfactorily. The results of the final examination are as follow:—

FINAL EXAMINATION OF IRRIGATED SECOND RATOON CANE: PLATS WITH MANURES; ALL OTHER  
CONDITIONS OF CULTIVATION BEING EQUAL—SEPTEMBER, 1908.

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.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH.	Fibre in Cane.	Sucrose in Cane.	Date of Arrowing.
16	New Guinea	N.G. 24	21-9-08	11 mo's	21·1	18·84	·24	89·2	5·5	9·39	17·07	
17	Do.	24A	21-9-08	do.	20·2	18·61	·44	92·1	5·5	10·74	16·61	
18	Do.	24B	21-9-08	do.	20·0	18·50	·50	92·5	3·5	10·29	16·59	
19	Trinidad	Trinidad S. 60	21-9-08	do.	17·3	15·53	·63	89·7	5·5	10·82	13·84	18 July
25	New Guinea	N.G. 4	18-9-08	do.	19·9	18·84	·33	94·6	5·0	11·23	16·72	
26	Mauritius	Bois Rouge	18-9-08	do.	20·4	18·99	·49	93·0	3·0	10·70	16·95	5 May (fully)
27	Do.	Settlers	18-9-08	do.	20·6	19·25	·33	93·4	6·0	11·51	17·03	
28	New Guinea	N.G. 8A	18-9-08	do.	18·2	15·82	·85	86·9	4·0	6·50	14·79	21 July
29	Do.	15	18-9-08	do.	19·1	17·09	·69	89·4	5·0	10·20	15·34	
30	Do.	64	18-9-08	do.	19·6	17·55	·78	89·5	5·5	12·21	15·40	6 July

FINAL EXAMINATION OF IRRIGATED SECOND RATOON CANE: PLATS, NO MANURES; ALL OTHER  
CONDITIONS OF CULTIVATION BEING EQUAL—SEPTEMBER, 1908.

16A	New Guinea	N.G. 24	21-9-08	11 mo's	21·0	18·61	·12	88·6	5·0	11·82	16·41	
17A	Do.	24A	21-9-08	do.	20·4	19·15	·25	93·8	5·5	10·77	17·08	
18A	Do.	24B	21-9-08	do.	19·8	18·74	·16	94·6	5·5	11·66	16·55	
19A	Trinidad	Trinidad S. 60	21-9-08	do.	19·5	18·46	·21	94·6	4·0	12·12	16·22	6 July
25A	New Guinea	N.G. 4	18-9-08	do.	20·0	18·55	·09	92·7	4·5	11·36	16·44	
26A	Mauritius	Bois Rouge	18-9-08	do.	19·4	18·13	·26	93·4	5·5	10·58	16·21	5 May (fully)
27A	Do.	Settlers	18-9-08	do.	19·9	18·39	·37	92·4	4·5	11·80	16·21	
28A	New Guinea	N.G. 8A	18-9-08	do.	19·0	17·29	·68	91·0	5·0	9·41	15·66	14 July
29A	Do.	15	18-9-08	do.	21·5	20·22	·24	94·0	5·0	11·59	17·87	
30A	Do.	64	18-9-08	do.	20·0	18·50	·44	92·5	5·0	12·35	16·21	16 June

FINAL EXAMINATION OF NON-IRRIGATED SECOND RATOON CANE: PLATS WITH MANURES; ALL OTHER  
CONDITIONS OF CULTIVATION BEING EQUAL—SEPTEMBER, 1908.

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.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH.	Fibre in Cane.	Sucrose in Cane.	Date of Harvesting.
1	New Guinea ... ..	N.G. 24	18-9-08	11 mo's	19.5	17.82	.49	91.3	5.0	10.73	15.90	
2	Do. ... ..	24A	18-9-08	do.	19.4	17.47	.61	90.0	5.5	10.59	15.61	
3	Do. ... ..	24B	18-9-08	do.	19.2	17.37	.57	90.4	5.5	10.81	15.49	
4	Trinidad ... ..	Trinidad S. 60	18-9-08	do.	17.6	15.88	.50	90.2	5.0	11.38	14.07	
10	New Guinea ... ..	N.G. 4	17-9-08	do.	15.8	13.55	.78	85.7	5.5	10.21	12.16	
11	Mauritius ... ..	Bois Rouge Settlers	17-9-08	do.	21.3	19.96	.25	93.7	5.0	9.71	18.02	5 May (fully)
12	Do. ... ..		17-9-08	do.	19.4	18.27	.24	94.1	5.0	10.70	16.31	
13	New Guinea ... ..	N.G. 8A	17-9-08	do.	20.0	18.39	.33	91.9	5.5	9.22	16.60	
14	Do. ... ..	15	17-9-08	do.	21.8	20.92	.16	95.9	6.0	10.68	18.68	
15	Do. ... ..	64	17-9-08	do.	19.7	18.35	.38	93.1	3.0	9.44	16.61	4 Aug.

FINAL EXAMINATION OF NON-IRRIGATED SECOND RATOON CANE: PLATS, NO MANURES; ALL OTHER  
CONDITIONS OF CULTIVATION BEING EQUAL—SEPTEMBER, 1908.

1A	New Guinea ... ..	N.G. 24	18-9-08	11 mo's	19.9	18.76	.19	94.2	5.5	11.18	16.66	1 Sept. (very slightly)
2A	Do. ... ..	24A	18-9-08	do.	20.5	19.30	.18	94.1	4.0	10.15	17.34	
3A	Do. ... ..	24B	18-9-08	do.	19.8	18.71	.19	94.4	3.5	10.69	16.70	
4A	Trinidad ... ..	Trinidad S. 60	18-9-08	do.	18.9	17.32	.33	91.6	5.5	10.83	15.44	1 Aug.
10A	New Guinea ... ..	N.G. 4...	17-9-08	do.	20.2	19.00	.11	94.0	5.5	10.73	16.96	
11A	Mauritius ... ..	Bois Rouge Settlers	17-9-08	do.	20.9	19.74	.17	94.4	5.0	11.31	17.50	5 May (fully)
12A	Do. ... ..		17-9-08	do.	19.0	17.67	.29	93.0	3.5	11.57	15.62	
13A	New Guinea ... ..	N.G. 8A	17-9-08	do.	21.2	20.27	.09	95.6	5.0	8.79	18.48	
14A	Do. ... ..	15	17-9-08	do.	21.9	20.84	.07	95.1	4.5	10.66	18.61	
15A	Do. ... ..	64	17-9-08	do.	19.2	17.83	.45	92.8	3.0	11.04	15.86	4 Aug.

The table following, showing the action of irrigation and manures upon the density and purity of the sugar juices, is given as confirming the indications of previous reports—namely, that irrigation and manures, while increasing the yield, have a tendency to lower the purity of the juices. As previously stated, however, this need not apply to cane from land thoroughly exhausted from long and continuous cropping:—

THE ACTION OF IRRIGATION AND MANURES UPON THE DENSITY AND PURITY OF SUGAR JUICES.

Conditions.	Average Density of Juice (Brix.)	Average Sucrose in Juice.	Average Purity of Juice.
Irrigated plats: mixed manures ... ..	19.6	17.90	91.3
Irrigated plats: no manures ... ..	20.0	18.60	93.0
Non-irrigated plats: mixed manures ... ..	19.3	17.79	92.1
Non-irrigated plats: no manures ... ..	20.1	18.94	94.2

After the analyses were completed, each plat was separately cut, and the cane therefrom sent to Meadowlands Mill. The mill weights, checked by occasional weighings over the station weighbridge, the count of the canes, and the analytical data, have been used in compiling the following tables of crop results:—

CROP RESULTS: SECOND RATOON CANE OF THE TEN BEST VARIETIES.

1.—IRRIGATED PLATS: MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—1908.

No. of Plat.	Country.	No. or Name of Variety.	Age of Cane.	No. of Canes per Acre.	Average Weight of the Stricks 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.
16	New Guinea	New Guinea 24	11 months	28,314	3·9	50·0	19,122	8·5
17	Do.	24A	do.	28,967	3·9	50·6	18,828	8·4
18	Do.	24B	do.	29,620	3·9	52·1	19,371	8·6
19	Trinidad	Trinidad S. 60	do.	30,927	2·2	31·7	9,829	4·3
25	New Guinea	New Guinea 4	do.	47,044	2·0	42·1	15,769	7·0
26	Mauritius	Bois Rouge	do.	30,056	2·6	35·8	13,619	6·0
27	Do.	Settlers	do.	43,560	1·6	31·3	11,973	5·3
28	New Guinea	New Guinea 8A	do.	32,670	2·5	37·3	12,384	5·5
29	Do.	15	do.	30,274	3·2	43·7	15,022	6·7
30	Do.	64	do.	14,810	3·1	20·9	7,213	3·2

2.—IRRIGATED PLATS: NO MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—1908.

16A	New Guinea	New Guinea 24	11 months	22,433	3·3	33·0	12,164	5·4
17A	Do.	24A	do.	23,522	3·2	33·6	12,870	5·7
18A	Do.	24B	do.	20,255	2·5	22·9	8,493	3·7
19A	Trinidad	Trinidad S. 60	do.	21,997	2·8	27·9	10,144	4·5
25A	New Guinea	New Guinea 4	do.	32,234	1·2	18·3	6,744	3·0
26A	Mauritius	Bois Rouge	do.	28,096	1·5	18·8	6,836	3·0
27A	Do.	Settlers	do.	21,997	1·9	18·6	6,778	3·0
28A	New Guinea	New Guinea 8A	do.	31,145	1·8	25·9	9,116	4·0
29A	Do.	15	do.	24,175	2·1	23·7	9,491	4·2
30A	Do.	64	do.	16,355	2·3	17·4	6,338	2·8

3.—NON-IRRIGATED PLATS: MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—1908.

1	New Guinea	New Guinea 24	11 months	36,154	3·1	50·7	18,090	8·0
2	Do.	24A	do.	33,323	3·2	48·3	16,905	7·5
3	Do.	24B	do.	32,670	3·4	50·3	17,463	7·7
4	Trinidad	Trinidad S. 60	do.	25,047	2·5	28·6	9,034	4·0
10	New Guinea	New Guinea 4	do.	51,836	1·8	42·1	11,491	5·1
11	Mauritius	Bois Rouge	do.	45,302	2·0	41·8	16,912	7·5
12	Do.	Settlers	do.	27,225	1·9	23·3	8,547	3·8
13	New Guinea	New Guinea 8A	do.	27,422	3·0	36·8	13,767	6·1
14	Do.	15	do.	29,403	3·1	41·8	17,531	7·8
25	Do.	64	do.	18,659	3·0	24·9	9,298	4·1

4.—NON-IRRIGATED PLATS: NO MANURES; ALL OTHER CONDITIONS OF CULTIVATION  
BEING EQUAL—1908.

No. of Plat.	Country.	No. or Name of Variety.	Age of Cane.	No. of Canes per Acre.	Average Weight of the Stalks 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.
1A	New Guinea	New Guinea 24	11 months	25,264	2·4	27·5	10,278	4·5
2A	Do.	24A	do.	25,482	2·6	29·9	11,627	5·1
3A	Do.	24B	do.	25,482	2·7	30·8	11,547	5·1
4A	Trinidad	Trinidad S. 60	do.	31,798	1·7	25·1	8,695	3·8
10A	New Guinea	New Guinea 4	do.	49,876	1·5	33·6	12,766	5·6
11A	Mauritius	Bois Rouge	do.	28,096	1·8	22·5	8,858	3·9
12A	Do.	Settlers	do.	22,215	1·3	13·0	4,560	2·0
13A	New Guinea	New Guinea 8A	do.	15,899	2·6	18·8	7,813	3·4
14A	Do.	15	do.	17,859	2·9	23·6	9,876	4·4
15A	Do.	64	do.	16,156	2·3	16·5	5,893	2·6

The particulars summarised below give the average results obtained from the various plats under the four sets of conditions:—

SUMMARY TABLE.

AVERAGE OF RESULTS FROM THE SECOND RATOONS OF THE TEN BEST VARIETIES UNDER THE FOUR SETS OF CONDITIONS SET FORTH IN THE PRECEDING TABLES.

Conditions.	Weight of Cane per Acre in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
Irrigated plats: mixed manures; other conditions of cultivation being equal	39·5	14,313	6·3
Irrigated plats: no manures; other conditions of cultivation being equal	24·0	8,897	3·9
Non-irrigated plats: mixed manures; other conditions of cultivation being equal	38·8	13,903	6·1
Non-irrigated plats: no manures; other conditions of cultivation being equal	24·1	9,191	4·0

This year the irrigated plats with manures have given a slightly higher yield over the non-irrigated plats with manures, the difference being equivalent to 14 cwt. more cane per acre. On the other hand, the irrigated plats without manures give a very slightly lower result when compared with the non-irrigated plats without manures, the difference in favour of the latter being 2 cwt. more cane per acre. The irrigated plats with manures show an increase of 15½ tons of cane per acre and 2·4 tons of sugar per acre over the irrigated plats with no manures, while the non-irrigated plats with manures show an increase of 14·7 tons of cane per acre and 2·1 tons of sugar per acre over the non-irrigated plats without manures.

The anticipations, therefore, of the Director—that in the ratoon crops the difference between the manured and unmanured plats would be remarkably striking—have been most fully borne out; and, as stated last year, these experiments have been of the greatest interest, both to the writer, and to all persons who have seen them. The immense difference in the yield, caused by the action of the fertilisers, between the two series of plats, is a great object lesson to growers, and cannot be over-emphasised. Had these experiments been carried out with the best of the New Guinea canes only, the results would have been still more amazing, as can be easily seen on comparing the manured plats of New Guinea 24, 24A, and 15 with the unmanured plats.

In considering the tables in detail, it will be noticed that this year the manures have given a higher yield on every plat, when compared with the plats having no manures. The non-manured plats of Trinidad Seedling 60, which have hitherto given a higher yield than the manured plats (due to causes explained in previous reports), have been unable to hold out any longer, and the manured plats have come to the front.

As mentioned in last year's report, a comparison of the plats of New Guinea 24B on the irrigated side will not be fair, due to the fact that the cane did not ratoon as it should have done, on the unmanured plat, after the plant crop had been cut. No reason was found for this behaviour.

Excluding the irrigated plat of New Guinea 24B, therefore, the largest difference due to manure was found in the irrigated plats of New Guinea 4. Here the fertilised plat gave an increase of 23·8 tons of cane per acre more than was found on the corresponding plat without manures. This wide difference was closely followed in the non-irrigated plats of New Guinea 24 (or Goru), where the manured plat gave a yield of 23·2 tons of cane per acre more than did the unmanured plat.

As already pointed out, the average increase due to manure was 15.5 tons of cane per acre on the irrigated and manured plats and 1.7 tons of cane per acre on the non-irrigated and manured plats above the yield given by the corresponding non-manured plats.

The smallest increase (excepting Trinidad 60, for reasons already given) is shown on the irrigated plats of New Guinea 64 with and without manure, where the increase for manure is only 3½ tons.

As these varieties have now passed through three crops, a table showing the total results to date from the plant, first ratoon, and second ratoon crops is appended. From this table it will be seen that the New Guinea canes of the 24 series, together with New Guinea 15 (or Badila), maintained the lead both in cane and sugar production over the Mauritius and Trinidad canes:—

TOTAL RESULTS OF THE TEN BEST VARIETIES TO DATE COVERING PLANT, FIRST RATOON AND SECOND RATOON CROPS 1906-1908, UNDER THE FOUR SETS OF CONDITIONS.

NUMBER OR NAME OF VARIETY.	IRRIGATED PLATS.						NON-IRRIGATED PLATS.					
	MIXED MANURES.			NO MANURES.			MIXED MANURES.			NO MANURES.		
	Total Cane per Acre, English Tons, 3 Crops.	Total Sugar per Acre, Pounds, 3 Crops.	Total Sugar per Acre, English Tons, 3 Crops.	Total Cane per Acre, English Tons, 3 Crops.	Total Sugar per Acre, Pounds, 3 Crops.	Total Sugar per Acre, English Tons, 3 Crops.	Total Cane per Acre, English Tons, 3 Crops.	Total Sugar per Acre, Pounds, 3 Crops.	Total Sugar per Acre, English Tons, 3 Crops.	Total Cane per Acre, English Tons, 3 Crops.	Total Sugar per Acre, Pounds, 3 Crops.	Total Sugar per Acre, English Tons, 3 Crops.
New Guinea 24	169.3	67,569	30.1	136.3	51,574	23.0	165.0	59,600	26.6	108.1	39,737	17.7
24A	169.2	60,194	28.8	147.0	55,400	24.7	148.1	52,040	23.2	127.9	47,834	21.3
24B	170.2	64,318	28.7	106.9	40,473	18.0	165.8	56,704	25.3	124.8	46,158	20.6
Trinidad Seedling 60	116.4	33,712	15.0	123.0	41,237	18.4	98.6	29,319	13.0	103.9	36,317	16.2
New Guinea 4	130.0	46,555	20.7	96.4	35,340	15.7	146.3	38,229	17.0	125.6	41,521	18.5
Mauritius Bois Rouge	122.0	47,587	21.2	103.4	38,803	17.3	126.8	49,863	22.2	96.1	37,116	16.5
Settlers	117.9	41,227	18.4	81.4	28,520	12.7	95.8	35,482	15.8	66.5	25,171	11.2
New Guinea 8A	128.9	46,010	20.5	105.2	36,610	16.3	118.0	44,587	19.9	85.8	35,756	15.9
15	155.8	56,707	25.3	115.6	46,055	20.5	144.6	62,325	27.8	108.6	46,392	20.7
64	120.0	37,602	16.7	92.6	32,432	14.4	111.4	36,340	16.2	86.3	30,469	13.6

These varieties are being again ratooned for a third ratoon crop.

SUBSOILING AND CULTIVATION EXPERIMENT WITH CANE KNOWN AS NEW GUINEA No. 40 (SECOND RATOONS).

A ridge running through the main experiment area, of the same nature chemically as the rest of the soil, but only having a depth of 8 to 9 inches of true soil, was divided into ten plats, and planted with the variety known as New Guinea 40. The second ratoons of this variety were separated into two portions of five plats each. One such portion was ploughed and deeply subsoiled between the rows, and subsequently cultivated with the Planet Junior cultivator until out of hand, while the other portion received no treatment whatever, beyond being kept free from weeds, although the land for the plant crop had originally been subsoiled. The analyses of these canes is shown in the following tables:—

FIRST PRELIMINARY EXAMINATION OF SECOND RATOON CANE, NEW GUINEA 40—JUNE, 1908.

Conditions of Experiments.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
Subsoiled and cultivated	15-6-08	7½ months	16.2	13.28	1.60	81.9
Not subsoiled and not cultivated	15-6-08	do.	16.3	13.77	1.33	84.4

SECOND PROGRESSIVE EXAMINATION OF SECOND RATOON CANE, NEW GUINEA 40—JULY, 1908.

Subsoiled and cultivated	16-7-08	8½ months	17.1	13.69	1.01	80.0
Not subsoiled and not cultivated	17-7-08	do.	18.1	16.38	.54	90.5

THIRD PROGRESSIVE EXAMINATION OF SECOND RATOON CANE, NEW GUINEA 40—AUGUST, 1908.

Subsoiled and cultivated	12-8-08	9½ months	18.2	16.78	.43	92.2
Not subsoiled and not cultivated	12-8-08	do.	18.9	17.54	.28	92.8

## FINAL EXAMINATION OF SECOND RATOON CANE, NEW GUINEA 40—SEPTEMBER, 1908.

Conditions of Experiments.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Acidity per 100 Juice expressed in c.c. N/10 NaOH.	Fibre in Cane.	Sucrose in Cane.	Date of Arrowing.
Subsoiled and cultivated ... ..	17-9-08	11 mo's.	18.3	15.61	.92	85.3	5.0	11.85	13.76	...
Not subsoiled and not cultivated ... ..	18-9-08	do. ...	19.1	18.07	.18	94.6	5.0	11.73	15.95	..

These plats form the largest experiment on the station, and occupy a relatively large area. They are not manured or irrigated, and the increase shown of 12.1 tons of cane per acre is due solely to cultivation and the use of the subsoiler. The crop results are shown below—

## CROP RESULTS OF NEW GUINEA 40: SECOND RATOONS—1908.

## No. 1.—RATOONS SUBSOILED AND CULTIVATED.

Plat Numbers.	No. 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.
5 to 9	New Guinea 40 ... ..	11 months ...	33,759	2.0	31.3	9,670	4.3

## No. 2.—RATOONS NOT SUBSOILED AND NOT CULTIVATED.

20 to 24	New Guinea 40 ... ..	11 months ...	28,720	1.5	19.2	6,871	3.0
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That this result should be obtained from the mere acts of ploughing and deeply subsoiling between the rows will no doubt surprise many farmers. The difference right through the crop between the subsoiled and not subsoiled plats has been very great, and it was at no time difficult to see that a large increase in tonnage was going to be the outcome of subsoiling. Taking the first and second ratoon crops together, the cane per acre on the subsoiled and cultivated plats has exceeded the cane per acre on the non-subsoiled and uncultivated plats by 24 tons.

## EXPERIMENTS FOR DETERMINING THE MOST ADVISABLE DISTANCES BETWEEN THE PLANTS IN THE ROW, AND THE DISTANCE BETWEEN THE ROWS, OR THE NUMBER OF EYES, PLANTS, AND WEIGHT OF SEED PER ACRE.

Upon page 9 of the report of 1904-5 a description of experiments in planting under the above conditions is given. The brief preliminary description contained in the report is reproduced here before setting forth the analytical and crop results of the second ratoons.

A piece of land on which cane had not been grown for some time has been broken up, four times cross-ploughed, and once subsoiled. This has been set aside for a series of planting tests. These comprise ten plats, and include experiments in planting in rows of different widths and distances between plants. The plan of the trials is set out in the following table:—

Date of Planting.	Number of Plat.	Variety Used.	Width between the Rows.	Width between the Plants in the Row. (Three eyes to each plant.)
3 April ... .. 1905.	1	N.G. 24A ...	4 feet ... ..	6 inches
3 " ... ..	2	ditto ...	5 " ... ..	6 "
3 " ... ..	3	ditto ...	6 " ... ..	6 "
3 " ... ..	4	ditto ...	7 " ... ..	6 "
7 " ... ..	5	N.G. 40 ...	5 " ... ..	Continuous cane
7 " ... ..	6	ditto ...	5 " ... ..	6 inches
7 " ... ..	7	ditto ...	5 " ... ..	12 "
7 " ... ..	8	ditto ...	5 " ... ..	18 "
7 " ... ..	9	ditto ...	5 " ... ..	24 "
7 " ... ..	10	ditto ...	5 " ... ..	36 "

For the sake of convenience, the two series of experiments, which are set forth together in the table reproduced, will now be stated separately in their two distinct series. Two tables are given which set forth: "The number of plants per acre," "The number of eyes per acre," and "The weight of seed per acre," in the two series of tests now under discussion. The first series deals with the number of plants in the row, the distance between the rows in this series being uniformly 5 ft.; and under the heading of "Weight of seed used per acre," it is seen that, while one continuous stick in the row used  $2\frac{1}{2}$  tons of seed per acre, the other extreme of 36 in. between the plants in the row used only half a ton of seed per acre. In the second series it is also shown that a distance between the rows of 4 ft. used 1 ton 18 cwt. of seed per acre, while the distance of 7 ft. between the row used 1 ton 2 cwt. per acre. These data require to be kept in mind when the crop results are dealt with in a later place.

DISTANCE EXPERIMENTS.  
CANE PLANTS USED PER ACRE.

FIRST SERIES.

Distance between the Plants.	Number of Plants per Acre.	Number of Eyes per Acre.	Weight of Seed Used per Acre.
1. Continuous stick in the row ... ..	Continuous stick ...	34,848	Tons cwt. 2 10
2. Plants 6 inches apart ... ..	6,969	20,908	1 10
3. Plants 12 inches apart ... ..	4,976	14,929	1 2
4. Plants 18 inches apart ... ..	3,867	11,602	0 16
5. Plants 24 inches apart ... ..	3,168	9,504	0 14
6. Plants 36 inches apart ... ..	2,323	6,969	— 0 10

SECOND SERIES.

Distance between the Rows.	Number of Plants per Acre.	Number of Eyes per Acre.	Weight of Seed Used per Acre.
1. 4 feet apart ... ..	8,712	26,136	Tons cwt. 1 18
2. 5 feet apart ... ..	6,969	20,908	1 10
3. 6 feet apart ... ..	5,808	17,424	1 4
4. 7 feet apart ... ..	4,978	14,935	1 2

The cultivation of the second ratoons and climatic conditions were the same as in the second ratoons of the ten best varieties on the non-irrigated plats, except that all the plats in the distance experiments were fertilised. They were not, however, irrigated. The usual preliminary and progressive analysis are set out hereunder:—

FIRST PRELIMINARY EXAMINATION OF SECOND RATOON CANE IN THE DISTANCE EXPERIMENTS—  
JUNE, 1908.

FIRST SERIES.

Variety of Cane.	Distance between the Plants.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
New Guinea 40 ... ..	Continuous stick in the row	16-6-08	7½ mo's	14·5	10·99	1·92	75·8
40 ... ..	Plants 6 inches apart ...	16-6-08	do. ...	14·2	10·28	2·12	72·4
40 ... ..	Plants 12 inches apart ...	16-6-08	do. ...	14·4	10·85	1·95	75·3
40 ... ..	Plants 18 inches apart ...	16-6-08	do. ...	14·6	10·80	2·27	73·9
... ..	Plants 24 inches apart ...	17-6-08	do. ...	14·5	10·31	2·40	71·1
40 ... ..	Plants 36 inches apart ...	17-6-08	do. ...	12·4	7·89	2·84	63·6

## SECOND SERIES.

Variety of Cane.	Distance between the Rows.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
New Guinea 24A	4 feet	15-6-08	7½ mo's	16.8	12.83	2.19	76.3
24A	5 feet	16-6-08	do.	16.0	12.27	2.08	76.7
24A	6 feet	16-6-08	do.	15.3	11.40	2.19	74.5
24A	7 feet	16-6-08	do.	15.8	12.21	2.05	77.2

SECOND PROGRESSIVE EXAMINATION OF SECOND RATOON CANE IN THE DISTANCE EXPERIMENTS—  
JULY, 1908.

## FIRST SERIES.

Variety of Cane.	Distance between the Plants.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
New Guinea 40	Continuous stick in the row	15-7-08	8½ mo's	15.2	12.10	1.85	79.6
40	Plants 6 inches apart	16-7-08	do.	15.7	12.53	1.85	79.8
40	Plants 12 inches apart	16-7-08	do.	15.7	12.13	1.97	77.2
40	Plants 18 inches apart	16-7-08	do.	15.1	11.64	1.91	77.1
40	Plants 24 inches apart	16-7-08	do.	12.2	7.74	2.68	63.4
40	Plants 36 inches apart	16-7-08	do.	15.5	12.45	1.52	80.3

## SECOND SERIES.

Variety of Cane.	Distance between the Rows.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
New Guinea 24A	4 feet	15-7-08	8½ mo's	16.3	12.86	1.85	78.9
24A	5 feet	15-7-08	do.	17.7	15.10	1.20	85.3
24A	6 feet	15-7-08	do.	16.3	12.29	2.10	75.4
24A	7 feet	15-7-08	do.	17.1	13.90	1.57	81.2

THIRD PROGRESSIVE EXAMINATION OF SECOND RATOON CANE IN THE DISTANCE EXPERIMENTS—  
AUGUST, 1908.

## FIRST SERIES.

Variety of Cane.	Distance between the Plants.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
New Guinea 40	Continuous stick in the row	11-8-08	9½ mo's	17.3	14.87	1.09	85.9
40	Plants 6 inches apart	11-8-08	do.	16.3	13.64	1.20	83.6
40	Plants 12 inches apart	11-8-08	do.	16.6	14.06	1.22	84.7
40	Plants 18 inches apart	12-8-08	do.	15.5	14.17	1.02	85.8
40	Plants 24 inches apart	12-8-08	do.	16.4	13.96	1.19	85.1
40	Plants 36 inches apart	12-8-08	do.	15.8	12.43	1.70	78.6

## SECOND SERIES.

Variety of Cane.	Distance between the Rows.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
New Guinea 24A ... ..	4 feet ... ..	11-8-08	9½ mo's	19.3	17.18	.93	89.0
24A ... ..	5 feet ... ..	11-8-08	do. ...	17.8	15.21	1.05	85.4
24A ... ..	6 feet ... ..	11-8-08	do. ...	16.8	13.69	1.43	81.5
24A ... ..	7 feet ... ..	11-8-08	do. ...	17.5	14.68	1.09	83.9

The final analyses, covering fibre and juice, appear in the table below—

## FINAL EXAMINATION OF SECOND RATOON CANE IN THE DISTANCE EXPERIMENTS—SEPTEMBER, 1908.

## FIRST SERIES.

Variety of Cane.	Distance between the Plants.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH.	Fibre in Cane.	Sucrose in Cane.	Date of Arrowing.
New Guinea 40 ... ..	Continuous stick in the row	21-9-08	11 mo's	18.5	16.53	.64	89.3	4.5	10.79	14.74	
40 ... ..	Plants 6 in. apart	21-9-08	do. ...	17.7	15.75	.86	88.9	5.0	11.42	13.95	
40 ... ..	Plants 12 in. apart	21-9-08	do. ...	17.8	16.25	.57	91.2	5.5	11.57	14.36	
40 ... ..	Plants 18 in. apart	21-9-08	do. ...	18.9	17.59	.38	93.0	4.0	11.28	15.70	
40 ... ..	Plants 24 in. apart	21-9-08	do. ...	18.5	15.68	.47	84.7	5.0	11.17	13.92	
40 ... ..	Plants 36 in. apart	21-9-08	do. ...	18.3	15.76	.44	86.1	3.5	10.74	14.06	

## SECOND SERIES.

Variety of Cane.	Distance between the Rows.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH.	Fibre in Cane.	Sucrose in Cane.	Date of Arrowing.
New Guinea 24A ... ..	4 feet ... ..	21-9-08	11 mo's	19.2	17.17	.64	89.4	5.5	10.15	15.42	
24A ... ..	5 feet ... ..	21-9-08	do. ...	19.4	17.63	.54	90.8	5.5	9.83	15.89	
24A ... ..	6 feet ... ..	21-9-08	do. ...	18.6	16.34	.76	87.8	5.0	10.77	14.58	
24A ... ..	7 feet ... ..	21-9-08	do. ...	19.2	17.17	.67	89.4	5.5	9.90	15.47	

Early in the month of October the plats were cut and sent to Meadowlands. The results are now appended:—

## CROP RESULTS OF THE DISTANCE EXPERIMENTS: SECOND RATOONS—1908.

## FIRST SERIES.

Distance between the Plants in the Row.	Name of Variety.	Age of Cane.	Number of Canes per Acre.	Average Weight of the Sticks in Pounds.	Weight of Cane per Acre in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
1. Continuous stick in the row ... ..	New Guinea 40	11 months ...	39,839	2.6	46.2	15,268	6.8
2. Plants 6 inches apart ... ..	40	do. ...	38,550	2.5	44.4	13,889	6.2
3. Plants 12 inches apart ... ..	40	do. ...	35,719	2.6	42.8	13,789	6.1
4. Plants 18 inches apart ... ..	40	do. ...	30,886	2.8	38.6	13,577	6.0
5. Plants 24 inches apart ... ..	40	do. ...	25,047	3.5	39.7	12,384	5.5
6. Plants 36 inches apart ... ..	40	do. ...	20,037	4.1	36.7	11,568	5.1

## SECOND SERIES.

Distance between the Rows.	Name of Variety.	Age of Cane.	Number of Cane 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. 4 feet apart ... ..	New Guinea 24A	11 months ...	42,323	3.0	56.6	19,578	8.7
2. 5 feet apart ... ..	24A	do. ...	33,323	3.2	48.9	17,417	7.7
3. 6 feet apart ... ..	24A	do. ...	25,828	4.0	46.3	15,142	6.7
4. 7 feet apart ... ..	24A	do. ...	25,228	3.0	44.7	15,494	6.9

From the table of "Crop Results" it will be seen that these distance experiments have, in the second ratoon crop, closely followed the results obtained in the plant and first ratoon crops. This year the plat planted with the continuous stick in the row has given a higher yield than the plat where the plants were placed 6 in. apart in the row. This was the case in the plant crop; but last year, in the first ratoon crop, the plat with plants 6 in. apart led the way. In the first series the plat planted with a continuous stick in the row has this year given  $9\frac{1}{2}$  more tons of cane per acre, and 1.7 more tons of sugar per acre than where the plants were placed 36 in. apart in the row. The gradation in the tonnage of sugar produced is regular throughout the first series, but owing to some factor unaccounted for, which might be due to depredations of vermin, the gradation in tonnage of cane, while regular so far as the plats planted with a continuous stick in the row, 6 in. apart, 12 in. apart, and 36 in. apart are concerned, show a small difference in the plats planted with sets 18 in. and 24 in. apart. In considering the total results from the three crops, this will also be found the case.

In the second series the cane planted in rows 4 ft. apart has given an increased yield of 11.9 tons of cane per acre, and 1.8 tons of sugar per acre over the cane planted in rows 7 ft. apart. The gradation in the weight of cane produced is perfectly regular. The yield of sugar also diminishes regularly until the 7 ft. rows are reached, when this plat is found to have given a slightly higher yield than the plat with rows 6 ft. apart, as was also the case last year. This, as previously explained, could be due to some other factor affecting the crop.

These experiments having now passed through three crops—viz., plant, first, and second ratoons, the following table is presented showing the total results obtained from the use of more or less seed per acre in the different methods of planting:—

## TOTAL RESULTS OF THE DISTANCE EXPERIMENTS TO DATE, COVERING PLANT, FIRST RATOON, AND SECOND RATOON CROPS—1906-1908.

## FIRST SERIES.

Distance between the Plants in the Row.	Name of Variety.	Total Cane per Acre English Tons, 3 Crops.	Total Sugar per Acre Pounds, 3 Crops.	Total Sugar per Acre English Tons, 3 Crops.
1. Continuous stick in the row ... ..	New Guinea 40	147.2	46,416	20.7
2. Plants six inches apart ... ..	40	145.1	44,690	19.9
3. Plants twelve inches apart ... ..	40	135.2	42,583	19.0
4. Plants eighteen inches apart ... ..	40	127.9	44,274	19.7
5. Plants twenty-four inches apart ... ..	40	129.4	41,235	18.4
6. Plants thirty-six inches apart ... ..	40	118.9	40,261	17.9

## SECOND SERIES.

Distance between the Rows.	Name of Variety.	Total Cane per Acre English Tons, 3 Crops.	Total Sugar per Acre Pounds, 3 Crops.	Total Sugar per Acre English Tons, 3 Crops.
1. Four feet apart ... ..	New Guinea 24A	188.4	65,541	29.2
2. Five feet apart ... ..	24A	161.5	58,820	26.2
3. Six feet apart ... ..	24A	154.0	52,862	23.5
4. Seven feet apart ... ..	24A	146.	52,645	23.5

From this table we are now able to learn what advantage is to be derived from using more or less seed per acre in the rows, as was done in the first series. Taking the total results of the plant, first ratoon, and second ratoon crops to date, we find the plat on which the continuous stick in the row was used has given :—

- 1st. An increase over the yield from plants placed 6 in. apart in the row of 2.1 tons of cane per acre, and 16 cwt. of sugar per acre, for an expenditure of 20 cwt. more seed per acre.
- 2nd. An increase over the yield from plants placed 12 in. apart in the row of 12 tons of cane per acre, and 1.7 tons of sugar per acre, for an expenditure of 28 cwt. more seed per acre.
- 3rd. An increase over the yield from plants placed 18 in. apart in the row of 19.3 tons of cane per acre, and 1 ton of sugar per acre, for an expenditure of 34 cwt. more seed per acre.
- 4th. An increase over the yield from plants placed 24 in. apart in the row of 17.8 tons of cane per acre, and 2.3 tons of sugar per acre, for an expenditure of 36 cwt. more seed per acre, and
- 5th. An increase over the yield from plants placed 36 in. apart in the row of 28.3 tons of cane per acre, and 2.8 tons of sugar per acre, for an expenditure of 40 cwt. more seed per acre.

This series is not quite regular owing to the behaviour of the plats planted with sets 18 and 24 in. apart in the row, which have been *somewhat upset* by unknown factors.

The second series have from the outset given more uniform and remarkable results. The comparisons made between these plats for the total results of the three crops is as follows. The cane planted in rows 4 ft. apart has up to date given—

- 1st. An increase over the yield from the cane planted in rows 5 ft. apart of 2.69 tons of cane per acre, and 3 tons of sugar per acre, for an expenditure of 8 cwt. more seed per acre.
- 2nd. An increase over the yield from the cane planted in rows 6 ft. apart of 34.4 tons of cane per acre, and 5.7 tons of sugar per acre, for an expenditure of 14 cwt. more seed per acre, and
- 3rd. An increase over the yield from the cane planted in rows 7 ft. apart of 42.4 tons of cane per acre, and 5.7 tons of sugar per acre, for an expenditure of 16 cwt. more seed per acre.

The remarks already made in previous reports, that variation in distance between the rows has a much more definite bearing upon crop results than varying the distance between the plants in the row, has to be repeated.

As previously stated in foregoing reports, the indications given by these experiments point to the fact that a more liberal use of seed secures a much larger crop. Many farmers place cane anywhere from 1 to 3 ft. in the row, or in the holes, and these tests clearly show that this is not the way to plant cane to obtain the largest crop. The experiments, so far as they have gone, decidedly tend to confirm the conclusions already drawn, namely :—

First.—Plants with three eyes placed 6 in. apart in the row, or even closer, is indicated to be the best way of planting the seed in the row. Too thick planting, however, in the event of abnormally heavy rains and severe winds can have a decidedly livening effect upon the yield.

Secondly.—Any increase in distance between the rows exceeding 5 ft. is likely to result in a lower weight of cane and yield of sugar per acre, while less than 5 ft. between the rows can, and has, resulted in an increase of cane and sugar per acre.

The questions which the Experiment Station set out to investigate at the commencement of these experiments—viz., “How shall we plant?” “How far apart shall we plant?” and “How much seed per acre shall we use?”—are now being answered, and, with the conclusion of the experiments next year as a third ratoon crop, definite conclusions may be drawn.

In the meantime, however, these experiments must be considered in the light of the different natures of soils and climatic conditions obtaining in Queensland. As previously pointed out, in the North, with its heavy rainfalls and moist humid conditions, thick planting may not be advisable, while in the South, where droughts frequently occur, a wider distance providing more moisture to the rows may be imperative. For the Mackay district, however, the guidance so far given should prove reliable.

NEW SERIES OF EXPERIMENTS INITIATED IN 1907, WITH (a) TEN HAMBLEDON SEEDLINGS, (b) BARBADOS 208, AND AN UNKNOWN CANE FROM SOUTH AFRICA.

(a) The planting out of the ten leading Hambleton seedlings obtained from the Colonial Sugar Company's Hambleton Plantation, Cairns, was carried out in the beginning of August, 1907.

This series of experiments was undertaken to establish the comparative value of the seedlings supplied, both as cane and sugar producers, from an economic standpoint. Their resistance to disease and pests was also to be under careful observation.

The land selected for the growth of these seedlings as an experiment crop was first limed to neutralise any sourness left over by previous cropping, cross-ploughed three times, subsoiled to a depth of from 19 to 21 in., and then planted with a crop of cow-pea. In February, 1907, a fine bulk of green manure was ploughed under, and by the time the crop was planted the land was in fine condition. In planting the drills were drawn 5 feet apart, and the distance between the three-eye plants in the drill was 6 in.

The greater part of the year 1907 was very dry, and as it had been determined to conduct this series of experiments without any irrigation, the plants made little progress during August, September, and October. When the rains came in November the crop started to move ahead; good growing weather obtaining through December also. January, 1908, was a much cooler month than usual, and the cane did not make the same progress it usually does in this month; February, March, and April, however, were hot and humid, and the cane made the bulk of its growth in this period. On the 12th March severe gales from the south-west and north-west blew over the station, and laid many of the Hambleton seedlings over. The twisting that many of the stalks received induced sprouting at the eyes, with a subsequent lowering of the sugar contents in those varieties affected.

Mixed fertilisers were applied to all the seedlings and the cultivation given to each variety was the same in every case—namely, the shallow stirring of the soil with a Planet Junior cultivator, fitted with duck-foot hoes, together with hand hoeing when necessary.

Preliminary and progressive analyses of these seedlings were carried out in a precisely similar manner to the other varieties under experimental conditions. The following tables indicate the progress of the cane towards maturity, in the months of June, July, and August, 1908:—

FIRST PRELIMINARY EXAMINATION OF TEN HAMBLEDON SEEDLINGS: PLANT CANE—JUNE, 1908.

Number 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 ... ..	Hambleton, Q'land	5 2-6-08	10 months	12.5	7.29	2.85	58.3
2	Do. ... ..		10 2-6-08	do. ...	15.2	11.66	1.87	76.7
3	Do. ... ..		11 2-6-08	do. ...	17.2	14.96	.99	86.9
4	Do. ... ..		62 2-6-08	do. ...	14.8	10.76	2.31	72.7
6	Do. ... ..		114 2-6-08	do. ...	13.7	9.76	2.42	71.2
6	Do. ... ..		172 3-6-08	do. ...	16.3	13.27	1.34	81.4
7	Do. ... ..		222 3-6-08	do. ...	13.9	10.47	1.97	75.3
8	Do. ... ..		243 3-6-08	do. ...	12.6	7.95	2.94	63.1
9	Do. ... ..		285 3-6-08	do. ...	16.2	13.65	1.41	84.2
10	Do. ... ..		297 4-6-08	do. ...	15.2	11.77	1.72	77.4

SECOND PROGRESSIVE EXAMINATION OF TEN HAMBLEDON SEEDLINGS: PLANT CANE—JULY, 1908.

Number 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 ... ..	Hambleton, Q'land	5 2-7-08	11 months	14.9	11.11	2.18	74.5
2	Do. ... ..		10 do. do. ...	do. ...	17.2	14.74	1.22	85.7
3	Do. ... ..		11 do. do. ...	do. ...	17.9	15.56	0.79	86.9
4	Do. ... ..		62 do. do. ...	do. ...	15.9	12.62	1.79	79.3
5	Do. ... ..		114 do. do. ...	do. ...	14.7	11.71	1.75	79.6
6	Do. ... ..		172 do. do. ...	do. ...	15.1	14.79	0.91	86.4
7	Do. ... ..		222 do. do. ...	do. ...	15.2	12.37	1.55	81.3
8	Do. ... ..		243 3-7-08	do. ...	14.7	11.13	1.91	75.7
9	Do. ... ..		285 do. do. ...	do. ...	16.5	14.14	1.09	85.7
10	Do. ... ..		297 do. do. ...	do. ...	17.5	15.31	0.92	87.4

## THIRD PROGRESSIVE EXAMINATION OF TEN HAMBLEDON SEEDLINGS: PLANT CANE—AUGUST, 1908.

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, Q'land	5	3-8 08	12 months	14.1	9.66	2.41 68.5
2	Do.		10	3-8-08	do.	18.6	16.88	.65 90.7
3	Do.		11	3-8-08	do.	19.8	19.01	.19 96.0
4	Do.		62	3-8-08	do.	17.9	15.70	.90 87.7
5	Do.		114	3-8-08	do.	16.9	15.30	.68 90.6
6	Do.		172	3-8-08	do.	18.9	17.80	.24 94.1
7	Do.		222	4-8-08	do.	17.4	15.79	.63 90.7
8	Do.		243	4-8-08	do.	17.1	14.94	1.17 87.3
9	Do.		285	4-8-08	do.	17.7	16.35	.50 92.3
10	Do.		297	4-8-08	do.	17.5	15.58	.73 89.0

The final analyses of the juice and estimation of the fibre in the cane were made early in September, and the results are as follows:—

## FINAL EXAMINATION OF TEN HAMBLEDON SEEDLINGS: PLANT CANE—SEPTEMBER, 1908.

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.	Acid by per 100 Juice Expressed in % N/10 NaOH.	Fibre in Cane.	Sucrose in Cane.	Date of Arrowing.
1	Queensland	Hambledon, Queensland	5	19 9-08	13 mo's	18.2	15.03	1.34 82.5	3.7	11.69	13.27	
2	Do.		10	19 9-08	do.	20.6	19.07	.45 92.5	4.2	11.20	16.93	
3	Do.		11	19 9-08	do.	19.0	17.40	.55 91.5	3.5	11.08	15.47	
4	Do.		62	19 9-08	do.	18.1	15.90	.77 87.8	5.0	11.25	14.11	
5	Do.		114	19 9-08	do.	16.9	14.66	.97 86.7	3.5	11.37	12.99	
6	Do.		172	19 9-08	do.	19.5	17.46	.60 89.5	4.2	10.57	15.61	22 May
7	Do.		222	19 9-08	do.	17.2	15.45	.69 89.8	4.7	10.87	13.77	
8	Do.		243	19 9-08	do.	15.0	11.68	1.89 77.8	3.0	10.24	10.48	
9	Do.		285	19 9-08	do.	17.6	15.81	.67 89.8	3.7	8.71	14.43	
10	Do.		297	19 9-08	do.	19.4	17.30	.43 89.1	5.2	10.59	15.46	

The balance of the crop was now cut and sent to Meadowlands Mill, each plat separately, so that the actual weight could be arrived at. Check weighings were made over the station weighbridge. The crop results appear below:—

## CROP RESULTS—TEN HAMBLEDON SEEDLINGS—PLANT CANE, 1908.

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	13 months	36,263	3.8	61.8	18,379	8.2
2	10	do.	33,541	3.8	57.1	21,688	9.6
3	11	do.	24,720	4.8	53.1	18,402	8.2
4	62	do.	25,155	3.7	41.7	13,201	5.8
5	114	do.	27,769	3.7	46.5	13,552	6.0
6	172	do.	26,004	4.2	49.6	17,358	7.7
7	222	do.	23,195	3.2	34.0	10,497	4.6
8	243	do.	28,122	3.9	49.6	11,647	5.1
9	285	do.	24,937	4.0	44.8	14,494	6.5
10	297	do.	26,353	3.3	39.9	13,830	6.1

From the analytical and crop results it will be seen that the seedlings known as Hambleton, Queensland, 5 and 10, are the most promising so far. H.Q. 10 is a tall erect cane of medium thickness, and a good variety to handle. Of the other varieties it has to be said that some are indicating the gumming disease, and others are not altogether satisfactory from a healthy standpoint. Concerning this crop of seedlings in its young stage of growth it was said in last year's report: "The present young crop of seedlings, including all the Hambleton and one other (viz., B. 208), not only do not indicate great vigour, but indications of great debility have appeared in certain of them." This debility continued to exist in given varieties right through the whole growth of the crop. However, definite conclusions will not be drawn until the first and second ratoon crops are in, when it is hoped that some of the seedlings will be found of sufficiently high value for distribution purposes.

(b) Barbados 208, and one unknown cane from South Africa, called "South Africa No. 1."

The treatment of the land and all subsequent operations, planting, and cultivation was identical with the Hambleton seedlings. The preliminary, progressive, final examinations, and crop results are set out below:—

FIRST PRELIMINARY EXAMINATION OF BARBADOS 208, AND ONE UNKNOWN CANE FROM SOUTH AFRICA: PLANT CANE—JUNE, 1908.

No. of Plat.	Country.	Name or No. of Variety.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
1	Barbados	Barbados 208	22-6-08	10 months	13.3	9.13	2.36	68.6
2	South Africa	South Africa 1	22-6-08	do.	14.9	10.48	2.60	70.3

SECOND PROGRESSIVE EXAMINATION OF BARBADOS 208, AND ONE UNKNOWN CANE FROM SOUTH AFRICA; PLANT CANE—JULY, 1908.

1	Barbados	Barbados 208	21-7-08	11 months	18.7	16.21	.48	86.7
2	South Africa	South Africa 1	21-7-08	do.	16.6	12.32	1.85	74.2

THIRD PROGRESSIVE EXAMINATION OF BARBADOS 208, AND ONE UNKNOWN CANE FROM SOUTH AFRICA; PLANT CANE—AUGUST, 1908.

1	Barbados	Barbados 208	14-8-08	12 months	19.2	17.64	.39	91.8
2	South Africa	South Africa 1	14-8-08	do.	18.8	16.56	.80	88.0

FINAL EXAMINATION OF BARBADOS 208, AND ONE UNKNOWN CANE FROM SOUTH AFRICA; PLANT CANE—SEPTEMBER, 1908.

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.	Acid, per 100 Juice expressed as N/10 NaOH.	Fibre in Cane.	Sucrose in Cane.	Date of Arriving.
1	Barbados	Barbados 208	1-9-08	12½ months	15.7	13.04	1.18	83.0	4.5	8.64	11.91	
2	South Africa	South Africa 1	1-9-08	do.	19.5	17.07	1.01	87.5	5.5	10.69	15.24	

CROP RESULTS—BARBADOS 208 AND ONE UNKNOWN CANE FROM SOUTH AFRICA CALLED "S.A. No. 1" PLANT CANE—1908.

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	Barbados, No. 208	13 months	28,314	3.4	43.6	11,647	5.1
2	"S.A. No. 1"	Ditto	25,773	4.1	47.9	16,376	7.3

The results obtained from these two canes were very disappointing. B 208 has a strong record in the West Indies as a sugar producer, and it is also very highly spoken of on the Herbert River, where it is fast becoming the leading cane. On the Mackay Station, however, it does not present a healthy appearance, and develops a rind rot at many of the joints. It also shoots badly from the eyes. The South African cane, which somewhat resembles White Bamboo, was apparently free from disease, and it is hoped will give a better result as a ratoon crop. The second South African cane mentioned in last year's report as having been planted out with the B 208, and the "S.A. No. 1" developed so much disease, and appeared to so exactly resemble Rose Bamboo, that it was ploughed out and destroyed.

## SURPLUS CANE SENT TO MEADOWLANDS MILL.

All cane not required for distribution, planting, and analysis, was sold to the Meadowlands Mill Company. The bulk of the cane was second and fourth ratoons, a smaller proportion being plant and first ratoons. The total tonnage sold amounted to 167 tons 8 cwt., and was cut from an area of  $4\frac{1}{2}$  acres, being an average of 37·2 tons per acre.

Area of cane sold	...	...	...	...	...	4 $\frac{1}{2}$ acres
Tonnage	...	...	...	...	...	167 tons 8 cwt.
Value, including bounty	...	...	...	...	...	£159 Os. 6d.

The experiment station received 1s. per ton less for the cane, in order to send it in at the convenience of the station, in the quantities, and at the times best suited to the experiments, with a view to their subsequent ratooning.

## ABSTRACT OF METEOROLOGICAL OBSERVATIONS TAKEN AT THE SUGAR EXPERIMENT STATION, MACKAY, FROM 1ST SEPTEMBER, 1907, TO 30TH SEPTEMBER, 1908, COVERING PERIOD OF GROWTH OF EXPERIMENT CROPS.

Month.	Rainfall.	AIR TEMPERATURE.								SOIL TEMPERATURES AT 6 INCHES DEEP AT SUNRISE.			Inches of Water Applied to Irrigated Plats, Second Ratoons.	Per Cent Soil Moisture on Irrigated Plats of Second Ratoons.	Mean Relative Humidity of the Air Saturation, equalling 100 at 9 a.m.	Mean Daily Evaporation in Cubic Inches.	Lowest Grass Temperature Recorded.	
		Highest Shade Maximum.	Lowest Shade Maximum.	Mean Shade Maximum.	Highest Shade Minimum.	Lowest Shade Minimum.	Mean Shade Minimum.	Mean Diurnal Range.	Mean Temperature.	Highest.	Lowest.	Mean.						
1907.																		
September	0·31	84·5	76·0	78·9	64·8	46·0	54·8	24·1	66·8	66·0	63·8	65·2	...	14·5	66·5	0·300	36·0°, 12 Sept.	
October ...	0·15	89·0	81·0	85·1	72·9	56·4	64·2	20·9	74·6	72·6	71·0	71·8	2·0	19·0	60·3	0·367	49·0°, 1 Oct.	
November	6·59	88·2	80·3	84·4	71·9	57·8	65·6	18·8	75·0	72·8	71·0	71·7	2·0	21·5	63·4	0·367	51·0°, 4 Nov.	
December	12·81	89·9	76·5	84·9	75·6	59·0	71·1	13·8	78·0	75·0	74·0	74·5	...	23·7	70·7	0·272		
1908.																		
January	13·24	85·3	79·9	82·6	77·0	65·0	71·9	10·7	77·2	74·6	72·6	73·7	...	24·2	78·0	0·270		
February	5·13	93·8	83·0	86·8	77·5	65·0	71·7	15·1	79·2	77·0	75·2	76·1	...	23·3	75·6	0·183		
March ...	24·24	92·5	75·6	84·7	75·0	58·5	63·4	16·3	76·5	76·0	70·2	73·6	...	25·0	75·0	0·211		
April ...	20·55	86·7	70·6	81·0	71·3	53·8	65·9	15·1	73·4	73·0	69·3	71·6	...	24·2	75·0	0·177		
May ...	3·61	86·8	69·5	77·7	67·0	45·0	58·9	18·8	68·3	70·1	62·3	65·9	...	23·5	74·2	0·167		
June ...	1·09	78·5	63·2	71·6	62·5	33·6	47·4	24·2	59·5	62·0	51·2	58·3	...	22·7	71·5	0·218	26·6°, 27 June	
July ...	1·97	78·0	67·5	72·0	63·8	35·3	50·5	21·5	61·2	63·0	55·0	59·9	...	20·3	76·0	0·201	28·8°, 5 July	
August ...	1·88	79·9	70·5	73·9	65·0	40·7	51·9	22·0	62·9	63·1	59·0	61·0	...	18·8	74·2	0·206	32·2°, 13 Aug.	
September	2·46	82·6	69·1	76·6	67·0	42·5	54·2	22·4	65·4	66·0	62·3	64·4	...	18·7	62·6	0·251	34·1°, 17 Sept.	
Total	94·03	...	...	...	...	...	...	...	...	...	...	...	4·0	...	...	...	...	...

## EXPERIMENTS ENDEAVOURING TO RAISE NEW VARIETIES.

No work along these lines has been carried out this year, due to the fact that the best of the leading varieties produced no arrows. Of the new seedling canes, only one variety produced arrows, and these only amounted to four complete flowers.

## NEW VARIETIES INTRODUCED.

The cane introduced last year—namely, Mauritius, Malagache, Barbados 147, and six of the best of the Queensland Acclimatisation Society's seedlings, numbered Q. 6, Q. 30, Q. 102, Q. 116, Q. 121, and Q. 176, have been planted out on a larger scale to provide seed for new experiments next year. All these canes are healthy, and have given good analytical results, so that it is hoped, under experiment conditions, some new canes of high promise will be secured.

## VARIETIES IN HOSPITAL.

The following varieties, originally possessing a high-class record, but which, during late years, have become affected with disease and debility, were, in August, 1906, planted out on a virgin piece of ground, separated from healthy varieties, and called the Station Hospital:

Mavoe, Chenoma, Oiva, Batoo, Kikarea, Mabuan, Moo Moo, Oraya, Meerah, Iduari, Akewa, Oiboku, White Bamboo, Striped Singapore, Rose Bamboo, Louisiana Striped, Louisiana Tiboo Merd, D. 74, D. 95, Trinidad S. 202, New Guinea 3, and New Guinea 7.

Concerning these varieties, it was stated by the Director in the Report for 1905-6—

"Precisely as in the case of animals and their diseases, varieties and kinds of plants are being dealt with at this experiment station by the Director on the principle that, while any variety may become debilitated or the subject of a special disease, yet such a variety is capable of recovering and of becoming an absolutely healthy organism again.

"For the time being debilitated varieties are being placed under the conditions that are considered the most favourable for enabling them to resist the progressive action of disease, and to afford them the means of an ultimate recovery.

"Should any of these varieties during their period of three crops throw off every appearance of debility, or specific disease, they will be restored to the class of sound and valuable cropping varieties. If, on the other hand, they do not recover totally, they will be abandoned."

The behaviour of these debilitated varieties as a plant crop was described in last year's report. The first ratoon crop showed great weakness right through the growing season, with two exceptions. Inspections of all the varieties were carried out at regular intervals, and sections of diseased cane were examined with the microscope. As in the previous year no indications of root or fungoid disease was discovered, but the gumming disease appeared prevalent in many of the canes. In August, 1908, the whole of the varieties were cut and crushed in the experimental mill at the station. The expressed juice from each hospital variety was then analysed for the purpose of ascertaining the quality of the juice. Acidity determinations were also carried out. Prior to crushing, the number of sticks with a leaf system not wholly dead, and the number of sticks whose tops were all dead, and the sticks themselves diseased, were ascertained, and the results are given in a subsequent table.

The analyses of the juice are now given:—

ANALYSIS OF VARIETIES IN HOSPITAL.

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.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH.
1	New Guinea	Mavoe	13-8-08	11½ mo's	14.8	12.10	1.73	81.7	6.0
2	Do.	Chenoma	13-8-08	do.	17.8	14.73	.49	82.7	6.0
3	Do.	Oiva	13-8-08	do.	12.8	9.26	1.97	72.3	7.0
4	Do.	Batoe	13-8-08	do.	8.6	4.76	2.17	55.3	4.0
5	Do.	Kikarea	13-8-08	do.	7.5	2.78	2.68	37.0	4.0
6	Do.	Mabuan	13-8-08	do.	13.0	9.56	2.06	73.5	4.0
7	Do.	Moo Moo	13-8-08	do.	11.4	7.65	2.42	67.1	3.5
8	Do.	Oraya	13-8-08	do.	12.5	9.38	2.17	75.0	4.5
9	Queensland	Meerah	13-8-08	do.	17.1	16.16	.40	94.5	3.0
10	New Guinea	Iduari	13-8-08	do.	12.2	9.00	2.10	73.7	5.5
11	Do.	Akewa	13-8-08	do.	12.8	9.23	2.42	72.1	5.5
12	Do.	Oiboku	13-8-08	do.	11.7	8.03	2.10	68.6	6.0
13	Queensland	White Bamboo	13-8-08	do.	18.5	17.66	.37	95.4	5.5
14	Do.	Striped Singapore	13-8-08	do.	17.5	16.12	.40	92.1	6.0
15	Do.	Rose Bamboo	13-8-08	do.	14.9	12.37	1.18	83.0	4.5
16	Louisiana	Louisiana Striped	13-8-08	do.	14.4	11.66	1.09	80.9	6.5
17	Do.	Louisiana Tiboo Merd	13-8-08	do.	14.6	12.15	1.06	83.2	5.0
18	Demerara	Demerara 74	13-8-08	do.	12.9	9.99	1.17	77.4	5.0
19	Do.	Do. 95	13-8-08	do.	16.8	14.97	.64	89.1	4.5
20	Trinidad	Trinidad S. 202	13-8-08	do.	14.9	12.72	.83	85.3	4.0
21	New Guinea	New Guinea 2	13-8-08	do.	18.5	16.56	.61	89.5	4.5
22	Do.	Do. 7	13-8-08	do.	17.3	15.29	.46	88.3	5.0

Acidity determinations were carried out in the final examinations of all canes growing upon the experiment station this year, and the results do not again in any way bear out the opinion expressed (*vide* Bulletin No. 3 Div. Pathology and Physiology, Hawaiian Sugar Planters' Experiment Station) that canes showing a higher acidity are more immune to the gumming disease. The average acidity of canes in which the gumming disease was indicated, and the average acidity of healthy canes showing no indication of gum are compared in the following table:—

Average Acidity of Canes with Gumming Disease per 100 Juice, Expressed in c.c. N/10 NaOH.	Average Acidity of Healthy Canes with no Indications of Gum per 100 Juice, Expressed in c.c. N/10 NaOH.
4.95	4.70

The following table embodies the general observations made upon the canes as to state of foliage, &c., and examination of section for disease, and also supplies the result of the count of the canes when cut:—

No. or Name of Variety.	General Appearance of Foliage and Cane.	Result of Examination of Sections of Individual Sticks.	Number of Sticks per Acre Carrying a Leaf System not Wholly Dead.	Number of Canes per Acre where Tops were all Dead and Sticks Diseased.
Mavoe ... ..	Foliage unhealthy ...	Gumming disease indicated	16,879	9,256
Chenoma ... ..	" " ...	Gumming disease indicated	34,031	...
Oiva ... ..	Tops dying and sticks diseased	No gum seen; pithy centres	11,706	14,973
Batoe ... ..	Tops dying and sticks diseased	No gum seen; pithy centres	15,246	14,701
Kikarea ... ..	Tops dying and sticks diseased	Gumming disease indicated	4,900	14,157
Mabuan ... ..	Tops dying and sticks diseased	No gum seen; pithy centres	19,874	11,434
Moo Moo ... ..	Tops dying and sticks diseased	Gumming disease indicated	11,706	13,340
Oraya ... ..	Tops dying and sticks diseased	No gum seen; pithy centres	25,319	24,230
Meerah ... ..	Foliage unhealthy, many canes dead	Gumming disease indicated	23,958	3,811
Iduari ... ..	Tops dying and dead	No gum seen; pithiness	8,439	6,806
Akewa ... ..	" " "	No gum seen; pithiness	25,319	14,429
Oiboku ... ..	" " "	No gum seen; pithiness	16,062	19,874
White Bamboo ... ..	Foliage unhealthy, plants dying out	Bad case of gumming indicated	10,890	1,039
Striped Singapore ... ..	Foliage unhealthy, plants dying out	Gumming disease indicated	14,723	2,450
Rose Bamboo ... ..	Foliage unhealthy, plants dying out	Gumming disease indicated	14,973	13,884
Louisiana Striped ... ..	Foliage unhealthy, plants dying out	Gumming disease indicated	10,617	9,801
Louisiana Tiboo Merd ... ..	Foliage rusty and dying down	No gum seen ...	22,869	9,528
D. 74 ... ..	Foliage nearly all dead	No gum seen; pithy centres	17,151	14,157
D. 95 ... ..	Foliage unhealthy ...	Gumming disease indicated	20,418	5,445
Trinidad Seedling No. 202 ... ..	" " "	No gum seen; pithiness	19,057	11,706
New Guinea 3 ... ..	" " "	No gum seen; pithiness	14,973	816
7 ... ..	" " "	Gumming disease indicated	33,759	816

From the above statement it will be observed that the gumming disease was indicated in eleven of the varieties in the hospital. The remainder, with two exceptions, are also diseased, though the exact nature of the malady is not known. It consists of the drying up of the foliage, the subsequent perishing of the leaf system, and the development of an extreme pithiness in the interior of the stick. It must be admitted that the varieties in the hospital have not yet recovered, nor is the outlook very hopeful. The disease present in the first ratoon crop is much greater than it was in the plant crop. The varieties, however, will be allowed a third chance as a second ratoon crop, and if they do not recover they will be finally abandoned.

#### VARIETIES DISTRIBUTED FROM THE MACKAY STATION.

The second inspection of the varieties of cane distributed to farmers' associations and other growers, took place in July, 1908, and comprised the districts of Lower Burdekin, Herbert, and Johnstone Rivers, Cairns, and Mossman. The particulars relating to the methods of distribution, so that all cane plants should reach the grower free of charge, was detailed in last year's report, and the general history of all the varieties then growing at the Mackay Experiment Station will be found on reference to the 1903-4 Report of the Bureau of Sugar Experiment Stations. The following varieties were selected out of 105 given kinds, as being of the highest commercial promise under the conditions found at the Mackay Station, viz.: New Guinea 8A, New Guinea 15 (or Badila), New Guinea 24 (or Goru), New Guinea 24A, New Guinea 24B, New Guinea 64, Trinidad Seedling No. 60, Mauritius Bois Rouge, and Mauritius Settlers. During the past two years New Guinea 64 and Mauritius Settlers have decidedly lost ground, and can no longer be considered as amongst the best canes on the station. To show, however, the great advisability of trying all the promising varieties under different soil and climatic conditions (which was the object of the distribution), it has to be said that, at present, on the Herbert River, Mauritius Settlers is producing a weighty cane of high density, and is very favourably spoken of. It has also attracted attention in the Childers district.

Regarding the varieties distributed in localities south of Mackay, the associations and others receiving cane have been requested to send in to the Mackay Station reports upon their behaviour; these when furnished are appended.

The purposes of the inspection and collection of the reports is to ascertain, as far as practicable how each variety is likely to thrive under new soils, and in the wide range of climatic conditions which

are found between Nerang in the far South and Mossman in the far North. The varieties were, for the greater part of the State, given out in 1906 and have therefore been under new conditions for some two years.

Prior to giving particulars as to the growth and appearance of the varieties in question, the following tables which present the analytical data, and the yield of cane and sugar per acre from 1904 to 1908, comprising the plant, first ratoon, second ratoon, third ratoon, and fourth ratoon crops as grown under experimental conditions at Mackay will be of value.

In the final columns of these tables are shown :—

- (a) The mean sucrose and purity of the five years' analysis.  
 (b) The total yield of cane and sugar per acre for the five years' crops, four of which were ratoons.

#### ANALYTICAL RESULTS OF THE VARIETIES DISTRIBUTED.

Name or Number of Variety.	PLANT CROP, 1904.				FIRST RATOON CROP, 1905.				SECOND RATOON CROP, 1906.				THIRD RATOON CROP, 1907.				FOURTH RATOON CROP, 1908.				AVERAGE OF THE FIVE 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.	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.
New Guinea 8A ...	19.8	17.74	1.20	89.6	19.7	17.90	.78	91.3	21.0	19.61	.29	93.3	20.7	19.15	.37	92.5	21.3	19.63	.28	92.1	18.82	91.8
15 (Badila) ...	20.8	19.71	.55	94.7	22.0	20.86	.26	94.8	21.9	20.58	.27	93.9	22.2	20.76	.25	93.5	22.1	20.71	.21	93.7	20.52	94.1
24 (Goru) ...	20.5	19.60	.27	95.6	19.8	18.50	.32	93.4	20.3	18.88	.23	93.0	20.0	18.47	.32	92.3	19.9	18.53	.28	93.1	18.70	93.4
24A ...	19.8	17.86	1.43	90.2	21.2	19.76	.37	93.2	20.8	19.14	.48	92.0	20.5	19.10	.45	93.1	20.9	19.32	.39	92.4	19.03	92.3
24B ...	18.6	16.29	1.42	87.6	20.6	19.03	.59	92.3	20.8	18.84	.78	90.5	20.7	19.01	.59	91.9	20.4	18.63	.46	92.3	18.40	91.0
64 ...	19.0	16.95	1.31	89.9	18.9	16.95	.96	89.6	15.9	13.18	1.54	82.8	18.1	15.84	1.00	87.5	18.3	16.32	.71	89.1	15.81	83.0
Trinidad S. 60 ...	18.3	16.96	.71	92.7	20.5	19.28	.27	94.0	19.1	17.81	.28	93.2	Not grown.								18.01	93.3
Mauritius Bois Rouge ...	22.7	20.69	.31	91.1	21.4	19.63	.15	91.7	20.5	19.10	.20	93.1	Not grown.								19.80	91.0
Mauritius Settlers ...	21.7	20.88	.34	96.2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

#### CROP RESULTS, 1904-1908.

Name or Number of Variety.	PLANT CROP, 1904.		FIRST RATOON CROP, 1905.		SECOND RATOON CROP, 1906.		THIRD RATOON CROP, 1907.		FOURTH RATOON CROP, 1908.		TOTAL YIELD, FIVE 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.	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.	
New Guinea 8A ...	58.9	9.7	49.5	8.0	32.7	5.6	41.8	7.2	37.7	6.7	220.6	37.2	
15 (Badila) ...	59.8	10.8	53.8	10.1	41.6	7.7	43.0	7.9	34.0	6.3	232.2	42.8	
24 (Goru) ...	63.5	11.1	51.8	8.5	33.0	5.5	54.0	8.9	61.6	10.2	263.9	44.2	
24A ...	58.9	9.6	51.3	8.9	36.7	6.3	41.0	6.9	42.1	7.3	230.0	39.0	
24B ...	60.4	8.9	49.0	8.4	34.7	5.8	40.0	6.7	39.4	6.6	223.5	36.4	
64 ...	56.7	8.6	43.2	6.4	27.6	3.3	30.5	4.3	30.0	4.3	188.0	27.0	
Trinidad Seedling No. 60 ...	55.7	8.4	55.4	9.4	34.8	5.5	Not ratted	...	...	...	†145.9	23.3	
Mauritius Bois Rouge ...	51.3	9.4	38.1	6.5	19.5	3.2	Not ratted	...	...	...	†108.9	19.1	
Mauritius Settlers ...	52.3	9.8	This variety being needed for seed was not ratooned					...	...	...	...	...	...

\* The yield of sugar per acre means the actual sugar per acre produced by the crop, and not the amount recovered by the mills, which is a variable factor, depending on the modern or other character of each mill.

† Three crops only.

Five of the above varieties are now being cultivated as a fifth ratoon crop. The analytical results and cropping values of New Guinea 24, Mauritius Bois Rouge, and Trinidad Seedling No. 60 may be followed, by those interested, on the pages of next year's report, devoted to the third ratoons of the ten best varieties.

With the object of preventing confusion, and enabling growers to identify the canes in cases where the labels have been lost, the following short description of the varieties is again given, together with the table of general particulars:—

*New Guinea 8A* (New Guinea name, Gogari).—A dull, deep green cane of moderately stout habit, turning a reddish colour on exposure. Internodes usually 4 to 6 in. long, and occasionally grooved. Habit bulging. Trashes easily. Flesh yellow. A sparse arrower at station. Spring planting appears to suit this variety best.

*New Guinea 15* (New Guinea name, Badila).—A dark purple to black coloured cane. Stout sticks, with pronounced white waxy rings at nodes. Internodes usually 2 to 3 in. long, but sometimes longer, especially in ratoon cane. Habit erect; foliage also somewhat erect and very green. Eyes generally full and prominent. Trashes easily. Has never arrowed at station. The foliage of very young cane has a slightly reddish tinge. Flesh white and highly saccharine. A remarkably heavy cane, often weighing 1 lb. per foot. Greatly appreciated by labourers, as it is so easily cut, trashed, and loaded.

*New Guinea 24* (New Guinea name, Goru or Goru possi possana).—A greenish brown to copper coloured cane, moderately stout. Joints have a pronounced zigzag appearance. Internodes usually from 3 to 4 in. long. This cane has a slight waxy bloom. Habit: inclined to lodge. Basal end develops roots, and upper eyes sometimes shoot. Foliage broad and plentiful. Trashes readily. Flesh yellow. A sparse arrower at station. This is a very favourite cane at Cairns and Mossman, where from 50 to 70 per cent. of the whole crop is Goru.

*New Guinea 24A* (New Guinea name, Goru Scela Scelana).—Like No. 24 (Goru) in appearance and colour, but is distinctly marked with longitudinal reddish coloured stripes. Moderately stout. Internodes 3 to 4 in. long. Habit lodging. Foliage broad and plentiful. Trashes easily. Flesh yellow. Has never arrowed at station.

*New Guinea 24B* (New Guinea name, Goru Bunu Bunanu).—This cane also resembles No. 24 (Goru) in shape, though not in colour, which varies from yellow to yellowish green. On exposure the skin of this cane is sometimes marked with reddish granular spots. Internodes usually 3 to 4 in. long. Eyes full and prominent. Foliage broad and plentiful. Trashes readily. Flesh yellow. A very sparse arrower at station. *New Guinea 24B* is more upright in growth than either 24 or 24A, and is somewhat thicker. It is a nice clean cane to handle, and should be a favourite with cutters.

*New Guinea 64* (New Guinea name unknown).—A brownish to olive greenish cane with longitudinal claret coloured stripes and small linear skin cracks. Moderately stout. Internodes usually from 3 to 5 in. long, contracted at nodes and bulging towards centres. The foliage of this cane is remarkable, being of a red to purple colour when the plant is young. As the cane progresses towards maturity, the leaves become greener, but never wholly lose a purple tint. It is a sparse stoler, but the sticks generally grow to great length. Flesh white. Trashes very easily. Arrows to some extent at Mackay Station.

*Trinidad Seedling No. 60*.—A stout bluish purple cane covered with a white waxy bloom. Habit erect. Internodes usually 2½ to 4 in. long. Flesh soft and white. Eyes prominent and somewhat inclined to shoot. Foliage of medium breadth and erect in growth. Trashes easily. A few canes arrow at station.

*Mauritius Bois Rouge*.—An olive green cane with a marked red blush. When exposed the red colour frequently predominates. Sticks thin; habit erect. Internodes usually from 5 to 6 in. long and slightly concave. Eyes small. Foliage rather narrow. Trash adheres to some extent. An early and full arrower at station.

*Mauritius Settlers*.—A dull green thin cane. Habit erect. Internodes 3½ to 5 in. long, occasionally showing longitudinal linear skin cracks. Eyes very prominent and sharply pointed. Foliage of medium width. Somewhat erect. Trashes with some difficulty. A sparse arrower at station.

Name or Number of Variety.	Origin.	Habit of Growth.	Thickness, &c.	Germinating Power.	Trashing.	Ratooning Power.	Period of Growth Plant Crop.	Best Time to Plant, Spring or Autumn.	Fibre Content Average.	Rolling Qualities.
No. 8A	New Guinea	Lodging ...	Moderately thick	Good if planted in Spring	Easy ...	Good ...	12 months ...	Spring ...	9.48	Good.
No. 15	do.	Erect ...	Thick ...	Very good	Almost a self-trasher	Very good	12 to 18 mo's	Either ...	9.52	Good if mixed with other canes, or if prepared for roller by shredder
No. 24	do.	Lodging ...	Moderately thick	Good ...	Easy ...	Good ...	do. ...	do. ...	10.88	A great favourite in Northern mills; grinds up very small.
No. 24A	do.	do. ...	do. ...	do. ...	do. ...	do. ...	do. ...	do. ...	10.25	Good.
No. 24B	do.	Generally erect	Thick ...	do. ...	do. ...	do. ...	do. ...	do. ...	9.87	do.
No. 64	do.	Lodging ...	do. ...	Low ...	Very easy ...	Fair ...	do. ...	Spring planting	11.30	do.
No. 60	Trinidad	Erect ...	do. ...	Good if planted in Spring	Easy ...	Good ...	do. ...	do. ...	10.92	do.
Bois Rouge	Mauritius	do.	Thin ...	Good	Difficult ...	do. ...	12 months ...	Either, but Spring preferable	11.49	Tough; requires mixing with other canes.
Settlers	do.	do.	do.	do.	do.	Not too good	12 to 18 mo's	do.	10.35	Fair.

During this year's inspection of the varieties in the North (which, as previously stated, took place in July) more standing cane was seen than at the same period last year, and it was possible to come to a better conclusion as to the merits of each variety. There is scarcely yet enough cane grown of each kind to enable trustworthy analytical results to be obtained, but where the varieties had been analysed the results obtained were very promising, especially as the canes were not mature,

With the exception of the Burdekin district, the varieties New Guinea 15 (Badila) and New Guinea 24 (Goru) have been largely grown in the North for some years, the Colonial Sugar Refining Company having recognised, very early in their history, their great value as sugar-producers. These two varieties, however, were introduced by the Queensland Department of Agriculture, and form part of what is known as Tryon's collection of New Guinea varieties. This being so, observations on their behaviour have been included in some places where they were not actually distributed from the Mackay Station, they having originally reached the far North through the medium of the State Nursery at Kamerunga.

Of these two varieties it has been said in the preceding paragraph that they are largely grown in the North. Of the Mulgrave-Hamblendon districts it may be stated that they are almost exclusively grown, fully 99 per cent. of the crop consisting of Goru and Badila. This being the case, it is exceedingly difficult to get growers in the Cairns district to take any interest in any other varieties, the two varieties named giving such excellent returns. It must be remembered, however, that as far as the history of the cane is known no variety has a perennial existence as a healthy cropper and sugar-producer, and the constant introduction and testing of new and promising varieties with their subsequent distribution to growers, if of value, should be appreciated by the man on the soil, whose bread and butter actually depends on such work. This selection and distribution of varieties the Experiment Station is endeavouring to carry out, and it trusts to have from the farmers generally an intelligent interest in and an appreciation of its efforts in this direction. The laying out of small nurseries and the careful watching of the varieties sent to them during growth; preventing such accidents as stock having access to the cane; and the making of occasional notes on the behaviour of the canes; would be of the greatest value and assistance to the Experiment Station, but only in very isolated cases is this at present done, the majority of growers considering any old piece of ground good enough to stick varieties in, and never give the new kinds a fair deal.

The results of the observations this year are put into somewhat different shape, the average results of the varieties upon the different farms visited being given, as it was found that minor differences of soil made but little difference in the behaviour of the canes, and that where a particular variety was doing well in one part of a district it was generally found to be giving good results in all parts of that district, except where a radical change in soil or other conditions was found.

#### LOWER BURDEKIN DISTRICT.

Soils: Deep to moderately deep alluvial loams, mostly heavy and dark, resting on granular and porous subsoils; also black loams with clay subsoils, and sandy loams with sandy subsoils.

Rainfall: Average for past ten years about 36·14 in. Rainfall from 1st July, 1907, to 30th June, 1908, 42·84 in.

The varieties were originally taken charge of by the secretary of the association, Mr. G. S. Mackersie, and planted by him in a nursery specially prepared for the purpose, where they were carefully tended. They are now generally distributed through the district, and it has to be said that the varieties have met with more appreciation and been more carefully looked after by the farmers generally than in any other place in the North. Owing partly to the favoured situation of the Lower Burdekin district, and its entire freedom from pests and grubs, the cultivation and cleanliness of the Burdekin farms is far ahead of anything in the North, and the varieties have thus had a better chance in that place to show what they can do.

#### LOWER BURDEKIN DISTRICT.

Variety.	Remarks.
New Guinea 8A ... ..	On two of the farms visited this cane was healthy and vigorous, but on the average it was only fairly good, and on some areas very poor. On friable river loam it was considered a good cane for early crushing. Germination somewhat backward.
New Guinea 15—or Badila ... ..	This variety has done excellently in every part of the district, and is considered eminently suitable for irrigation. Both plant and ratoon crops were showing a fine vigorous growth. The standing crops inspected were very heavy, and, owing to the ease with which it is handled, it is proving a favourite with cutters. Germination and growth good.
New Guinea 24—or Goru ... ..	Good results have also been obtained with this cane both as plant and ratoon crops. The appearance of the young cane and also standing crop was healthy, while the germination and growth had been vigorous.
New Guinea 24A ... ..	This cane was also found to be well adapted to Burdekin conditions. It germinates well, and makes a good healthy growth. It recovers arrows, and irrigation suits it.

LOWER BURDEKIN DISTRICT—*continued.*

Variety.	Remarks.
New Guinea 24B ... ..	The appearance, germinating power, and growth of this cane were very satisfactory, and (with Badila) is considered the best of the varieties sent. It was highly spoken of in all parts of the district, and appears to be a cane of high promise for the Burdekin lands.
New Guinea 64 .. .. .	Poor in germination, and not particularly healthy. Apparently not suited to district.
Trinidad Seedling No. 60 ... ..	The climate and soil of the Burdekin seem excellently suited for this variety, as since last inspection it had improved wonderfully. The growth of the sticks had been vigorous, and the weight of cane produced good. This cane obtained first prize at the local agricultural show for the best stole of cane. The Burdekin was the only district in the North where this variety was spoken well of.
Mauritius Bois Rouge ... ..	Not generally planted, as it is considered unsuitable for white labour on account of its thin sticks. Another objection is the early arrowing of the variety. On the farms visited the germination had been good, but the growth was poor and its appearance not healthy. The variety will not be further cultivated.

SUMMARY.—New Guinea 15, 24, 24A, 24B, and Trinidad Seedling No. 60 are all doing well, and giving high promise of proving successful in the district.

## HERBERT RIVER DISTRICT.

Soils: Alluvial sandy loams, with sandy subsoils. Alluvial river flats, with sandy subsoils.

Rainfall: Average for past ten years about 82.7 in.

Rainfall from 1st July, 1907, to 30th June, 1908, 75.92 in.

The varieties were originally sent to the local farmers' associations at Ingham and Halifax, and by them distributed generally through the district.

The varieties appeared to be doing somewhat better, and to have more interest taken in them at and about Ingham, than at Halifax. They are also growing well and thriving about the Stone River.

## HERBERT RIVER DISTRICT.

Variety.	Remarks.
New Guinea 8A ... ..	Germination rather slow, but growth good both as plant and ratoon. Although not of the highest promise, it may prove a useful cane on the Herbert as an early variety.
New Guinea 15 (Badila) ... ..	This variety does remarkably well in this district, and is greatly liked by the mill for its high percentage of sucrose, and by the grower for its weight and ease in working. It is somewhat overshadowed, however, in many parts of the Herbert by the Seedling B 208, which is developing into a very fine sugar and weight producer in this particular district, although farther north it is not nearly so good.
New Guinea 24 (Goru) ... ..	Largely grown, but not so general a favourite as Badila and B 208. Germination good, growth vigorous, and appearance healthy.
New Guinea 24A ... ..	This cane was giving good results and was highly spoken of by the farmers visited. The plant and ratoon crops were good. Germinating power and growth vigorous.
New Guinea 24B ... ..	Generally thought to be the best of the varieties sent, after Badila. On all areas visited this cane was found to be clean and healthy. Growth large and vigorous, germinating power good, and sticks heavy.
Trinidad Seedling No. 60 ... ..	Poor germination and growth. Appearance generally not healthy and of doubtful value to this district.
Mauritius Bois Rouge ... ..	Germination and growth fair. A large stole, but thin sticks, and so of little commercial value. Will not be generally selected by growers.
Mauritius Settlers ... ..	This cane has given very fine results on the Herbert River both as a cropper and sugar producer, and is greatly favoured by many growers. It produces a fine, tall, heavy cane on different areas, and is much superior to the same variety in Mackay, where it shows some tendency to pithiness. The soil and climatic conditions of the Herbert appear suited to this variety, for it has done well nowhere else in the North.
New Guinea 64 ... ..	Germination slow and too few sticks to a stole. Sticks are long and heavy, but the variety is not liked, and will not be grown in any quantity.

SUMMARY.—New Guinea 15 and 24 are already of high commercial value to growers in the Herbert River district, while the varieties 24A, 24B, and Mauritius Settlers, subsequently introduced, are of fine promise. New Guinea 8A may come to the front, but New Guinea 64, Trinidad Seedling 60, and Mauritius Bois Rouge, as far as present evidence goes, are unsuited to the district.

## GERALDTON DISTRICT.

Soils: Alluvial and Volcanic—Alluvial soils have clay, sandy, and gravelly subsoils.

Rainfall: Average for past ten years about 143.5 in. Rainfall from 1st July, 1907, to 30th June, 1908, 173.58 in.

The varieties were here sent to the Farmers' Association, Geraldton, and distributed throughout the district.

## GERALDTON DISTRICT.

Variety.	Remarks.
New Guinea 8A ... ..	Germination and growth rather poor.
New Guinea 15 ... ..	The favourite cane in this district. Germination good, vigorous growth, and a great sugar and weight producer. In addition to being the best cane grown for the mill, it is specially well liked by cutters on account of its great weight, straight sticks, and ease in cutting and loading. The one drawback to this variety is the fact that when fed alone to the mill it breaks up into small pieces, difficult to crush, but, by mixing with other canes, this objection is removed.
New Guinea 24 ... ..	Largely grown, but not such a favourite as Badila. The growth and germination are good, and the appearance of the cane healthy.
New Guinea 24A ... ..	On the localities visited this cane was doing very well and holding its own with other varieties. At the Mill Nursery, Goondi, 24A gave the highest percentage of obtainable cane sugar (in a field containing twenty other varieties) for the month of July, all the canes being plant fourteen months old. Its analysis was better than either Badila or B 208. Germination and growth good.
New Guinea 24B ... ..	This variety is also doing well at Geraldton, and on the poor volcanic soils of Mundoo was far ahead of the standard varieties growing there. Germination, growth, and appearance excellent.
New Guinea 64 ... ..	Very little of this variety is being grown. The variety does not appear to suit Geraldton, and will not be replanted to any extent.
Trinidad Seedling 60 ... ..	Very poor germination and growth. Foliage unhealthy. Ratooning power poor. This cane is evidently better suited to a drier climate like the Burdekin.
Mauritius Bois Rouge ... ..	Considered of no value whatever.
Mauritius Settlers ... ..	This cane has also done very little good at Geraldton, and is not cared for.

SUMMARY.—New Guinea 15 and 24 are already well established at Geraldton, and are of the highest value to both growers and the mill. New Guinea 24A and 24B are very promising, and should give good results if carefully watched and planted out. New Guinea 24B appears specially suited to the poor Mundoo soils.

## CAIRNS DISTRICT.

On arrival at the Mulgrave, the secretary of the Cairns United Farmers' Association informed the writer that, owing to the ravages of the grub pest, and neglect on the part of many growers in allowing stock to eat the varieties down, no cane worth a visit was in existence.

As previously stated, however, farmers in the Cairns district are at present taking but little interest in any variety outside the two standard varieties of the district—namely, New Guinea 24 (Goru) and New Guinea 15 (Badila).

Hambledon Plantation was also visited, and while New Guinea 24A and New Guinea 24B appeared to have given the best results out of the varieties sent, yet even they had been attacked by the grub, and were, therefore, incapable of being judged fairly.

## MOSSMAN DISTRICT.

Soils: Shallow, alluvial, resting on stiff clays or sandy subsoils.

Rainfall: Average, about 170 in.

Rainfall, 1st July, 1907, to 30th June, 1908, 103.72 in.

The varieties sent to this district were at first taken charge of by the Mossman Central Mill Company and planted in a nursery adjacent to the mill. When sufficiently grown to be ready for plants,

the canes were given out to individual farmers. The varieties have had more interest taken in them, and were better looked after, than in any other locality outside the Lower Burdekin and Ingham.

## MOSSMAN DISTRICT.

Variety.	Remarks.
New Guinea 8A ... ..	Germination and growth fairly good. Appearance healthy. It is not likely, however, to become a standard cane.
New Guinea 15 (Badila)... ..	A large quantity of this variety is grown at Mossman, in common with Northern centres generally. Germination, growth, and appearance excellent. A very heavy cropper on new lands.
New Guinea 24 (Goru) ... ..	This cane is also extensively grown and favoured at Mossman. The bulk of the crop consists of N.G. 15 and 24.
New Guinea 24A ... ..	The cane of this variety germinates well and grows admirably in the district, to which it is well adapted.
New Guinea 24B ... ..	This is considered the best cane of the varieties sent from Mackay, and it will receive more attention as its merits become better known. Germination, growth, and appearance very fine, and ratooning power also good.
New Guinea 64 ... ..	Slow in germination and a poor stoler. A pithiness, accompanied by a brown rot, is developing in this cane which will render it unfit for further trial.
Trinidad Seedling No. 60 ... ..	Germination and growth slow, apparently not suited to this district.
Mauritius Bois Rouge... ..	Variety not liked, and will not be further planted.

SUMMARY.—Owing to the large amount of N.G. 15 and 24 grown, it is difficult to get any interest taken in the other varieties supplied. New Guinea 24A and 24B, however, appear highly promising on the Mossman, and it is intended to send a further supply next April, so that a wider trial may be given. New Guinea 8A, 64, Trinidad Seedling 60, and Mauritius Bois Rouge are not promising.

## BUNDABERG DISTRICT.

Soils: Rich deep volcanic, with some alluvial areas.

Average rainfall for past ten years about 40 in.

## GOOBURRUM SUB-DISTRICT.

The varieties were sent to the Gooburrum Farmers' Association in August, 1906. The secretary of the association writes, under date 30th July, 1908:—

"New Guinea 8A.—We have not a great deal of this variety, it did not grow well, but seems to be doing better now.

"New Guinea 15.—Did very well. Very large sticks but short joints. Wants very rich land; stands over well, and is, I think, one of the best.

"New Guinea 24.—Does not do very well, grows at the sides if a dry spell comes.

"New Guinea 24A and 24B.—Both pretty bad with rust; does all right for one year, but will not stand over. Nearly all dies if tried.

"New Guinea 64.—A pretty slow grower, but a strong cane.\*

"Trinidad Seedling 60.—Very good grower, but not many sticks; some stools having only two or three sticks, but very long.\*

"Mauritius Bois Rouge.—No good here; too scrubby, and too many small sticks. Trash sticks on too much."

## GIN GIN SUB-DISTRICT.

The following report on varieties sent from the Mackay Experiment Station has been received from the Cane Inspector of the Gin Gin Central Mill, dated 24-6-08:—

"New Guinea 24 (Goru).—Received and planted in 1904, is very slow growing cane, and does not ratoon well; is not liked by farmers.

"B 208.—Is doing very well, giving a good heavy crop.

"New Guinea 22.—Planted in 1907. Is doing very well, and looks promising.

"New Guinea 8A.—Not doing well. Slow growth.

"New Guinea 15 (Badila).—Slow growing cane; very heavy sticks, but short jointed and woody.

"New Guinea 24A.—Doing fairly well, and promising good cane.

"New Guinea 24B.—Planted in 1907. Good and promising cane.

"New Guinea 47.—Good promising cane.

"New Guinea 48.—Good promising cane.

"New Guinea 54.—Good promising cane."

\* These two canes, judging by the description given, appear to be transposed.

## MOUNT BAUPLE SUB-DISTRICT.

The Comptroller of Central Sugar Mills states that the varieties sent to the Mount Bauple district have been generally distributed throughout the district, and the results are, on the whole, highly satisfactory.

## SPRING HILL SUB-DISTRICT.

Mr. P. L. Elliott, to whom the varieties were sent in August, 1906, reports on June 20th, 1908:—

"I am sorry to say that for some reason none of the varieties have done at all well this season, either as plants or first ratoons. The Goru has made the best growth, but that is very unsatisfactory. Rappoe planted at the same time, and growing alongside, is much better."

## BINGERA SUB-DISTRICT.

Some of the New Guinea varieties were supplied to Messrs. Gibson and Howes, of Bingera, in August, 1907. They report, on 16th June, 1908:—

"Canes were planted August 27th, 1907.

"Numbers 24 and 48 first showed above ground, followed by No. 24A. These three are the best, and at present show 3 feet of good cane.

"No. 40 is next in growth, with 2 feet of cane, but the grub spoils this variety and prevents best results.

"24B is reported as fair, but there is borer in this variety.

"8A and 47, also Mave, are reported failures.

"The land was in good condition at time of planting, but the weather was very dry. Irrigation was started in October. The rainfall from December on was regular and sufficient, until the last few weeks.

"None of the cane came up to expectation, and some have shown leaf disease heavily. The land was kept clean and in good tilth throughout the experiment. Canes will most likely be cut this year, and we hope to get a further report."

## QUNABA SUB-DISTRICT.

The manager of Qunaba, who received the varieties in August, 1907, reports under date 24th July, 1908, as follows:—

"All plants were carefully hand planted, watered for three weeks, and plenty of stable manure used, but no artificial fertiliser. They were planted in the very best of volcanic soil and carefully cultivated. Owing, however, to the severe frosts experienced this year the cane will have to be cut down, and, therefore, no results as to quality can be given.

"N.G. 15, Badila.—Planted 1st September, 1907, now showing about 2 ft. of crushable cane. Frosted; not too good a variety.

"New Guinea 24A, 24B, and 47.—Planted 1st September, 1907, now showing about 4 feet of crushable cane. Very fair varieties. All subject to frost.

"New Guinea 64.—Planted 1st September, 1907, now showing about 5 ft. of crushable cane. Good healthy grower, but subject to frost.

"Mauritius Settlers.—Planted 1st September, 1907, now showing about 5 ft. of crushable cane. Seems to be one of the best of the varieties, but frosted."

## GOODWOOD SUB-DISTRICT.

Messrs. Blissett and Hart, under date 4th June, 1908, report as follows upon three varieties sent them in August, 1906:—

"New Guinea 8A.—Unsatisfactory both as plant and ratoon cane. Little growth and feeble stalks.

"New Guinea 15.—Unsatisfactory both as plant and ratoon cane. Little growth and feeble stalks.

"New Guinea 24.—As a plant crop this cane proved very much better than either of the others, and the same may be said of the ratoons.

"The three varieties received every attention as regards situation of planting, and the rainfall of last year was also in their favour, some 37 in. having fallen at Goodwood during the year."

## HUMMOCK PLANTATION SUB-DISTRICT.

Messrs. Farquhar and others, Hummock Plantation, Bundaberg, were sent varieties in 1906 and 1907. They forward a report, dated 18th September, 1908, in which they say—

"Three varieties—viz., Mauritius Bois Rouge, N.G. 24, and N.G. 15—were not cut and replanted last year owing to reasons given in our previous report. Two of these, Mauritius Bois Rouge and N.G. 24, failed to reach a satisfactory growth before commencing to die off; we, therefore, did not replant these two varieties. New Guinea 15 is a very slow grower, and the cane now ready for cutting is estimated at 40 tons per acre. There is a fair quantity of this variety growing in this district, and it has the reputation of being a slow, but sure grower, and a heavy cropper.

"All of the remaining five varieties received in August, 1906, and cut in June, 1907, were ratooned. The rainfall, since cutting, has been only moderate, the total for fifteen months ending 31st August last being 41.5 in. Severe frosts last June also served to check the growth. The canes, however, ratooned well, with the exception of N.G. 8A, of which only half the number of stools came again, and these very slowly.

"New Guinea 24A and 24B still maintain their lead, the yields per acre being estimated at 15 and 18 tons respectively. The others come in the following order:—Trinidad Seedling 60, N.G. 64, and N.G. 8A, all showing the same peculiarities of growth, as mentioned in last report.

"Cuttings of the above five varieties were planted on 3rd June, 1907, in usual manner. The rainfall, as before mentioned, has only been moderate, and the frost last June, in some cases, killed the cane, consequently the results have been disappointing.

"Mavoe and N.G. 48, received from you in August, 1907, were planted out on 28th of that month, and came up fairly well, N.G. 48 being the worst in that respect. Both varieties, though looking healthy, are very slow growers with us. The June frosts cut them almost completely down, but growth has again commenced, and we hope to get cuttings later from them."

We enclose copy of analysis of each variety.—

Variety of Cane.	ANALYSIS OF JUICE.			Per cent. obtainable Cane Sugar in Cane.
	Brix.	Sugar.	Purity.	
Trinidad Seedling No. 60, first ratoon	20.5	18.22	88.8	14.26
New Guinea No. 15, plant	22.0	19.71	89.6	15.49
Mauritius Bois Rouge, plant sucker	15.6	12.48	81.7	9.24
New Guinea 24, plant sucker	18.8	15.95	84.8	12.11
24A, first ratoon	21.0	18.87	89.8	14.86
24B, "	21.0	18.48	88.0	14.36
8A, "	21.4	19.37	90.5	15.32
64, "	17.6	15.08	85.6	11.45

#### NORTH KOLAN SUB-DISTRICT.

The secretary of the North Kolan Farmers' Association, to whom the varieties were forwarded in 1906, reports on 28th September, 1908:—

"When this association received the cane they distributed it amongst thirty-two members, who agreed to give the varieties a fair trial. Some of the cane, however, never came up, on account of the cane being very dry from long transport, and the soil was also too dry at time of planting. Some of the canes that did come up were neglected, and unfavourable reports were given to me. Others lost the run of theirs, and I am not able to procure a report. The varieties still being looked after are New Guinea 8A, 24A, 24B, and Mauritius Bois Rouge, and these are considered to be very fair."

#### BEENLEIGH DISTRICT.

Soils: Alluvial river banks.

Average rainfall for past ten years about 42.23 inches.

The varieties were sent to the Sugar Growers' Association in August, 1906. Mr. W. Kleinschmidt, on 6th July, 1908, reported as follows:—

"I think it is safe to attribute last year's poor results to the plants, some of which were not too fresh; the farmers, for this reason, planting somewhat too thickly.

"In all cases this year where the cane was replanted, it showed a marked improvement.

"Of all the canes sent, I think that New Guinea 24 (Goru) comes first in every respect. I have had several opportunities of seeing it in comparison with Rappoe and Striped Singapore, alongside of which it was planted, and find that in growth it seems to be even better than either of these canes. The cane is strong and healthy in appearance, and has all the signs of being a good sugar-producer. I think this cane is going to be pretty generally adopted in Beenleigh and district. With reference to the rust in the Goru, which I reported last year, I am pleased to be able to state that it does not seem to affect the cane in the slightest degree. After apparently showing all the symptoms of rust, the leaves soon shoot again. The manager of Nerang tells me this is characteristic of the species, and there is no cause for alarm. In his district the planters are going in for it extensively.

"Of the varieties, the cane which shows the greatest growth is the New Guinea 64. It does not, however, impress one so favourably as the Goru, on account of being badly cracked, and having distinct signs of a dry pith.

"Trinidad Seedling No. 60 and New Guinea 15 (Badila) are very similar types of canes. Both would make excellent standover canes. They are very strong canes, of medium growth, and, on account of having a heavy top, are well protected from the frost. Indeed, these two canes have withstood the effect of frost far better than any other canes, with the exception of Caledonian Purple.

"New Guinea 24A, New Guinea 24B, and New Guinea 8A are all looking much better than last year. They are all about the same sort of canes, but none of them are so good as the Goru, which, I am convinced, has come to stay.

"The remaining variety, Bois Rouge (Mauritius), is not nearly so good as any of the other canes in growth, although it seems a hardy little cane, and a heavy stooler. The sticks are too slight, and, when the cane is just above the ground, looks like a vine.

"I am going to replant all these canes, together with other varieties, so as to have comparisons, and will again, should you wish it, report results next year.

"In the Logan district display this year at the National Association's Show in Brisbane, I am endeavouring to have, in the cane section, a special exhibit of canes that have been forwarded from your station through the kindness of Dr. Maxwell."

Messrs. R. and H. Witty, Beenleigh, who received the varieties in August, 1906, report on 30th May, 1908:—

"We regret to say that none of the varieties have done very well here, with the exception of a red-leaved variety, which gives promise of being a useful cane. We regret we cannot give a description of each variety, as the labels were totally obliterated during transit of the cane."

#### NERANG DISTRICT.

The Manager of the Nerang Central Mill writes as follows under date 3rd July, 1908—

"Goru.—The first lot of plants of this variety was received in 1904, and has now had three years' trial. It has proved itself to be well adapted to this district, giving a high sugar content, as will be seen from the following average analysis of last season's ratoons:—Brix., 19.8; Sucrose, 17.60; Quotient, 88.8. Ratoons averaged about 18 tons to the acre, and standover 28 tons. It has also shown itself to be less susceptible to frost than any of the other varieties grown in this district, and being almost self-trashing it is very easily cut. The farmers are extending the cultivation of it.

"B 208.—This was received in 1906, and plants cut last year. 9 months' growth gave the following analysis:—Brix., 21.7; Sucrose, 19.86; Quotient, 91.5.

"The following varieties were received in September, 1907, viz.:—New Guinea, 8A, 15, 24, 24A, 24B, 54, 22; 47, 48; and Mauritius Bois Rouge.

"These varieties were planted in a very dry time, but have shown remarkable growth, and most of them appear to suit this district. Analysis of each variety will be made this season, and plants sent out for distribution.

"The introduction of these new varieties has been most opportune, as the Rappoe and Striped Singapore, which are the principal varieties grown in this district, are showing rapid signs of deterioration."

#### SUMMARY.

The object of distributing these varieties was, as already stated, to determine the soil and climatic conditions to which the varieties are respectively best adapted. The reports sent in, together with the report of the inspection of Northern centres, show that certain varieties are giving good results in given localities, while others appear to be not so well suited to these districts. In order that the work may be continued and further results obtained, the co-operation of farmers in each district is urgently invited.

#### FURTHER DISTRIBUTION OF CANE VARIETIES.

This work is being continued, and specially built crates have been packed with selected varieties and despatched to Brisbane, Proserpine, Halifax, Pinalba, and Cairns; while the usual distribution in April was made to Mackay farmers.

#### SUBSIDIARY CROPS.

##### SORGHUMS.

Distributions of useful varieties of sorghum have been made during the year, and new areas planted, so that this work may be continued. The lighter croppers, such as Mixed American, Planters' Friend, and Early Grange, still continue to give more satisfactory results than the larger and coarser Sorghum Saccharatum and Giant Honduras, which are not only much slower in growth, but do not ripen so quickly, three crops of the smaller kind being produced in the same time as two of the larger. Stock also very much prefer the lighter to the coarser sticks.

## SISAL HEMP.

It is expected that the sisal planted in August, 1905, will very shortly commence to pole, and machinery for treating the leaves will soon be needed. A large number of suckers have been produced, but though these have been offered to farmers no applications have been received during the last year. There are great possibilities in this industry, and the returns are certain. It is to be regretted that growers will not give hemp a trial on their poorer lauds. It is, perhaps, not sufficiently known that the Commonwealth Government are offering a bonus of 10 per cent. on the market value of this product.

## COTTON.

The larger area planted with the Caravonica variety of cotton has since last report yielded very poor results. Scarcely any cotton has been produced, but an enormous growth of wood has taken place. The yield per acre for the twelve months ending October, 1908, is shown below. It is now intended to prune the trees.

Yield per acre of Caravonica Cotton (including seed) during the twelve months from 1st November, 1907, to 31st October, 1908:—

Month.													Lb. per Acre.	
1907—November	...	...	...	...	...	...	...	...	...	...	...	...	...	...
„ December	...	...	...	...	...	...	...	...	...	...	...	...	...	34.8
1908—January	...	...	...	...	...	...	...	...	...	...	...	...	...	8.4
„ February	...	...	...	...	...	...	...	...	...	...	...	...	...	6.0
„ March	...	...	...	...	...	...	...	...	...	...	...	...	...	...
„ April	...	...	...	...	...	...	...	...	...	...	...	...	...	...
„ May	...	...	...	...	...	...	...	...	...	...	...	...	...	...
„ June	...	...	...	...	...	...	...	...	...	...	...	...	...	...
„ July	...	...	...	...	...	...	...	...	...	...	...	...	...	...
„ August	...	...	...	...	...	...	...	...	...	...	...	...	...	...
„ September	...	...	...	...	...	...	...	...	...	...	...	...	...	...
„ October	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total yield for twelve months													49.2	

## FRUIT TREES.

The surviving paw-paw tree from the seed brought by the Director from Hawaii has grown well, and remained free from the disease which attacked most of the paw-paw trees in the district last year. Fruit has developed, and when this ripens, seed will be given out. The other varieties of paw-paw on the Station are also free from disease this year, and this is true generally of all the paw-paw trees in the district. This fact seems to point that the trouble was due to climatic causes.

The mango trees are fairly clean, and in good order. The crop last year was a huge one, but it is not anticipated that the output in Mackay will be nearly so large during the coming season.

## GRAPE VINES AND PINEAPPLES.

The vines have received the usual application of lime and sulphur, and are in good condition. Distributions of cuttings were made at the time of pruning. Pineapple suckers of approved varieties have also been distributed.

## GRASSES.

The Rhodes grass planted last year grew vigorously, and a larger area has been brought under this grass which appears very promising. It produces fine stools of dark green herbage, about 4 ft. high, and is liked by stock. It appears from present observation to withstand cold weather and frost very much better than the *Paspalum dilatatum*, and to be in every way a much superior grass for the North. Stools of Rhodes grass have been largely distributed, and are still available. A fair amount of *Paspalum dilatatum* has also been given out. It is intended, later in this year, to introduce some new grasses which have been favourably reported on by Mr. Landells, of the Alligator Creek State School.

## MISCELLANEOUS.

As stock of all kinds feed upon the Water Hyacinth, now choking the Mackay Fresh Water Lagoons, adjacent to which the Experiment Station is situated, an analysis of the plant was made to find its feeding value. This is relatively poor, owing largely to the high water content. It is, however, a good standby in time of drought, and though a serious pest, is not without its uses:—

## ANALYSIS OF WATER HYACINTH GROWING IN LAGOON NEAR EXPERIMENT STATION.

Constituent.	Green Substance.	Dry Substance.
Moisture ... ..	90.650	...
Dry Substance ... ..	9.350	100.000
Crude Fibre ... ..	1.367	14.624
Total Nitrogen ... ..	.127	1.357
× 6.25 = to Proteids ... ..	.793	8.481
Albuminoid Nitrogen ... ..	.117	1.252
× 6.25 = to Proteids ... ..	.731	7.825
Amide Nitrogen (diff.) ... ..	.010	.105
Asparagine ... ..	.053	.562
Ether Extract ... ..	.276	2.960
Carbohydrates (less fibre) ... ..	5.423	57.997
Total Ash ... ..	1.499	16.032
Soluble Ash ... ..	1.463	15.648

The following analyses were made to show the loss of nitrogen which takes place as the cane leaves turn into trash. The Director has frequently called attention to the fact that a still further loss takes place when trash is allowed to lie upon the surface of the land, instead of being ploughed under:—

## DETERMINATION OF NITROGEN IN GREEN LEAVES AND TRASH OF STAND-OVER CANE (BADILA).

MOISTURE.		NITROGEN.			
		DRY LEAVES.		GREEN LEAVES.	
Dry Leaves.	Green Leaves.	Fresh Substance.	Dry Substance.	Fresh Substance.	Dry Substance.
9.256	66.204	2.494	2.748	2.772	.8202

Thirty samples of soil collected at Hatton (Mackay district) at the end of 1907 are being analysed as time permits. Eight have been completed, and are shown in the following table, a serial number representing the farmer from whose land the sample was obtained:—

## ANALYSES OF EIGHT HATTON (MACKAY) SOILS.

Serial Number.	Total Elements in Soil.				Available Elements in Soil.		
	Lime, per cent.	Potash, per cent.	Phosphoric Acid, per cent.	Nitrogen, per cent.	Lime, per cent.	Potash, per cent.	Phosphoric Acid, 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	0.255	0.120	0.0839	0.0111	0.0007
6	1.388	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
Means	1.354	0.296	0.410	0.152	0.1345	0.0128	0.0028

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

Serial Number.	Total Pounds per Acre.				Available Pounds per Acre.		
	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	335	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	55
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
Means	33,868	7,403	10,259	3,809	3,364	321	71

In comparison with other soils analysed through the State, the results are satisfactory, the lime and phosphoric acid being good, and nitrogen fair, although the available potash is somewhat low:—

ANALYSES MADE AT THE MACKAY SUGAR EXPERIMENT STATION LABORATORY FROM 1ST JULY, 1907, TO 30TH JUNE, 1908.

Materials.	No. of Samples Analysed.	No. of Analyses.
Sugar-canes for Experiment Station	372	744
Sugar-cane fibres for Experiment Station	64	128
Sugar cane for outside growers	15	30
Molasses	2	4
Water hyacinth for feeding value	1	2
Nitrogen in cane leaves and trash	2	4
Fertilisers	4	8
Soils, agricultural method	10	20
Soils, Maxwell's aspartic method	14	14
Total	484	954

## STATEMENT OF EXPENDITURES FOR THE YEAR ENDED 30TH JUNE 1908.

	£	s.	d.
Salaries	987	10	0
Wages	629	14	3
Travelling expenses, all officers	134	0	3
Chemicals and apparatus	82	6	5
Freights, passages, railway travel, &c.	78	3	10
Stamps, telegrams, and petty cash, &c.	73	19	1
Printing and advertising	60	4	6
Transport	56	6	11
Rents, rates, duty, &c.	50	8	6
Manures	44	5	2
Gas	34	18	0
Purchase live stock	30	0	0
Library and subscriptions to newspapers	29	4	11
Timber	20	15	5
Sundries	17	4	2
Telephones, post office box, &c.	16	4	1
Tools, implements, &c.	15	8	2
Repairs (blacksmith, carpenter, plumber, &c.)	14	10	2
Furniture	13	9	8
Insurance, &c.	12	0	0
Stationery	9	2	3
Washing	8	19	1
Purchase cane plants	6	6	0
Entertaining allowance	5	0	0
Horse feed	3	13	5
Fuel	3	10	0

£2,437 4 3

## RECEIPTS AND EXPENDITURES, YEAR 1907-8.

## RECEIPTS.

	DR.			CR.		
	£	s.	d.	£	s.	d.
Balance on hand 30th June, 1907 (as per last annual report) ... ..	2,540	2	7			
Sale of cane, Mackay ... ..	88	9	9			
Bonus on white-grown cane ... ..	54	9	5			
Other collections ... ..	14	5	0			

## EXPENDITURE.

Expenditure, as above ... ..				2,437	4	3
Balance to credit at 30th June, 1907.... ..				260	2	6
	£2,697	6	9	£2,697	6	9

Price 1s. 2d.]

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

