

1909.

QUEENSLAND.

ANNUAL REPORT OF THE BUREAU OF SUGAR
EXPERIMENT STATIONS.

Presented to both Houses of Parliament by Command.

TO THE UNDER SECRETARY, DEPARTMENT OF AGRICULTURE AND STOCK.

Sugar Experiment Station,

Mackay, 12th October, 1909.

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

I have, &c.,

HARRY T. EASTERBY.

The report this year deals with the analyses carried out at the Bundaberg Laboratory, and the chemical and experimental work of the Sugar Experiment Station, Mackay.

The first Director of the Bureau of Sugar Experiment Stations, Dr. W. Maxwell, retired during the past year in consequence of the expiration of his agreement with the Queensland Government, after eight and a-half years' service.

The Experiment Stations have now come into direct relation with the Department of Agriculture, and proposals have been made for the more extended working of the stations, so as to embrace districts both north and south of Mackay. This, with other changes which have been foreshadowed, should prove of great value to growers generally.

BUNDABERG LABORATORIES.

The following table shows the total number of analyses made since the inception of the laboratories:—

FIRST ASSISTANT CHEMIST'S REPORT.

Material.	Method of Analysis.	Number of samples Analyzed.	Number of Analyses.
Soils	Agricultural Method	1,139	2,278
Ditto	Maxwell's Aspartic Acid Method	1,079	1,079
Ditto	Soluble Silica (Special)	118	236
Ditto	Nitrogen (Special)	1,221	2,442
Ditto	Humus (Special)	1,056	2,112
Ditto	Insoluble Residue (Special) ...	98	196
Ditto	Mechanical Analysis	1,208	1,208
Ditto	Absorptive and Retentive Power of Soils for Water	782	782
Ditto	Solubility Tests	12	18
Waters	Irrigation Waters	538	876
Manures	For Fertilisation Uses	100	200
Limes	ditto	36	72
Canes and Juices	Polarisation Tests	161	322
Sugar	ditto	13	26
Molasses	Complete Analysis	48	96
Sugar	ditto	76	152
Water	Complete Analysis, Total Solids	50	100
Basalts	Complete Analysis	19	20
Miscellaneous Analyses ... ..	... ..	195	390
		8,140	13,235

Credit is due to Mr. James Pringle, who was made Junior Assistant Chemist, for his painstaking and industrious work.

GEORGE R. PATTEN,
First Assistant Chemist.

The two tables next set out represent the average agricultural analysis of composite samples of soil from the sugar districts between Bundaberg and Mossman, also the relative solvent action of various acids upon such composite samples. For lands upon which sugar-cane is grown, Maxwell's aspartic acid method is considered the most useful, and the one which approximates most closely in showing the amount of the necessary elements available for cane crops.

AVERAGE AGRICULTURAL ANALYSIS OF COMPOSITE SAMPLES OF SOIL THE SOLUBILITY IN 1% ACID SOLUTIONS IS SHOWN IN ANOTHER TABLE.

Locality	Moisture.	Volatile Matter.	Insoluble Residue.	Chlorine	Phosphoric acid.	Ferrie Oxide.	Alumina.	Lime.	Magnesia.	Potash.	Soda.
Mossman, Hambleton, Mulgrave (alluvial)	1717	6029	74953	003	136	1122	8940	271	435	481	180
Geraldton, Mourilyan, Halifax, Ripple Creek, and Ingham (alluvial)	2808	7696	71644	003	164	5414	10941	321	472	240	152
Geraldton and Mulgrave (bastard red soils)	3444	13182	50953	004	264	13069	18592	159	256	248	137
Mackay and Proserpine (alluvial)	2349	6760	79013	004	174	3969	5932	753	920	200	207
Burdakin (alluvial)	2334	6439	80439	004	187	3414	5166	958	734	348	144
Isis Level Land Soils (volcanic)	2558	11255	53943	003	247	14336	16726	344	277	186	092
Wongara, Bundaberg (volcanic)	3733	13985	43641	004	407	15267	21613	904	920	139	130
Chilera (red soils)	1365	8436	69210	009	201	6548	12842	365	177	187	114

TABLE SHOWING THE SOLVENT ACTION OF VARIOUS ACIDS UPON COMPOSITE SAMPLE OF SOILS USING 1% SOLUTIONS OF EACH ACID.

Locality.	Name of Solvent.—1 %	ANALYSIS CALCULATED TO THE % OF THE SOIL.					
		Silica.	Ferrie Oxide and Alumina.	Phosphoric Acid.	Lime.	Potash.	Soda.
Mossman, Mulgrave, and Hambleton— <i>Alluvial</i>	Aspartic acid	0092	0093	0013	0880	0121	0104
	Acetic acid	0049	0055	0013	0821	0085	0092
	Citric acid	0274	1558	0037	0843	0112	0122
	Hydrochloric acid	1066	3572	0045	1216	0187	0090
Geraldton, Mourilyan, Halifax, Ripple Creek, and Ingham— <i>Alluvial</i>	Aspartic acid	0130	0111	0014	0830	0104	0119
	Acetic acid	0080	0054	0020	0795	0067	0019
	Citric acid	0116	2060	0035	0798	0133	0151
	Hydrochloric acid	1742	5898	0042	1450	0163	0117
Geraldton and Mulgrave— <i>Bastard Red Soils</i>	Aspartic acid	0076	1297	0010	0608	0132	0098
	Acetic acid	0038	0177	0021	0581	0090	0113
	Citric acid	0233	2614	0017	1555	0157	0135
	Hydrochloric acid	0866	3865	0025	0736	0162	0093
Mackay and Proserpine—Soils, <i>Alluvial</i>	Aspartic acid	0134	0078	0017	1280	0051	0060
	Acetic acid	0116	0016	0014	1103	0073	0094
	Citric acid	0746	2365	0071	1180	0080	0129
	Hydrochloric acid	2679	6578	0075	3240	0154	0160
Burdakin—Soils, <i>Alluvial</i>	Aspartic acid	0235	0044	0174	1783	0084	0142
	Acetic acid	0140	0020	0107	1508	0057	0103
	Citric acid	0723	1711	0367	2215	0101	0171
	Hydrochloric acid	2042	4943	0140	5230	0218	0168
Isis Level Land—Soils, <i>Volcanic</i>	Aspartic acid	0251	0091	0017	1593	0097	0177
	Acetic acid	0186	0030	0015	1411	0110	0050
	Citric acid	0532	2114	0027	1610	0173	0124
	Hydrochloric acid	1036	4300	0042	2713	0259	0262
Wongara, Bundaberg—Soils, <i>Volcanic</i>	Aspartic acid	0631	0857	0018	2755	0033	0074
	Acetic acid	0165	0005	0017	2545	0079	0065
	Citric acid	0093	2825	0051	2915	0132	0107
	Hydrochloric acid	1132	6267	0196	3174	0232	0329
Bingera—Soils, <i>Red</i>	Aspartic acid	0324	0097	0017	1680	0048	0082
	Acetic acid	0263	0032	0018	1653	0047	0086
	Citric acid	0576	1887	0036	1755	0084	0101
	Hydrochloric acid	0043	4118	0062	2263	0208	0269

The following table, which is a highly interesting one, shows the average percentage of organic matter, water absorbed, and water retained of the various sugar districts of Queensland. It must be borne in mind, however, that being artificial tests in a laboratory the percentages of water retained and absorbed are valuable in a comparative sense only:—

TABLE SHOWING THE AVERAGE PERCENTAGE OF ORGANIC MATTER, WATER ABSORBED, AND WATER RETAINED OF VARIOUS SUGAR DISTRICTS OF QUEENSLAND.

District.	Sub-district.	Organic Matter.	Water Absorbed.	Water Retained.
		%	%	%
Cairns	Mossman	6.52	39.62	2.03
	Kamerunga	3.55	34.10	1.15
	Hambledon	5.33	36.19	1.63
	Mulgrave (red soils)	7.15	39.69	2.84
	„ (alluvial soils)	5.72	40.90	2.40
	Geraldton (red soils)	15.98	46.01	5.17
	„ (alluvial soils)	11.89	49.18	5.77
	Mourilyan	11.93	45.02	4.51
	Halifax	5.64	41.47	2.91
	Ingham	4.88	39.17	2.09
	Ripple Creek	5.82	42.18	2.82
	Burdekin	6.48	43.65	3.39
	Mackay	Proserpine	8.22	43.93	4.70
Homebush		4.08	34.63	1.63
Mackay (river bank soils)		5.92	39.23	2.83
North Eton		4.55	37.41	2.63
Plane Creek (forest lands soils)		10.77	43.55	6.14
„ (scrub lands and low flats)		7.02	40.84	3.44
North of River and Farleigh		9.63	43.25	5.74
Sunnyside		6.34	42.33	3.70
Bundaberg	Isis (level land soils)	11.34	43.80	3.41
	„ (hillside soils)	12.73	46.58	3.44
	Woongarra	13.97	51.45	4.46
	Bingera	8.39	38.63	2.41
	Watawa	12.03	43.14	4.64
	Gin Gin (forest lands)	8.71	41.08	3.63
	„ (river flats)	7.33	41.74	3.38
	Birthamba	7.85	31.52	1.69
	Sharon, Oakwood, Kalbar, and Bonna	5.86	36.36	2.44
	Fairymead	9.10	17.14	1.48
	Avondale	5.07	42.58	3.51
	Miara	15.65	73.95	6.89
	Invieta	8.09	39.94	3.21
	Gooburrum	3.95	30.49	1.06
	Pialba	8.12	33.47	2.72
	Nerang	8.89	51.60	4.16
	Mount Bauple (red soils)	8.04	17.31	2.49
	„ „ (yellow and grey soils)	6.96	37.76	2.35
	Beenleigh	8.08	41.81	1.54
	Nambour	10.60	43.82	4.28
Goodwood	11.84	43.81	3.20	

In the following table is given the analyses of the total solids of a number of well waters taken from Woongarra and Barolin, near Bundaberg, where the total solids amounted to more than 50 grains per gallon:—

ANALYSIS OF THE TOTAL SOLIDS OF WELL WATERS (TOTAL SOLIDS OF WHICH ARE MORE THAN 50 GRAINS PER GALLON) FROM WOONGARRA AND BAROLIN, NEAR BUNDABERG.

LABORATORY No.	Location of Well	TOTAL SOLIDS.		ANALYSIS OF TOTAL SOLIDS IN GRAINS PER GALLON (OR PARTS PER 70,000)								
		Per Cent.	Grains per Gallon.	Organic Matter.	Ferric Oxide and Alumina.	Iron.	Magnesia.	Potash.	Soda.	Sulphuric Acid.	Chlorine.	Oxygen—Equivalent of Chlorine.
1	Burnett Heads Lighthouse	1739	121.73	34.30	...	19.67	7.21	1.54	20.80	6.09	42.00	9.40
5	C. Seehara, Heads Road	1491	104.37	23.50	...	6.23	9.80	1.96	27.23	3.43	36.40	8.20
6, 7	— Forsey, Heads Road	1161	81.27	21.20	...	9.10	3.36	1.61	22.17	6.58	21.84	4.92
8	B. Tchorzowski, Burnett Heads	4314	301.98	57.63	...	14.28	20.65	12.88	88.76	14.07	121.10	27.39
10	Hoffman, Burnett Heads	1540	107.80	25.21	...	5.60	7.84	1.33	27.13	3.78	47.60	10.72
14	F. C. Schlegel, Rubyana	1466	102.60	33.50	...	7.84	6.65	4.06	23.31	8.19	24.50	5.52
18	Kirby, Brown's Estate	2242	156.94	44.52	...	9.52	16.24	2.03	35.00	8.96	52.50	11.83
19	— Stevenson, Burnett Heads	1069	74.76	12.80	...	2.87	5.04	1.61	25.55	6.79	25.90	5.83
21	J. Finlay, Heads Road	1027	71.89	18.35	...	3.64	6.30	1.12	21.42	.98	25.90	5.83
23	W. Crow, Heads Road	1042	72.94	18.21	...	.91	1.82	2.94	22.05	3.15	30.80	6.94
27	R. G. Glasgow, Heads Road	10873	61.46	13.90	...	1.54	2.87	2.52	19.95	5.74	19.25	4.33
33	P. L. Elliott, Spring Hill	1450	101.50	23.86	...	1.12	3.88	1.90	31.73	2.24	44.92	8.20
34	E. J. Nonkes, Heads Road	1300	91.00	25.00	...	4.34	12.46	1.26	18.34	5.74	30.80	6.94
36	J. F. Auer, Heads Road	5926	414.82	57.07	...	9.24	41.44	8.19	120.36	23.10	189.00	42.58
40	A. P. Barton, Mon Repos	1992	139.44	14.73	...	15.26	12.39	7.00	25.60	36.89	34.50	7.73
41	Qunaba Plantation	1768	133.76	36.26	...	8.40	8.47	6.81	31.50	2.73	51.10	11.51
42	Qunaba Plantation	2964	207.48	51.80	...	14.70	24.50	2.17	42.14	9.80	80.50	18.13
43	Qunaba Plantation	1082	75.74	23.52	...	5.11	7.28	1.05	15.54	4.83	23.30	5.36
46	J. McGill, Rubyana	2420	169.40	10.33	.049	4.48	8.40	10.08	65.66	14.00	72.80	16.40
47	G. R. Condes, The Hermitage, Rubyana	1424	99.68	29.57	...	3.78	11.06	8.82	14.98	2.73	37.10	8.36
49	J. McGill, Rubyana	1486	104.02	28.00	...	5.60	11.41	1.54	21.77	5.88	38.50	8.67
52	H. Rowland, Rubyana	1160	81.20	14.65	...	3.01	7.28	3.24	21.42	12.53	25.90	5.83
55	— Galm, near Qunaba	1344	94.08	33.60	...	4.69	11.06	1.26	17.15	3.01	30.10	6.78
58	Windsor Homestead	1732	121.24	12.66	...	3.08	9.87	2.38	31.22	1.54	38.50	8.01
60	S. Rowe, Sandhills Road	5419	378.70	102.16	...	13.30	63.99	9.38	67.48	14.00	138.60	31.22
61	W. Ryan, Sandhills Road	1240	86.30	35.21	...	3.92	9.38	.98	17.15	2.80	22.40	5.04
62	Pasture Reserve, off Sandhills Road	1970	137.90	47.30	...	6.16	14.14	2.24	26.88	3.78	48.30	10.88
63	Bauer, Sandhills	7890	552.30	21.40	...	20.15	15.12	14.84	247.10	13.79	280.00	63.08
66	J. Christensen, Rubyana Road	1062	74.34	23.30	.35	3.29	9.31	1.40	14.70	3.01	21.50	5.52
70	Fritchey, Sandhills Road	1780	124.60	31.84	...	6.23	20.02	1.96	22.75	5.46	46.90	10.56
71	— Smith, Sandhills Road	1348	94.36	27.91	...	3.78	10.85	2.50	23.26	3.64	30.10	6.78
75	— Holland, Sandhills	1830	128.10	44.70	...	5.25	18.34	1.82	20.79	2.49	44.80	10.09
76	W. G. Farquhar, Hummock Plantation	1362	95.34	28.81	...	3.47	9.80	1.75	24.85	7.35	25.90	5.83
77	— Watson, Woongarra	9494	660.58	208.72	...	58.10	85.26	10.71	84.70	12.39	259.00	58.30
80	— Kelley, Sandhills	1366	91.42	25.00	...	5.81	10.71	1.75	23.54	2.94	28.90	6.31
81	Smith and Toft, Kalkie	1296	90.72	26.06	...	3.29	12.32	1.12	18.69	4.83	31.50	7.09
83	H. A. Cattermull, Sunnyside	2938	142.66	31.27	...	5.81	21.84	2.15	31.50	9.66	51.80	11.67
88	— Holland, Windermere Road	2864	200.48	64.01	...	17.36	11.90	3.85	43.49	9.52	65.10	14.66
90	— Trevore, Sandhills	1608	112.56	49.87	...	4.06	15.26	1.95	15.19	1.96	44.10	9.43
106	S. Kirby, Barolin	1412	98.84	35.83	...	3.71	15.89	.98	15.61	3.50	30.10	6.78
107	Biederman, Barolin	2170	151.90	51.16	...	4.90	20.65	2.17	27.02	5.32	52.50	11.82
108	Bass Bros., Pemberton	1438	100.66	35.60	...	2.73	11.90	1.05	20.79	3.64	32.20	7.25

ANALYSIS OF THE TOTAL SOLIDS OF WELL WATERS, &c.—*continued.*

Laboratory No.	Location of Well.	TOTAL SOLIDS.		ANALYSIS OF TOTAL SOLIDS IN GRAINS PER GALLON (OF PARTS PER 70,000)								
		Per Cent.	Grains per Gallon.	Organic Matter.	Ferric Oxide and Alumina.	Iron.	Magnesia.	Potash.	Soda.	Sulphuric Anhydride.	Chloride.	Oxygen—Equivalent of Phosphine.
111	A. Lovegreen, Barolin	1528	166.98	39.60		2.31	7.06	1.47	26.11	6.02	31.50	7.09
129	Mrs. F. Zielkie, Barolin	1730	121.10	43.30		6.86	15.33	1.78	16.10	7.46	41.65	9.38
134	F. Nott, Windermere	1664	116.48	26.48		10.88	22.02	1.19	20.15	5.81	38.50	8.67
153	S. Rowe, Sandhills Road	4256	279.92	73.58		18.31	97.06	3.50	29.19	7.39	53.20	19.56
161	J. Davies, near Elliott River	1048	73.36	16.15		1.45	29.24	1.24	16.38	6.6	30.70	6.53
196	R. Crawford, Springfield	1648	115.36	26.16		5.46	18.11	2.45	13.72	3.28	60.90	13.72
192	R. Rule, Springfield	1630	114.16	36.47		1.12	15.40	2.05	11.60	4.64	48.30	10.88

Mr. Patten also reports that during the past year a series of lectures was given to the State School teachers of the Bundaberg district, the subject being "Elementary Theoretical Chemistry of the Non-metals." The average attendance at the lectures was 27. Under instructions from the Minister of Agriculture, Mr. Patten attended at the Sugar Court of the recent Brisbane Exhibition, and gave demonstrations on the use of the polariscope, and the testing of sugar juices, &c., twice a day during the period of the Exhibition.

Mr. Patten's work, in both the above connections, was, to the writer's knowledge, very highly appreciated.

WORK OF THE MACKAY CENTRAL SUGAR EXPERIMENT STATION.

Sundry experiments initiated by the late Director have now been completed. These comprised the quadruple testing of ten best varieties from different countries, the further ratooning as a sixth crop of the best of the New Guinea varieties which were reserved from the original large experiment with sixty-eight varieties from different countries; and of experiments for determining the most advisable distances for planting. Particulars of the results given by these experiments will be found later on, together with an outline of new experiments which it is proposed to undertake.

Further work during the year has consisted in the testing of ten Hambleton Queensland seedlings as a first ratoon crop, the planting out under experimental conditions of six Queensland seedlings (raised by the Queensland Acclimatisation Society), together with canes known as Barbados 147 and Mauritius Malagache; the continued distribution of high-class canes of approved kinds to farmers' associations and individual applicants; the introduction of new varieties for subsequent testing; and the continuation of subsidiary crops.

A visit was also paid to the Northern sugar centres by the writer in June and July of the present year, and advices given to growers as to cultivation and manuring, while an inspection of the different kinds of cane given out by this station in 1906 was also made.

The work in the Mackay laboratory principally comprised analyses of soils, irrigation waters, sugars, sugar-canes, &c., all of which work has been carried out in a most creditable and conscientious manner by the Assistant Chemist, Mr. L. C. McCready.

The greater part of the experimental area of the Mackay Station has now been almost continuously under cane during the past seven years, and, as the experiments upon the land in question have now been completed, the stoles are being ploughed out and green crops will be planted and ploughed in, while the land will be resting from the growth of cane for some months before the initiation of further experiments.

Turning from the work of the station for a moment, and reviewing the work done by cane farmers generally, it is gratifying to find that a much keener interest in manures and cultivation exists at the present time than has ever been the case previously, and application for advice along these lines are now of daily occurrence. The farmers around Mackay alone are buying and using fertilisers most extensively, and formulas supplied by the Experiment Station are being largely adopted. North of Mackay great interest is also displayed in the fertilising of the cane, as well as in that most indispensable act of cultivation, the restoring of humus to the soil by the ploughing in of green crops. The effect of manures combined with proper cultivation on the Experiment Station, particularly with ratoon crops, have certainly been most surprising, as will be seen from the results which appear on other pages. This question our farmers are now going into, and, as long as their cultivation is good, the land is maintained in their soils, and climatic conditions are favourable, they are certain to largely profit.

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

In the report for 1905-6 will be found the final results given by the whole of the sixty-eight varieties from different countries for the plant, first ratoon, and second ratoon crops, the experiment being originally initiated in 1903.

In 1906 those canes of small commercial value were discarded, while others, which were originally of high class but had developed disease, were planted out in what was termed the "station hospital." These latter have now all been discarded owing to their failure to recover. The remaining varieties were continued in cultivation, and eleven of these were the subject of the present experiment as a fifth ratoon crop.

Due to good cultivation and judicious fertilising with mixed manures, these varieties this year have again given a very handsome return. Their appearance and growth during the season was excellent, and, indeed, resembled plant cane more than ratoons. At the early stage of growth the weather was too cool and dry, and this continued up till the end of December. In February there was a limited amount of rain with much heat, which prevented the maximum results being achieved. Thanks, however, to a regular though small rainfall since that date, and a warm and open winter, the crop, in common with Mackay crops generally, made fair progress towards maturity.

The cultivation consisted, as in previous years, of the ploughing and subsoiling of the ground between the rows of cane, and farmers would be well advised to pursue this method of cultivation with their ratoons, wherever possible. Mixed fertilisers composed of nitrate of soda, sulphate of ammonia, sulphate of potash, and superphosphate were also applied, and though the cost may be considered high by those farmers who have not yet tried manuring, yet the results leave a large profit, the expense being about £3 10s. per acre, varying with the market prices of the manures.

The preliminary analyses of these varieties was made in July, 1909, the final analyses and determination of fibre being carried out in August. The results are given in the following tables. All the canes, large and small, growing on 50 running feet were taken as a bulk sample for the final analyses:—

FIRST PRELIMINARY EXAMINATION OF FIFTH RATOON CROP OF THE VARIETIES—JULY, 1909.

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	1.7.09	10 months	17.4	14.04	.79	85.8
32	Do.	8A	1.7.09	do.	20.2	18.16	.45	89.9
35	Do.	15	1.7.09	do.	19.8	18.58	.68	93.8
41	Do.	24A	2.7.09	do.	19.6	18.08	.49	92.2
42	Do.	24B	2.7.09	do.	18.7	16.21	1.09	86.6
43	Do.	26	5.7.09	do.	18.0	15.02	.82	88.4
46	Do.	37	5.7.09	do.	17.7	15.13	.80	85.4
47	Do.	38	5.7.09	do.	18.6	16.67	.81	89.6
49	Do.	40	5.7.09	do.	18.0	16.76	.49	93.1
59	Do.	64	5.7.09	do.	15.9	12.66	1.78	79.6
61	Do.	66	5.7.09	do.	20.9	16.84	1.84	80.5

FINAL EXAMINATION OF FIFTH RATOON CROP OF THE VARIETIES—AUGUST, 1909.

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.	Fibre in Cane.	Sucrose in Case.	Date of Arrowing.
28	New Guinea	N. G. 4	20.8.09	11 months	20.0	18.76	.15	93.8	10.58	16.77	
32	Do.	8A	20.8.09	do.	21.4	20.09	.17	93.8	8.76	18.33	18th May
35	Do.	15	20.8.09	do.	22.7	21.48	.15	94.6	9.77	19.38	
41	Do.	24A	20.8.09	do.	20.9	20.00	.17	95.7	10.37	17.92	
42	Do.	24B	20.8.09	do.	20.0	18.60	.39	92.5	10.79	16.50	
43	Do.	26	20.8.09	do.	18.1	16.28	.63	89.9	11.40	14.42	
46	Do.	37	20.8.09	do.	18.8	16.18	.72	86.0	11.25	14.36	18th May
47	Do.	38	20.8.09	do.	20.6	18.35	.31	91.5	11.09	16.76	18th May
49	Do.	40	20.8.09	do.	18.3	17.04	.32	93.1	9.38	15.41	
59	Do.	64	20.8.09	do.	17.4	15.29	.95	87.8	9.97	13.76	
61	Do.	66	20.8.09	do.	20.9	17.66	.78	84.4	10.02	15.89	18th May (fully)

The balance of the cane was then cut and sent to Meadowlands Mill, and the crop results tabulated as under:—

FIFTH RATOON CROP—RESULTS OF THE VARIETIES CONTINUED IN EXPERIMENT—1909.

Serial No.	Country.	No. or 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.
28	New Guinea	New Guinea 4	11 mo'ths	50,529	1.3	30.4	11,420	5.0
32	Do.	8A	do.	31,570	2.1	32.6	13,413	5.9
35	Do.	15	do.	31,798	2.7	38.3	16,658	7.4
41	Do.	24A	do.	29,040	2.8	36.7	14,753	6.5
42	Do.	24B	do.	30,956	2.5	34.0	12,577	5.6
43	Do.	26	do.	42,543	1.9	36.9	11,934	5.3
46	Do.	37	do.	30,456	2.0	27.2	8,757	3.9
47	Do.	38	do.	26,426	1.9	23.1	8,687	3.8
49	Do.	40	do.	32,815	2.3	34.4	11,903	5.3
59	Do.	64	do.	18,585	3.2	27.2	8,391	3.7
61	Do.	66	do.	73,616	1.6	55.8	19,865	8.8

It will be seen from these results that the New Guinea canes 8A, 15, 24A, and 24B still continue to give excellent results at the station, and after these experiments their ratooning power, as far as Mackay is concerned, cannot be doubted. New Guinea 24 (or Goru), owing to the demands of space, had to be ploughed out last year, but its character as a ratooner is also high, if ratooned during August or September. New Guinea 40, while not being quite so good a cane as a sugar producer, yields a fine return, and is well spoken of in other parts of the district. New Guinea 4, 26, and 66 are, on account of the thinness of stick, not generally cared for. Two stoles of the fifth ratoon New Guinea 66 which were counted contained ninety-five and sixty-two sticks respectively.

This continued ratooning, originally undertaken to encourage farmers to more generally ratoon their crops on account of the scarcity and cost of labour in the cutting season, has now been brought to a close, and the land will be green fallowed and rested for a few months, it having been continuously under cane for six years, during which time it has produced six large crops from the one planting, the total results from which six crops are furnished in the next table:—

TOTAL RESULTS OF THE VARIETIES CONTINUED IN EXPERIMENT AS A FIFTH RATOON CROP TO DATE: COVERING PLANT, FIRST, SECOND, THIRD, FOURTH, AND FIFTH RATOON CROPS, 1904-1909

Serial No.	No. or Name of Variety.	Country.	Total Cane per Acre, English Tons (Six Crops).	Total Sugar per Acre, Pounds (Six Crops).	Total Sugar per Acre, English Tons (Six Crops).
28	New Guinea 4	New Guinea	269.9	88,335	39.4
32	8A	do.	253.2	97,276	43.3
35	15	do.	270.5	112,687	50.2
41	24A	do.	266.7	102,572	45.6
42	24B	do.	257.5	94,662	42.2
43	26	do.	249.4	79,264	35.3
46	37	do.	209.8	68,103	30.3
47	38	do.	190.8	70,471	31.3
49	40	do.	253.4	87,172	38.8
59	64	do.	215.2	69,187	30.7
61	66	do.	324.5	112,211	49.9

As these canes, together with most of the diseased varieties in the hospital, dealt with hereafter, are the survivors of the collections of Messrs. Cowley and Tryon, it has been thought advisable to publish the following list dealing with the whole of the New Guinea varieties. Both the collections were originally received by the then Mackay State Nursery (which afterwards became the Mackay Sugar Experiment Station). Cowley's collection was received early in 1893 and Tryon's early in 1896. They were also sent to the Kamerunga State Nursery, and were introduced by the Queensland Department of Agriculture. Before the Bureau of Sugar Experiment Stations took the Mackay Station over, some of the varieties had died out, both at Mackay and at Kamerunga. It was found, however, in 1901, that some of the varieties which had died out at Mackay were still in existence at Kamerunga, these being Iduari, Akewa, and Oiboku (or Moo Moo Oiboku) of Cowley's collection, and New Guinea 5, 7, 29, 36, 38, 63, and 64 of Tryon's collection. These were, therefore, brought to Mackay in October, 1901, and put under trial with the remainder.

In the following list the words "died out" signify the canes had actually perished before the experiments were commenced; the word "discarded" means that, either due to disease, or being worthless as a cropper or sugar producer, the variety was ploughed out, while the word "retained" means that the varieties are free from disease, good croppers and sugar producers, and still kept at the Experiment Station for experimental or for other purposes. All in this class are still available for distribution at given seasons of the year.

LIST OF NEW GUINEA CANES INTRODUCED BY THE QUEENSLAND DEPARTMENT OF AGRICULTURE AND RECEIVED BY THE MACKAY STATE NURSERY IN 1893 AND 1896, COMPRISING MESSRS. COWLEY AND H. TRYON'S COLLECTIONS, AND SHOWING WHAT HAS HAPPENED TO EACH VARIETY AT MACKAY STATION UP TO THE END OF 1909.

Number or Name of Variety.	Collection.	Final Result of Variety in Question.
Mave or Mahoaru	Cowley's	Discarded.
Chenoma	ditto	ditto.
Iduari	ditto	Died out. Subsequently brought from Kamerunga, and after trial discarded.
Arabora	ditto	Died out.
Batoo	ditto	Discarded.
Kikorea	ditto	ditto.
Oiva	ditto	ditto.
Mave or Nave	ditto	Retained.
Moo Moo Oiboku	ditto	Died out. Discarded after being again brought from Kamerunga and tried.
Mabuan	ditto	Discarded.
Akewa	ditto	Died out. Subsequently brought from Kamerunga, and after trial discarded.
Oraya	ditto	Discarded.
New Guinea 1	Tryon's	ditto.
2	ditto	ditto.
3	ditto	Died out in hospital.
4	ditto	Retained.
4A	ditto	Discarded.
5	ditto	Died out. Subsequently brought from Kamerunga, and discarded after trial.
6A	ditto	Discarded.
6B	ditto	ditto.
7	ditto	Died out. Subsequently brought from Kamerunga, and discarded after trial.
8A	ditto	Retained.
8B	ditto	Discarded.
9	ditto	ditto.
10	ditto	ditto.
11	ditto	ditto.
12	ditto	ditto.

LIST OF NEW GUINEA CANES INTRODUCED BY THE QUEENSLAND DEPARTMENT OF AGRICULTURE, &c.—
continued.

Number or Name of Variety.	Collection.	Final Result of Variety in Question.
New Guinea 13	Tryon's	Discarded.
14	ditto	ditto.
14A	ditto	ditto.
15	ditto	Retained.
16	ditto	Discarded.
17	ditto	ditto.
18	ditto	ditto.
19	ditto	ditto.
20	ditto	ditto.
21	ditto	ditto.
22	ditto	ditto.
23	ditto	Died out.
24	ditto	Retained.
24A	ditto	ditto.
24B	ditto	ditto.
25	ditto	Discarded.
26	ditto	Retained.
27	ditto	Died out.
28	ditto	Discarded.
29	ditto	Died out. Subsequently brought from Kamerunga, and after trial discarded.
30	ditto	Died out.
31	ditto	Discarded.
32	ditto	ditto.
33	ditto	Died out.
34	ditto	Discarded.
35	ditto	ditto.
35b	ditto	Died out.
36	ditto	Died out. Subsequently brought from Kamerunga, and after trial discarded.
37	ditto	Retained.
38	ditto	Died out. Subsequently brought from Kamerunga, and after trial retained.
39	ditto	Discarded.
40	ditto	Retained.
41	ditto	ditto.
42	ditto	Discarded.
43	ditto	ditto.
44	ditto	ditto.
45	ditto	ditto.
46	ditto	ditto.
47	ditto	Retained.
48	ditto	ditto.
49 (green)	ditto	Discarded.

LIST OF NEW GUINEA CANES INTRODUCED BY THE QUEENSLAND DEPARTMENT OF AGRICULTURE, &c.—
continued.

Number or Name of Variety.	Collection.	Final Result of Variety in Question.
New Guinea 49 (striped)	Tryon's ..	Discarded.
50	ditto ..	ditto.
51	ditto ..	ditto.
52	ditto ..	ditto.
53	ditto ..	ditto.
54	ditto ..	Retained.
55	ditto ..	Discarded.
56	ditto ..	ditto.
57	ditto ..	ditto.
58	ditto ..	ditto.
59	ditto ..	ditto.
60	ditto ..	ditto.
61	ditto ..	ditto.
62	ditto ..	Died out.
63	ditto ..	Died out. Subsequently brought from Kamerunga, and after trial discarded.
64	ditto ..	Died out. Subsequently brought from Kamerunga and retained.
65	ditto ..	Discarded.
66	ditto ..	Retained.

While it must be remembered that the judgment passed on the canes in the above list are the result of experience at the Mackay Station only, yet practically, the findings of the Mackay Station have been confirmed also at Cairns, and other places where these varieties have been grown. It must be recognised that North Queensland, as a whole, owes a very deep debt of gratitude to the Department of Agriculture for the introduction of the New Guinea canes, which have saved the situation in more than one locality. This has been so clearly seen by the Colonial Sugar Refining Company that they have, at their own expense, sent again to New Guinea for the purpose of making a new collection. These have been sent to Fiji, and the Experiment Station will, later on, apply to the company for cuttings of the new canes.

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

THIRD RATOON CROP, 1909.

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 a final competition. The results of the plant, first, and second ratoon crops have already appeared, and the results to be now given are those of the third ratoons, with which the trials are concluded.

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.

On the non-irrigated plats the third ratoons received the same cultivation as the first and second ratoons in previous years, which was as under—

On the non-irrigated plats the middles were split open with the swing plough, followed by the subsoiler to a depth of 18 in. These 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 no cultivation with implements took place, but the stole bed was loosened with picks, and the land subsequently kept clean with hand-hoeing while cane was young. Mixed fertilisers were applied to those plats carrying manures. The weather during December and February was abnormally dry, and 7 in. of irrigation water was applied.

In spite of the dry weather, however, the superior cultivation on the non-irrigated plats enabled them to catch up and even pass the irrigated plats, the subsequent rainfall being well distributed, though not so heavy as is usual in the wet season, and the winter being mild.

Taking the average of the total non-irrigated plats as against the average of the total irrigated plats, it is seen that this year the non-irrigated plats have given (manured and unmanured plats being added together) an increase of half a ton of cane, the yield of sugar per acre being also very slightly larger on the non-irrigated plats. These results bear out and confirm previous deductions, which were that in normal years with a fair rainfall good cultivation will give as good, if not better, results than are to be obtained with irrigation, and it may be said in passing that nearly all the new experiments at the station are being conducted without irrigation.

In the following tables are presented the preliminary and final analyses of the canes from the various plats, together with the fibre estimations. As in previous years the whole of the cane, large and small, was cut over 40 running feet so as to secure a reliable sample, and ensure an even quality of juice:—

FIRST PRELIMINARY EXAMINATION OF IRRIGATED THIRD RATOON CANE: PLATS WITH MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JULY, 1909.

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	12-7-09	9½ months	19.9	18.44	.55	92.6
17	Do.	24a	12-7-09	do.	19.2	16.53	.19	86.0
18	Do.	24b	12-7-09	do.	19.8	17.78	.92	89.8
19	Trinidad	Trinidad S. 60	13-7-09	do.	15.1	11.89	1.92	78.7
25	New Guinea	N. Guinea 4	13-7-09	do.	18.6	16.88	.78	90.7
26	Mauritius	Bois Rouge ..	13-7-09	do.	20.4	18.88	.68	92.5
27	Do.	Settlers ...	14-7-09	do.	18.3	16.53	.57	90.3
28	New Guinea	N. Guinea 8a	14-7-09	do.	19.8	17.22	1.19	86.9
29	Do.	15	14-7-09	do.	20.0	17.57	1.25	87.8
30	Do.	64	14-7-09	do.	15.9	12.21	2.40	76.7

SECOND PROGRESSIVE EXAMINATION OF IRRIGATED THIRD RATOON CANE: PLATS WITH MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—AUGUST, 1909.

16	New Guinea	N. Guinea 24	6-8-09	10½ months	20.8	19.79	.21	95.1
17	Do.	24a	6-8-09	do.	20.2	18.05	.69	89.3
18	Do.	24b	6-8-09	do.	19.9	18.08	.63	90.8
19	Trinidad	Trinidad S. 60	9-8-09	do.	12.9	9.39	1.63	72.7
25	New Guinea	N. Guinea 4	9-8-09	do.	20.0	19.14	.11	95.7
26	Mauritius	Bois Rouge ...	9-8-09	do.	21.5	20.09	.18	93.4
27	Do.	Settlers ...	9-8-09	do.	20.0	18.36	.24	91.8
28	New Guinea	N. Guinea 8a	9-8-09	do.	20.5	18.40	.49	89.7
29	Do.	15	9-8-09	do.	21.6	20.64	.49	95.5
30	Do.	64	10-8-09	do.	17.1	15.13	.86	88.4

FIRST PRELIMINARY EXAMINATION OF IRRIGATED THIRD RATOON CANE: PLATS, NO MANURES;
ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JULY, 1909.

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	N. Guinea 24	12-7-09	9½ months	20.2	18.50	.72	91.6
17A	Do.	24A	12-7-09	do.	19.3	16.60	1.23	86.0
18A	Do.	24B	12-7-09	do.	19.8	17.78	.76	89.8
19A	Trinidad	Trinidad S. 60	13-7-09	do.	17.7	15.83	.93	89.4
25A	New Guinea	N. Guinea 4	13-7-09	do.	19.0	17.75	.27	93.4
26A	Mauritius	Bois Rouge	13-7-09	do.	18.4	16.80	.63	91.3
27A	Do.	Settlers	14-7-09	do.	17.1	15.43	.92	90.2
28A	New Guinea	N. Guinea 8A	14-7-09	do.	19.5	17.37	1.00	89.0
29A	Do.	15	14-7-09	do.	18.9	16.92	.88	89.5
30A	Do.	64	14-7-09	do.	18.9	16.98	.98	89.8

SECOND PROGRESSIVE EXAMINATION OF IRRIGATED THIRD RATOON CANE: PLATS, NO MANURES; ALL
OTHER CONDITIONS OF CULTIVATION BEING EQUAL—AUGUST, 1909.

16A	New Guinea	N. Guinea 24	6-8-09	10½ months	20.7	19.07	.47	92.1
17A	Do.	24A	6-8-09	do.	20.3	18.46	.57	90.9
18A	Do.	24B	9-8-09	do.	19.8	18.16	.45	91.7
19A	Trinidad	Trinidad S. 60	9-8-09	do.	18.5	16.80	.50	90.8
25A	New Guinea	N. Guinea 4	9-8-09	do.	19.6	18.32	.10	93.4
26A	Mauritius	Bois Rouge	9-8-09	do.	20.0	18.28	.43	91.4
27A	Do.	Settlers	9-8-09	do.	19.0	17.29	.35	91.0
28A	New Guinea	N. Guinea 8A	9-8-09	do.	20.4	17.86	.69	87.5
29A	Do.	15	10-8-09	do.	20.9	19.69	.26	94.2
30A	Do.	64	10-8-09	do.	18.4	17.41	.40	94.6

FIRST PRELIMINARY EXAMINATION OF NON-IRRIGATED THIRD RATOON CANE: PLATS WITH MIXED
MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JULY, 1909.

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	N. Guinea 24	6-7-09	9½ months	19.3	17.24	.71	89.3
2	Do.	24A	6-7-09	do.	18.6	16.37	1.09	88.0
3	Do.	24B	6-7-09	do.	17.2	13.83	1.92	80.4
4	Trinidad	Trinidad S. 60	7-7-09	do.	15.6	12.61	1.56	80.8
10	New Guinea	N. Guinea 4	7-7-09	do.	16.8	14.17	1.09	84.3
11	Mauritius	Bois Rouge	8-7-09	do.	18.1	15.98	1.11	88.2
12	Do.	Settlers	8-7-09	do.	16.4	13.96	1.09	85.1
13	New Guinea	N. Guinea 8A	8-7-09	do.	17.7	13.96	1.92	78.8
14	Do.	15	9-7-09	do.	20.0	18.39	.66	91.9
15	Do.	64	9-7-09	do.	13.5	8.99	2.50	66.5

SECOND PROGRESSIVE EXAMINATION OF NON-IRRIGATED THIRD RATOON CANE: PLATS WITH MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—AUGUST, 1909.

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	N. Guinea 24	3-8-09	10½ months	19.6	17.58	.59	89.6
2	Do.	24A	4-8-09	do.	19.7	17.87	.52	90.7
3	Do.	24B	4-8-09	do.	18.5	16.21	.35	87.6
4	Trinidad	Trinidad S. 60	4-8-09	do.	18.4	16.75	.51	91.0
10	New Guinea	N. Guinea 4	4-8-09	do.	15.7	12.56	1.22	80.0
11	Mauritius	Bois Rouge	4-8-09	do.	20.0	18.50	.55	92.5
12	Do.	Settlers	4-8-00	do.	18.6	16.78	.58	90.2
13	New Guinea	N. Guinea 8A	6-8-09	do.	19.6	17.60	.74	89.7
14	Do.	15	6-8-00	do.	21.3	20.22	.20	94.9
15	Do.	64	6-8-09	do.	15.3	11.94	1.79	78.0

FIRST PRELIMINARY EXAMINATION OF NON-IRRIGATED THIRD RATOON CANE: PLATS, NO MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JULY, 1909.

1A	New Guinea	N. Guinea 24	6-7-09	9½ months	18.7	16.88	.81	90.2
2A	Do.	24A	6-7-09	do.	19.4	17.55	.81	90.4
3A	Do.	24B	6-7-09	do.	19.1	17.03	.96	89.1
4A	Trinidad	Trinidad S. 60	7-7-09	do.	17.2	15.24	1.00	88.6
10A	New Guinea	N. Guinea 4	7-7-09	do.	18.6	17.06	.39	91.7
11A	Mauritius	Bois Rouge	8-7-09	do.	18.5	16.83	.61	90.9
12A	Do.	Settlers	8-7-09	do.	14.0	10.98	1.49	78.4
13A	New Guinea	N. Guinea 8A	8-7-09	do.	20.0	18.18	.79	90.9
14A	Do.	15	9-7-09	do.	20.3	18.72	.53	92.2
15A	Do.	64	9-7-09	do.	17.8	15.82	.96	88.8

SECOND PROGRESSIVE EXAMINATION OF NON-IRRIGATED THIRD RATOON CANE: PLATS, NO MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—AUGUST, 1909.

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	N. Guinea 24	3-8-09	10½ months	20.1	18.28	.55	90.9
2A	Do.	24A	4-8-09	do.	19.9	18.23	.51	91.6
3A	Do.	24B	4-8-09	do.	19.1	17.24	.79	89.2
4A	Trinidad	Trinidad S. 60	4-8-09	do.	18.2	16.78	.61	92.1
10A	New Guinea	N. Guinea 4	4-8-09	do.	20.1	18.76	.08	93.3
11A	Mauritius	Bois Rouge	4-8-09	do.	19.8	18.26	.35	92.2
12A	Do.	Settlers	6-8-09	do.	17.1	14.97	.78	87.5
13A	New Guinea	N. Guinea 8A	6-8-09	do.	20.4	19.04	.30	93.3
14A	Do.	15	6-8-09	do.	21.0	19.69	.15	93.7
15A	Do.	64	6-8-09	do.	17.2	14.76	1.05	85.8

FINAL EXAMINATION OF IRRIGATED THIRD RATOON CANE: PLATS WITH MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—SEPTEMBER, 1909.

No. of Plate	Country	Variety of Cane	Date of Analysis	Age of Cane	Density of Juice (Brix)	Sucrose in Juice	Glucose in Juice	Purity of Juice	Fibre in Cane	Sucrose in Cane	Date of Harvesting
16	New Guinea	New Guinea 24	15-9-09	11½ months	19.9	18.92	27	95.0	11.65	16.71	12 July
17	Do.	24A	15-9-09	do.	20.4	18.93	29	92.7	11.72	16.71	12 July
18	Do.	24B	15-9-09	do.	20.0	18.50	41	92.5	11.60	16.35	12 July
19	Trinidad	Trinidad S. 60	15-9-09	do.	19.3	17.87	27	92.5	10.69	15.98	18 July
25	New Guinea	New Guinea 4	15-9-09	do.	20.7	19.38	15	93.6	10.60	17.33	
26	Mauritius	Bois Ronce	15-9-09	do.	21.3	19.41	17	91.1	11.11	17.25	18 May
27	Do.	Settlers	15-9-09	do.	19.6	18.58	38	94.7	11.12	16.51	1 July
28	New Guinea	New Guinea 8A	16-9-09	do.	20.1	18.50	38	92.0	8.71	16.89	18 May
29	Do.	15	16-9-09	do.	22.4	21.34	15	95.2	11.33	18.92	
30	Do.	64	16-9-09	do.	19.0	16.90	52	88.9	11.90	14.89	1 July

FINAL EXAMINATION OF IRRIGATED THIRD RATOON CANE: PLATS, NO MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—SEPTEMBER, 1909.

16A	New Guinea	New Guinea 24	15-9-09	11½ months	19.9	18.71	22	94.0	11.57	16.54	12 July
17A	Do.	24A	15-9-09	do.	20.6	19.38	23	94.0	11.12	17.22	12 July
18A	Do.	24B	15-9-09	do.	20.7	19.46	24	94.0	12.28	17.07	12 July
19A	Trinidad	Trinidad S. 60	15-9-09	do.	20.7	19.71	16	95.2	10.67	17.01	30 May
25A	New Guinea	New Guinea 4	15-9-09	do.	20.1	19.00	09	94.5	10.82	16.94	
26A	Mauritius	Bois Ronce	15-9-09	do.	20.6	19.12	29	92.8	11.55	16.91	18 May
27A	Do.	Settlers	16-9-09	do.	19.7	18.35	26	93.1	11.27	16.23	25 May
28A	New Guinea	New Guinea 8A	16-9-09	do.	20.7	19.28	21	93.1	9.15	17.51	18 May
29A	Do.	15	16-9-09	do.	22.0	20.69	13	94.0	11.42	18.33	24 Aug.
30A	Do.	64	16-9-09	do.	19.4	18.11	58	93.3	10.52	16.15	1 July

FINAL EXAMINATION OF NON-IRRIGATED THIRD RATOON CANE: PLATS WITH MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—SEPTEMBER, 1909.

1	New Guinea	New Guinea 24	16-6-09	11½ months	20.2	19.06	33	94.3	10.29	17.10	12 July
2	Do.	24A	16-6-09	do.	20.2	19.00	34	94.9	10.40	17.02	12 July
3	Do.	24B	16-6-09	do.	19.3	18.48	50	95.7	10.32	16.57	12 July
4	Trinidad	Trinidad S. 60	16-6-09	do.	19.6	18.38	26	93.7	11.48	16.27	18 July
10	New Guinea	New Guinea 4	17-9-09	do.	18.4	16.86	57	91.5	11.00	15.00	
11	Mauritius	Bois Ronce	17-9-09	do.	20.9	19.82	26	94.8	11.33	17.57	18 May
12	Do.	Settlers	17-9-09	do.	19.1	17.35	54	90.8	11.06	15.43	
13	New Guinea	New Guinea 8A	17-9-09	do.	21.7	20.22	25	93.1	8.47	18.51	18 May
14	Do.	15	17-9-09	do.	22.1	20.95	23	94.7	10.68	18.71	
15	Do.	64	17-9-09	do.	16.3	13.16	98	80.7	10.25	11.81	24 Aug.

FINAL EXAMINATION OF NON-IRRIGATED THIRD RATOON CANE: PLATS, NO MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—SEPTEMBER, 1909.

1A	New Guinea	New Guinea 24	16-9-09	11½ months	20.3	19.20	22	94.5	11.97	16.90	12 July
2A	Do.	24A	16-9-09	do.	20.3	18.30	29	92.6	11.58	16.62	12 July
3A	Do.	24B	16-9-09	do.	20.0	18.50	31	92.5	11.48	16.38	12 July
4A	Trinidad	Trinidad S. 60	17-9-09	do.	19.8	18.74	17	94.6	10.65	16.74	30 May
10A	New Guinea	New Guinea 4	17-9-09	do.	19.4	18.24	10	94.0	11.27	16.18	
11A	Mauritius	Bois Ronce	17-9-09	do.	20.5	19.12	17	93.2	11.35	16.95	18 May
12A	Do.	Settlers	17-9-09	do.	20.4	18.67	26	91.5	12.62	16.31	25 May
13A	New Guinea	New Guinea 8A	17-9-09	do.	21.2	19.87	19	93.7	9.64	17.95	18 May
14A	Do.	15	17-9-09	do.	21.5	20.22	20	94.0	12.47	17.70	24 Aug.
15A	Do.	16	17-9-09	do.	17.1	15.08	98	88.1	10.36	13.43	1 July

Below is given the average analyses of the canes under the four sets of conditions, in which, this year, it is shown that while the manures have caused as before a slight lowering of the purity of the juice, irrigation as compared with no irrigation has not had the same effect, the results being slightly higher on the irrigated side. This could be due to the continued non-cultivation of the irrigated plats.

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 Quotient of Purity.
Irrigated Plats; mixed manures	20.3	18.83	92.7
Irrigated Plats; no manures	20.4	19.18	94.0
Non-irrigated Plats; mixed manures	19.8	18.33	92.5
Non-irrigated Plats; no manures	20.0	18.64	93.2

On completion of the analyses the balance of the cane was cut and delivered to Meadowlands Mill, the weights obtained on the station weighbridge being checked by the mill weighbridge. We may present the crop results of the varieties under the four sets of conditions in the form shown hereunder:—

CROP RESULTS: THIRD RATOON CANE OF THE TEN BEST VARIETIES FROM DIFFERENT COUNTRIES.

1.—IRRIGATED PLATS: MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—1909.

No. of Plat.	Country.	No. or Name of Variety.	Age of Cane.	No. of Cans 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.	
16	New Guinea	N. Guinea	24	11½ mo's	37,679	2.9	49.0	18,342	8.1
17	Do.	21A	do.	30,709	3.0	41.7	15,613	6.9	
18	Do.	24B	do.	31,145	2.5	36.0	13,211	5.8	
19	Trinidad	Trinidad S.	60	do.	29,185	2.5	32.6	11,694	5.2
25	New Guinea	N. Guinea	4	do.	51,836	1.1	27.2	10,562	4.7
26	Mauritius	Bois Rouge	...	do.	42,035	1.7	32.2	12,473	5.5
27	Do.	Settlers	...	do.	44,866	1.1	22.5	8,342	3.7
28	New Guinea	N. Guinea	8A	do.	43,560	2.3	45.6	17,252	7.7
29	Do.	15	do.	33,105	2.4	35.6	15,081	6.7	
30	Do.	64	do.	20,255	3.2	28.9	9,664	4.3	

2.—IRRIGATED PLATS: NO MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL. THIRD RATOONS—1909.

16A	New Guinea	N. Guinea	24	11½ mo's	26,571	2.1	25.8	9,582	4.2
17A	Do.	24A	do.	27,442	2.2	27.2	10,501	4.6	
18A	Do.	24B	do.	28,096	1.5	19.5	7,472	3.3	
19A	Trinidad	Trinidad S.	60	do.	34,848	1.5	24.5	9,665	4.3
25A	New Guinea	N. Guinea	4	do.	39,639	0.8	14.7	5,667	2.5
26A	Mauritius	Bois Rouge	...	do.	28,967	0.8	10.9	4,161	1.8
27A	Do.	Settlers	...	do.	39,204	1.0	17.6	6,453	2.8
28A	New Guinea	N. Guinea	8A	do.	27,225	1.7	20.8	8,161	3.6
29A	Do.	15	do.	25,917	1.7	19.7	8,104	3.6	
30A	Do.	64	do.	18,948	1.8	15.6	5,662	2.5	

3.—NON-IRRIGATED PLATS: MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL. THIRD RATOONS—1909.

No. of Plat.	Country.	No. or 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	New Guinea	N. Guinea 24	11½ mo's	37,243	2·7	46·2	17,727	7·9
2	Do.	24A	do.	34,194	2·4	37·8	14,420	6·4
3	Do.	24B	do.	32,016	3·0	43·5	16,168	7·2
4	Trinidad	Trinidad S. 60	do.	26,353	2·3	27·4	9,992	4·4
10	New Guinea	N. Guinea 4	do.	47,698	1·4	31·3	10,519	4·6
11	Mauritius	Bois Rouge	do.	45,084	1·8	37·7	14,847	6·6
12	Do.	Settlers	do.	33,976	1·2	19·0	6,586	2·9
13	New Guinea	N. Guinea 8A	do.	33,974	2·3	35·7	14,836	6·6
14	Do.	15	do.	40,293	2·3	42·8	17,970	8·0
15	Do.	64	do.	26,353	3·2	38·1	10,083	4·5

4.—NON-IRRIGATED PLATS: NO MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL; THIRD RATOONS—1909.

1A	New Guinea	New Guinea 24	11½ mo's	31,798	1·7	24·5	9,275	4·1
2A	Do.	24A	do.	23,522	1·9	20·4	7,601	3·3
3A	Do.	24B	do.	29,838	1·8	24·8	9,132	4·0
4A	Trinidad	Trinidad S. 60	do.	26,136	1·7	20·8	7,802	3·4
10A	New Guinea	New Guinea 4	do.	45,738	1·3	27·2	9,867	4·4
11A	Mauritius	Bois Rouge	do.	35,283	1·1	18·1	6,903	3·0
12A	Do.	Settlers	do.	21,780	1·3	12·9	4,724	2·1
13A	New Guinea	New Guinea 8A	do.	24,829	1·6	17·8	7,193	3·2
14A	Do.	15	do.	23,086	2·1	21·9	8,712	3·8
15A	Do.	64	do.	13,503	1·6	10·2	3,071	1·3

The average results are given in the summary table below—

SUMMARY TABLE.

AVERAGE OF RESULTS FROM THE THIRD RATOONS 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	35·13	13,223	5·86
Irrigated plats: no manures; other conditions of cultivation being equal	19·63	7,536	3·32
Non-irrigated plats: mixed manures; other conditions of cultivation being equal	35·95	13,314	5·91
Non-irrigated plats: no manures; other conditions of cultivation being equal	19·86	7,428	3·26

From the above average table it will be at once noticed that the manures have again given most striking results, and seeing that the whole of these plats when taken together in this manner cannot be called "garden plats" or a "few feet of cane," but in reality occupy over 3 acres, very fair deductions are enabled to be drawn. Referring to the tables of crop results it will be seen that the largest increase due to manuring the third ratoons this year is in the non-irrigated plats of New Guinea 64, where the increase due to the use of fertilisers is 27·9 tons per acre of cane more than on the plat where no manures were used, the irrigated and manured plat of New Guinea 8A coming next with an increase of 24·8 tons of cane per acre more than on the irrigated and unmanured plat of the same variety.

Returning to the table furnishing the average results it appears that the total increase due to manures over all the irrigated plots amounts to 15½ tons of cane per acre and 2½ tons of sugar per acre, while the difference due to fertilising on the non-irrigated plots is as large as 16½ tons of cane per acre and 2½ tons of sugar per acre.

These results are sufficiently remarkable, and it is only fair to recognise that they were predicted by the late Director, Dr. W. Maxwell, before the plant crop was put in. They should certainly encourage every farmer to persevere with manuring combined with good cultivation.

As pointed out last year, had these experiments been carried out with the best of the New Guinea varieties only, the average difference due to fertilising would have been very much larger. Unfortunately the Mauritius and Trinidad canes, with the two poorer New Guinea canes—namely, 4 and 64—have given much lower results than were at first anticipated.

The average increase given by the use of manures during the currency of the four crops—namely, plant, first, second, and third ratoons—is shown below:—

TABLE SHOWING THE AVERAGE INCREASE DUE TO MANURES IN THE PLANT AND SUCCESSIVE, FIRST, SECOND, AND THIRD RATOON CROPS—1906-1909.

PLANTS.	1906. PLANT CROP.			1907. FIRST RATOON CROP.			1908. SECONDED RATOON CROP.			1909. THIRD RATOON CROP.		
	Manures.	No Manures.	Difference.	Manures.	No Manures.	Difference.	Manures.	No Manures.	Difference.	Manures.	No Manures.	Difference.
Irrigated	58.4	54.1	4.3	41.9	32.6	9.3	39.5	24.0	15.5	35.1	19.6	15.5
Non-irrigated	50.7	47.4	3.3	42.4	31.7	10.7	38.8	24.1	14.7	35.9	19.8	16.1

The increase in the plant crop, when the land had been freshly subsoiled and had previously been treated with burnt lime to neutralise any disease remaining in the land from the previous crop of Rose Bamboo, was very small. It was explained at the time that the action of the deep ploughing combined with the lime would cause a large amount of the chemical plant food elements to be brought into a soluble and available condition for the use of the crop. The difference, therefore, between manured and unmanured cane in the plant crop, was not very striking. In the first ratoon crop, however, the increase is more substantial, while it reaches the most satisfactory levels in the second and third ratoons, where the increase of cane, owing to manuring, varies between 14½ tons of cane per acre and 16½ tons of cane per acre. As the manure applied, which consists of nitrate of soda, sulphate of ammonia, sulphate of potash, and superphosphate costs something less than £4 per acre, these results would pay any farmer at present prices very handsomely. Farmers may obtain advice and formulas for manuring their lands by application to the Sugar Experiment Station, Mackay.

In order to make room for new experiments, and with the object of giving the main experiment area a short spell, these tests have now been brought to a close.

The competition of the ten best varieties from different countries under the above conditions has very markedly brought out one fact, which is that the canes selected from the Mauritius and West Indian varieties (at that time growing on the Station), to represent their countries, are, when brought into competition with the best of the New Guinea canes, found to be below the latter both as sugar and weight producers.

We may fitly conclude the account of these experiments by providing a table showing the total results of the four crops under the four sets of conditions:—

TOTAL RESULTS OF THE TEN BEST VARIETIES FROM DIFFERENT COUNTRIES, COVERING PLANT, FIRST, SECOND, AND THIRD RATOON CROPS 1906-1909, UNDER THE FOUR SETS OF CONDITIONS.

NUMBER OR NAME OF VARIETY.	IRRIGATED PLOTS.						NON-IRRIGATED PLOTS.					
	MIXED MANURES.			NO MANURES.			MIXED MANURES.			NO MANURES.		
	Total Cane per Acre, English Tons (4 Crops).	Total Cane per Acre, Pounds (4 Crops).	Total Sugar per Acre, English Tons (4 Crops).	Total Cane per Acre, English Tons (4 Crops).	Total Sugar per Acre, Pounds (4 Crops).	Total Sugar per Acre, English Tons (4 Crops).	Total Cane per Acre, English Tons (4 Crops).	Total Sugar per Acre, Pounds (4 Crops).	Total Sugar per Acre, English Tons (4 Crops).	Total Cane per Acre, English Tons (4 Crops).	Total Sugar per Acre, Pounds (4 Crops).	Total Sugar per Acre, English Tons (4 Crops).
New Guinea 21	25.83	51,332	38.2	102.1	51,556	27.2	22.2	77,336	11.5	102.6	49,012	11.8
24a	210.9	55,507	33.7	171.4	61,960	23.3	18.9	60,460	23.6	194.3	55,135	24.0
24b	206.2	75,629	34.5	154.4	47,335	23.3	22.3	72,472	32.5	130.4	55,250	24.6
Trinidad Seedling 80	199.0	65,406	20.2	197.5	69,362	22.7	12.3	39,311	17.4	122.7	44,169	13.0
New Guinea 4	157.2	57,317	25.4	111.1	19,332	18.2	17.4	41,743	21.6	152.8	51,328	22.9
Mauritius Bois Rouge	154.2	61,080	26.7	114.3	42,467	19.9	16.5	63,730	28.5	114.2	41,019	19.5
Do. Settlers	140.4	32,500	22.1	59.6	31,373	25.5	14.5	42,368	18.7	79.4	29,865	13.3
New Guinea 85	129.5	63,282	24.2	126.9	61,775	19.9	15.7	60,325	26.5	109.6	42,349	19.1
15	146.4	71,798	32.0	135.2	64,559	24.1	18.7	89,225	35.8	139.5	65,101	23.5
64	168.9	47,261	21.9	108.2	34,698	15.9	14.6	46,325	20.7	96.5	33,316	14.6

From the above we find that the relative agricultural and commercial values of these canes at the Experiment Station are as follows:—

- First.—New Guinea 24 (Goru or Farmers' Glory);
- Second.—New Guinea 24A;
- Third.—New Guinea 24B;
- Fourth.—New Guinea 15 or Badila, which however beats New Guinea 24B in total tonnage of sugar per acre;
- Fifth.—New Guinea 8A;
- Sixth.—New Guinea 4;
- Seventh and Eighth.—Trinidad Seedling 60 and Mauritius Bois Rouge are a tie as far as weight of cane per acre are concerned, but the Bois Rouge has produced more sugar per acre;
- Ninth.—New Guinea 64;
- Tenth.—Mauritius Settlers.

SUBSOILING AND CULTIVATION EXPERIMENT WITH CANE KNOWN AS NEW GUINEA No. 40 (THIRD 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 in. of true soil, was divided into ten plats, and planted with the variety known as New Guinea 40. The analyses of these canes is shown in the following table:—

FIRST PRELIMINARY EXAMINATION OF THIRD RATOON CANE, NEW GUINEA 40—JULY, 1909.

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	7-7-09	9½ months	17.5	15.51	.98	88.6
Not subsoiled and not cultivated	7-7-09	do.	16.1	13.88	1.02	86.2

SECOND PROGRESSIVE EXAMINATION OF THIRD RATOON CANE, NEW GUINEA 40—AUGUST 1909.

Subsoiled and cultivated	4-8-09	10½ months	18.5	17.04	.34	92.1
Not subsoiled and not cultivated	4-8-09	do.	18.1	16.55	.42	91.4

FINAL EXAMINATION OF THIRD RATOON CANE, NEW GUINEA 40—SEPTEMBER, 1909.

Conditions of Experiments.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Fibre in Cane.	Sucrose in Cane.	Date of Arrowing.
Subsoiled and cultivated	17-9-09	11½ mo's	18.8	17.94	.21	95.4	11.51	15.87	...
Not subsoiled and not cultivated	15-9-09	do.	19.0	17.83	.17	93.8	11.79	15.73	..

These plats cover the largest amount of ground on the station. They were neither manured nor irrigated, the sole difference lying in the cultivation. One series of plats was ploughed and subsoiled in the same way as treating other ratoons before spoken of, while the cane on the other plats received no treatment beyond keeping the ground free from weeds. The crop results from this third ratooning appear in the following table:—

CROP RESULTS OF NEW GUINEA 40: THIRD RATOONS—1909.

No. 1.—PLATS WITHOUT IRRIGATION AND MANURES, BUT SUBSOILED.

Plat Numbers.	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.
5 to 9	New Guinea 40	11½ months	28,513	1.6	20.4	7,258	3.2

No. 2.—PLATS WITHOUT IRRIGATION AND MANURES, AND NOT SUBSOILED.

20 to 24	New Guinea 40	11½ months	24,393	0.9	9.91	3,494	1.5
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The difference due to recent cultivation on the one side as opposed to no cultivation at all on the other has this year amounted to $10\frac{1}{2}$ tons of cane. The difference due to the same causes totalled from the first, second, and third ratoon crops amounts to $34\frac{1}{2}$ tons of cane per acre. This experiment attracted a great deal of attention from visiting farmers, who right through the progress of the two crops, could very easily see what a marked effect cultivation was having on the cane plants.

CONCLUSION OF 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 third 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.)
1905.				
3 April	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	14,920	1 2
4. Plants 18 inches apart	3,867	11,602	0 16
5. Plants 24 inches apart	3,168	9,501	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 Eys 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 details of cultivation of the distance experiments as a third ratoon crop were precisely similar to what has already been described in connection with the non-irrigated plats of the third ratoons of the ten best varieties from different countries, except that all the plats of the distance experiments were fertilised uniformly. Irrigation was not used. Should any comparison be attempted of the yields of these experiments with third ratoons in other experiments, it must be recollected (omitting any other factors) that the present experiment has been carried out on land that had not been previously cropped for some years.

The preliminary and final analyses of the juice, and estimation of fibre from the respective plats, were carried out as usual, and the results are given in the columns below:—

FIRST PRELIMINARY EXAMINATION OF THIRD RATOON CANE IN THE DISTANCE EXPERIMENTS—JULY, 1909.

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	... ..	16-7-09	9½ months	15.4	11.64	2.23	75.5
40	Plants 6 inches apart	... ..	16-7-09	do. ...	16.1	13.20	1.56	81.9
40	Plants 12 inches apart	... ..	16-7-09	do. ...	14.6	10.88	2.31	74.5
40	Plants 18 inches apart	... ..	16-7-09	do. ...	16.1	13.28	1.71	82.4
40	Plants 24 inches apart	... ..	19-7-09	do. ...	15.4	12.26	1.67	79.6
40	Plants 36 inches apart	... ..	19-7-09	do. ...	15.4	12.10	1.78	78.5

SECOND SERIES.

New Guinea 24A	4 feet	... ..	16-7-09	9½ months	16.9	13.45	1.87	79.5
24A	5 feet	... ..	16-7-09	do. ...	18.0	17.51	0.54	92.6
24A	6 feet	... ..	16-7-09	do. ...	18.5	16.51	0.79	89.2
24A	7 feet	... ..	16-7-09	do. ...	19.1	17.70	0.46	92.6

SECOND PROGRESSIVE EXAMINATION OF THIRD RATOON CANE IN THE DISTANCE EXPERIMENTS—AUGUST, 1909.

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.
FIRST SERIES.								
New Guinea 40	Continuous stick in the row	... ..	10-8-09	10½ months	16.9	14.33	.95	84.7
40	Plants 6 inches apart	... ..	10-8-09	do. ...	17.9	15.61	.79	87.2
40	Plants 12 inches apart	... ..	10-8-09	do. ...	16.6	13.66	1.26	82.2
40	Plants 18 inches apart	... ..	10-8-09	do. ...	17.7	15.75	.75	88.9
40	Plants 24 inches apart	... ..	10-8-09	do. ...	17.1	14.60	1.11	85.3
40	Plants 36 inches apart	... ..	10-8-09	do. ...	18.0	16.38	.53	91.0

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	...	...	...	...	...	10-8-09	10½ months	19.2	17.09	.58	89.0
24A	5 feet	...	...	...	...	...	10-8-09	do. ...	19.5	17.68	.53	90.6
24A	6 feet	...	...	...	...	...	10-8-09	do. ...	19.7	18.16	.42	92.1
24A	7 feet	...	...	...	...	...	10-8-09	do. ...	18.6	15.79	1.11	84.8

FINAL EXAMINATION OF THIRD RATOON CANE IN THE DISTANCE EXPERIMENTS—SEPTEMBER, 1909

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.	Fibre in Cane.	Sucrose in Cane.	Date of Harvesting.
New Guinea 40	Continuous stick in the row	20-9-09	11½ mo's	18.1	15.64	1.02	86.4	12.45	13.69	
40	Plants 6 inches apart	20-9-09	do. ...	18.6	16.32	.94	87.7	10.81	14.56	
40	Plants 12 inches apart	20-9-09	do. ...	18.0	15.61	.98	86.6	11.75	13.77	
40	Plants 18 inches apart	20-9-09	do. ...	18.2	16.41	.82	90.1	11.90	14.46	
40	Plants 24 inches apart	20-9-09	do. ...	18.6	16.72	.64	89.8	12.00	14.71	
40	Plants 36 inches apart	17-9-09	do. ...	18.5	16.91	.52	91.4	12.50	14.80	

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.	Fibre in Cane.	Sucrose in Cane.	Date of Harvesting.
New Guinea 24A	4 feet	20-9-09	11½ mo's	19.8	18.10	.39	91.4	11.08	16.09	
24A	5 feet	20-9-09	do. ...	19.2	17.62	.53	91.7	9.92	15.87	
24A	6 feet	20-9-09	do. ...	19.0	17.01	.55	89.5	10.39	15.24	
24A	7 feet	20-9-09	do. ...	19.0	16.74	.75	88.1	10.04	15.06	

At the beginning of October the balance of the crop not used for analyses was cut and delivered to Meadowlands Mill, the crop results appearing hereunder:—

CROP RESULTS OF THE DISTANCE EXPERIMENTS: THIRD RATOONS—1909.

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	11½ mo's	58,588	2.0	54.4	16,697	7.4
2. Plants 6 inches apart	40	do.	42,038	2.8	53.7	17,524	7.8
3. Plants 12 inches apart	40	do.	41,817	2.7	51.0	15,745	7.0
4. Plants 18 inches apart	40	do.	39,837	2.1	38.1	12,345	5.5
5. Plants 24 inches apart	40	do.	43,560	2.4	48.3	15,922	7.1
6. Plants 36 inches apart	40	do.	38,115	1.9	33.2	11,024	4.9

SECOND SERIES.

Distance between the Rows.	Name of Variety.	Age of Cane.	Number of Acres 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	11½ mo's	46,554	2.7	57.8	20,851	9.3
2. 5 feet apart	24A	do.	31,145	3.3	46.9	16,694	7.4
3. 6 feet apart	24A	do.	25,591	3.2	36.8	12,585	5.6
4. 7 feet apart	24A	do.	26,445	2.9	35.0	11,807	5.2

This year the experiments have again closely followed those obtained in the three previous crops. The plat in which the sets were planted continuously have given the highest yield of cane in the first series, although the yield of sugar is slightly below the plat where the sets were planted 6 in. apart.

In the first series the plat planted with continuous sets in the row has given $21\frac{2}{10}$ tons of cane and $2\frac{1}{2}$ tons of sugar more per acre than the plat in which the plants were placed 36 in. apart. While the gradation in the yield of cane per acre over the first series is fairly regular (excluding Plat 4 which behaved irregularly as it also did in the second ratoon crop), the gradation in the yield of sugar is not quite so exact.

In the second series the cane planted in rows 4 ft. apart has given for the third ratoon crop this year an increased yield of $22\frac{2}{10}$ tons of cane and $4\frac{1}{10}$ tons of sugar per acre over the plat where the cane was planted in rows 7 ft. apart. The gradation in this series, both in tonnage of cane and yield of sugar, is remarkably even through the plats planted with rows 4, 5, and 6 ft. apart respectively, but only a small difference is noticed between the 6 and 7 ft. rows.

This experiment is now concluded, and the total results of the plant, first, second, and third ratoons are furnished in the table given hereunder:—

TOTAL RESULTS OF THE DISTANCE EXPERIMENTS: COVERING PLANT, FIRST, SECOND, AND THIRD
RATOON CROPS—1906-1909.

FIRST SERIES.

Distance between the Plants in the Row.	Name of Variety.	Total Cane per Acre, English Tons (4 Crops).	Total Sugar per Acre in Pounds (4 Crops).	Total Sugar per Acre, English Tons (4 Crops).
1. Continuous stick in the row	New Guinea 40	201.6	63,113	28.1
2. Plants 6 inches apart	40	198.8	62,214	27.7
3. Plants 12 inches apart	40	186.2	58,328	26.0
4. Plants 18 inches apart	40	166.0	56,619	25.2
5. Plants 24 inches apart	40	177.7	57,157	25.5
6. Plants 36 inches apart	40	152.1	51,285	22.8

SECOND SERIES.

Distance between the Rows.	Name of Variety.	Total Cane per Acre, English Tons (4 Crops).	Total Sugar per Acre in Pounds (4 Crops).	Total Sugar per Acre, English Tons (4 Crops).
1. 4 feet apart	N. Guinea 24A	246.2	86,392	38.5
2. 5 feet apart	24A	208.4	76,514	33.6
3. 6 feet apart	24A	190.8	65,447	29.1
4. 7 feet apart	24A	181.0	64,462	28.7

From this table our final and definite conclusions must be made, and the advantage to be derived from wide and narrow planting, and using more or less seed per acre, will be found. Commencing by taking the first series we find that the total cane and sugar per acre produced by the four crops shows us that the plot in which the sets were placed continuously in rows 5 ft. apart has produced—

First.—An increase above the yield from plants placed 6 in. apart in the row amounting to $2\frac{8}{10}$ tons of cane and 8 cwt. of sugar per acre, for an expenditure of 20 cwt. more seed per acre.

Second.—An increase above the yield from plants placed 12 in. apart in the row amounting to $15\frac{4}{10}$ tons of cane and $2\frac{1}{10}$ tons of sugar per acre, for an expenditure of 28 cwt. more seed per acre.

Third.—An increase above the yield from plants placed 18 in. apart in the row amounting to $35\frac{6}{10}$ tons of cane and $2\frac{2}{10}$ tons of sugar per acre, for an expenditure of 34 cwt. more seed per acre.

Fourth.—An increase above the yield from plants placed 24 in. apart in the row amounting to $23\frac{6}{10}$ tons of cane and $2\frac{6}{10}$ tons of sugar per acre, for an expenditure of 36 cwt. more seed per acre, and

Fifth.—An increase above the yield from plants placed 36 in. apart in the row amounting to $49\frac{1}{2}$ tons of cane and $5\frac{3}{10}$ tons of sugar per acre, for an expenditure of 40 cwt. more seed per acre.

NOTE.—All rows in above series were 5 ft. apart.

This series has been somewhat upset by the irregular behaviour of Plat No. 4, where the plants were placed 18 in. apart. This is thought to be due to the depredations of water fowl and other vermin. In other respects the results are very conclusive.

When we consider the results from the second series it must be remembered that a superior variety of cane was here used. This series has from the beginning given more uniform and striking results. The total crop yields from the plant and three ratoons may be summarised as follows:—

The cane planted in rows 4 ft. apart has produced—

First.—An increase above the yield from the cane planted in rows 5 ft. apart amounting to $37\frac{8}{10}$ tons of cane and $4\frac{1}{10}$ tons of sugar per acre, for an expenditure of 8 cwt. more seed per acre.

Second.—An increase above the yield from cane planted in rows 6 ft. apart amounting to $55\frac{4}{10}$ tons of cane and $9\frac{1}{10}$ tons of sugar per acre, for an expenditure of 14 cwt. more seed per acre, and

Third.—An increase above the yield from cane planted in rows 7 ft. apart amounting to $65\frac{2}{10}$ tons of cane and $9\frac{4}{10}$ tons of sugar per acre, for an expenditure of 16 cwt. more seed per acre.

It is therefore evident, on comparing the two series, that the variation in distance between the rows has a far more important bearing on the yield than the variation of the plants in the rows, while at the same time the expenditure of seed is not nearly so large.

The conclusions which may be safely drawn from these experiments at Mackay are, therefore:—

Firstly.—Plants with three eyes placed 6 in. apart in the row, or even closer, is found to be the best method of planting the sets in the row.

Secondly.—Any increase in distance between the rows exceeding 5 ft. is likely to result in a low weight of cane and yield of sugar per acre, while 4 ft. between the rows has been found to result in a considerable increase both of cane and sugar.

It must, however, be carefully borne in mind that these experiments must be considered as applicable only to Mackay district in normal years. In the North, with its heavy rainfalls and moist humid conditions, thick planting may not be at all advisable, while south of Mackay, where droughts are not uncommon, a wider distance, providing more moisture for the cane, may be imperative.

CONTINUATION OF EXPERIMENTS WITH (a) TEN HAMBLEDON QUEENSLAND SEEDLINGS, (b) BARBADOS 208, AND AN UNKNOWN CANE FROM SOUTH AFRICA, AS A FIRST RATOON CROP.

(a) TEN HAMBLEDON QUEENSLAND SEEDLINGS.

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

The ratooning of these varieties took place in September, 1908, and consisted in first splitting out the middles with a swing plough followed by the subsoiler to a depth of 17 in. The furrows next to the cane were then ploughed on to the middles and again followed by the subsoiler, thus insuring all ground between the rows being thoroughly moved and stirred. The actual stole bed was next loosened,

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

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

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

The cane was not irrigated, and the weather experienced during the growth of the crop has already been described in connection with the fifth ratoon crop of New Guinea varieties. Due to the cool weather and small rainfall at the most critical time of the crop, a lighter yield than was hoped for resulted.

The analytical data comprising the preliminary, progressive, and final examinations of the varieties, with their fibre content, are submitted in the following tables:—

FIRST PRELIMINARY EXAMINATION OF TEN HAMBLEDON SEEDLINGS: FIRST RATOON CANE—
JUNE, 1909.

No. of Plt.	Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix).	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
1	Queensland	Hambledon, Queensland 5	7-6-09	9 months	13.5	7.40	3.57	54.8
2	Do. ...	10	7-6-09	do. ...	17.8	14.29	1.88	80.2
3	Do. ...	11	7-6-09	do. ...	18.5	16.14	1.13	87.2
4	Do. ...	62	7-6-09	do. ...	17.0	12.81	2.36	75.3
5	Do. ...	114	7-6-09	do. ...	17.0	13.79	1.82	81.1
6	Do. ...	172	7-6-09	do. ...	18.6	15.92	1.10	85.5
7	Do. ...	222	7-6-09	do. ...	15.9	11.97	2.23	75.2
8	Do. ...	243	7-6-09	do. ...	13.4	8.47	2.88	63.2
9	Do. ...	285	7-6-09	do. ...	18.6	16.55	.96	88.9
10	Do. ...	297	7-6-09	do. ...	19.1	16.67	1.24	87.2

SECOND PROGRESSIVE EXAMINATION OF TEN HAMBLEDON SEEDLINGS: FIRST RATOON CANE—JULY, 1909.

1	Queensland	Hambledon, Queensland 5	20-7-09	10 months	16.7	12.44	1.60	74.4
2	Do. ...	10	20-7-09	do. ...	19.0	17.26	.70	90.8
3	Do. ...	11	20-7-09	do. ...	19.4	18.06	.38	93.0
4	Do. ...	62	20-7-09	do. ...	18.8	16.33	1.10	86.8
5	Do. ...	114	20-7-09	do. ...	17.8	15.34	1.20	86.1
6	Do. ...	172	20-7-09	do. ...	19.9	18.41	.31	92.5
7	Do. ...	222	20-7-09	do. ...	18.3	16.44	.87	89.8
8	Do. ...	243	20-7-09	do. ...	14.7	10.66	2.40	72.5
9	Do. ...	285	20-7-09	do. ...	19.6	18.14	.48	92.5
10	Do. ...	297	20-7-09	do. ...	19.8	18.03	.59	91.0

THIRD PROGRESSIVE EXAMINATION OF TEN HAMBLEDON SEEDLINGS: FIRST RATOON CANE—
AUGUST, 1909.

No. of Plat.	Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
1	Queensland	Hambledon, Queensland 5	2 & 3-8-09	11 months	17.3	13.92	2.04	80.4
2	Do.	10	2 & 3-8-09	do.	20.1	18.87	.39	93.8
3	Do.	11	2 & 3-8-09	do.	19.6	18.32	.46	93.4
4	Do.	62	2 & 3-8-09	do.	18.6	16.34	1.11	87.8
5	Do.	114	2 & 3-8-09	do.	18.1	16.42	.89	90.7
6	Do.	172	2 & 3-8-09	do.	21.2	20.14	.16	95.0
7	Do.	222	2 & 3-8-09	do.	17.6	13.72	1.08	89.3
8	Do.	243	2 & 3-8-09	do.	16.3	12.60	2.29	77.3
9	Do.	285	2 & 3-8-09	do.	20.7	19.82	.24	95.7
10	Do.	297	2 & 3-8-09	do.	19.6	18.04	.49	92.0

FINAL EXAMINATION OF TEN HAMBLEDON SEEDLINGS: FIRST RATOON CANE—SEPTEMBER, 1909.

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.	Moisture in Cane.	Sucrose in Cane.	Date of Harvesting.
1	Queensland	Hambledon, Queensland 5	1-9-09	12 mo's	19.1	16.92	.85	88.5	12.74	14.76	18 May
2	Do.	10	1-9-09	do.	20.5	19.15	.28	93.4	11.17	17.01	24 Aug.
3	Do.	11	1-9-09	do.	17.2	16.02	.44	93.1	13.32	13.88	
4	Do.	62	1-9-09	do.	18.3	16.80	.51	91.8	12.41	14.71	18 May
5	Do.	114	1-9-09	do.	19.3	17.93	.29	92.9	12.61	15.67	1 July
6	Do.	172	1-9-09	do.	20.8	19.03	.35	91.4	13.08	16.54	18 May
7	Do.	222	1-9-09	do.	18.1	16.80	.59	91.7	9.36	15.05	1 July
8	Do.	243	1-9-09	do.	16.8	13.90	1.15	82.7	10.11	12.49	25 May
9	Do.	285	1-9-09	do.	19.7	18.56	.19	94.2	10.61	16.59	18 May
10	Do.	297	1-9-09	do.	19.5	17.60	.27	90.2	11.05	15.65	

In September, 1909, the balance of the crop was cut and sent to Meadowlands Mill, where it was weighed, the weights being checked on the station weighbridge. From an actual count of the canes, the sugar in cane, and the weight of the crop the following table of results has been compiled:—

CROP RESULTS—TEN HAMBLEDON SEEDLINGS—FIRST RATOONS, 1909.

No. of Plat.	Name of Variety.	Age of Cane.	No. of Canes per Acre.	Average Weight of the Sticks in pounds.	Weight of Cane per Acre in English tons.	Yield of Sugar per Acre in pounds.	Yield of Sugar per Acre in English tons.
1	Hambledon, Queensland 5	12 months	44,649	2.3	47.6	15,752	7.0
2	10	do.	44,431	1.7	34.7	18,225	5.9
3	11	do.	20,637	2.5	22.4	6,933	3.1
4	62	do.	27,442	2.4	29.9	9,867	4.4
5	114	do.	29,620	2.7	36.0	12,661	5.6
6	172	do.	26,136	2.3	27.8	10,338	4.6
7	222	do.	28,967	2.7	36.0	12,160	5.4
8	243	do.	27,878	2.8	35.3	9,901	4.4
9	285	do.	37,243	2.6	43.5	16,187	7.2
10	297	do.	35,283	2.5	40.8	14,315	6.3

From an examination of the above figures, it will be seen that on the whole these Hambleton seedlings are not particularly promising. Numbers 5, 10, 114, 222, and 285 are the healthiest, 297 is doubtful, while 11, 62, 172, and 243 show disease more or less strongly. Compared with the records of the New Guinea canes reserved for a fifth ratoon crop, they do not appear to be in the same class. However, two or three of the best of them will be distributed to other centres, where they may do better, although their history, where they have been tried in the North, to a great extent confirms the findings of the Mackay Station to date. The average weight of the stick of cane produced is on the light side, but is remarkably uniform in all the varieties. They possess one advantage compared with the Gorn class of cane, which is that they are nearly all erect in habit.

These varieties are now going forward as a second ratoon crop.

The following is a brief description of each variety:—

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

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

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

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

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

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

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

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

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

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

Dates of arrowing are given in final analyses table.

(b) BARBADOS 208 AND ONE UNKNOWN CANE FROM SOUTH AFRICA.

These two varieties had precisely the same treatment as the Hambleton Queensland seedlings.

The preliminary, progressive, and final analyses of juice, &c., together with the crop results, are given below:—

FIRST PRELIMINARY EXAMINATION OF BARBADOS 208, AND ONE UNKNOWN CANE FROM SOUTH AFRICA: FIRST RATOON CANE—JUNE, 1909.

No. of Plac.	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.
1	Barbados	Barbados 208	9-6-09	9 months	13.4	9.05	2.60	67.5
2	South Africa	South Africa 1	9-6-09	do. ...	17.0	13.37	1.69	78.6

SECOND PROGRESSIVE EXAMINATION OF BARBADOS 208, AND ONE UNKNOWN CANE FROM SOUTH AFRICA: FIRST RATOON CANE—JULY, 1909.

1	Barbados	Barbados 208	21-7-09	10 months	13.3	9.35	2.23	70.3
2	South Africa	South Africa 1	21-7-09	do. ...	19.3	16.68	1.08	86.4

FINAL EXAMINATION OF BARBADOS 208, AND ONE UNKNOWN CANE FROM SOUTH AFRICA: FIRST RATOON CANE—AUGUST, 1909.

No. of Plac.	Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Fibre in Cane.	Sucrose in Cane.
1	Barbados	Barbados 208	20-8-09	11 mo's	16.5	14.47	.98	87.6	11.32	12.83
2	South Africa	South Africa 1	20-8-09	do.	20.5	18.80	.39	91.7	12.30	16.49

CROP RESULTS: BARBADOS 208 AND ONE UNKNOWN CANE FROM SOUTH AFRICA CALLED
"S.A. No. 1," FIRST RATOONS—1909.

No. of Plots.	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.
1	Barbados No. 208	11 months	30,492	2.5	35.3	10,171	4.5
2	"S.A. No. 1"	do.	36,154	2.8	46.2	17,695	7.6

These two varieties will not be continued as a second ratoon crop, owing to the prevalence of disease in the cane. Fresh seed of B. 208 has been obtained from the Herbert River, which will be given a further trial, owing to the splendid record this cane has in some parts of Queensland, and also in its home, the West Indies. The South African cane is very similar to, and probably is, White Bamboo. The weight results were good, but the cane was fast going off, and behaving in a similar way to White Bamboo previously on the station.

SURPLUS CANE SENT TO MEADOWLANDS MILL.

All cane not required for distribution, planting, and analyses, was, as usual, forwarded to Meadowlands Mill, the current market price of 14s. per ton being received for same. The total tonnage sold was 138 tons 16 cwt. 2 qr., which was cut from an area of $4\frac{3}{4}$ acres, being an average of 32 tons per acre. As the bulk of the cane was third ratoons, this result is satisfactory.

Area of cane sold	... ..	$4\frac{3}{4}$ acres
Tonnage	... ..	138 tons 16 cwt. 2 qr.
Value, including bounty	... ..	£145 15s. 3d.

The following table is an abstract of weather observations made at the Mackay Station during the growth of the experiment crops:—

ABSTRACT OF METEOROLOGICAL OBSERVATIONS TAKEN AT THE SUGAR EXPERIMENT STATION, MACKAY, FROM 1ST SEPTEMBER, 1908, TO 30TH SEPTEMBER, 1909: COVERING PERIOD OF GROWTH OF EXPERIMENT CROPS.

Month.	Rainfall.	AIR TEMPERATURE.							SOIL TEMPERATURES, 6 INCHES DEEP AT SUNRISE.			Inches of Water Applied to Irrigated Plots, Third Ratoons.	For Cent. of Soil Moisture on Irrigated Plots of Third Ratoons.	Mean Relative Humidity of the Air Saturated, equalling 100 at 8 A.M.	Mean Daily Evaporation in Cubic Inches.	Lowest Grass Temperatures 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.
1908.																	
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
October ...	2.21	84.4	75.0	79.1	69.6	43.6	61.4	17.7	70.2	68.3	66.6	67.2	...	19.2	63.6	0.299	37.6
November	4.48	89.0	79.4	81.9	72.5	58.6	60.5	16.4	74.4	72.0	71.0	70.8	2.0	22.0	62.2	0.318	53.0
December	0.19	94.2	81.3	86.0	74.5	60.2	67.1	19.8	77.0	77.0	71.0	75.0	3.0	20.1	56.1	0.411	55.6
1909.																	
January..	18.48	97.7	75.6	85.8	77.5	61.4	71.0	14.6	78.3	80.0	78.0	75.8	1.0	30.4	71.0	0.350	55.2
February	2.18	91.4	82.2	85.3	74.0	62.1	69.0	16.3	77.1	78.5	75.5	76.5	1.0	20.0	71.2	0.256	65.6
March ...	9.92	85.5	72.6	82.5	74.0	62.8	69.3	13.2	75.9	76.0	74.0	75.1	...	22.7	78.0	0.223	60.1
April ...	2.87	85.9	74.0	81.0	68.6	48.2	63.9	17.1	72.4	73.5	68.5	70.1	...	20.4	72.2	0.207	42.1
May ...	1.47	84.1	71.1	78.1	66.2	49.0	57.1	21.6	67.6	71.6	65.0	69.1	...	18.8	73.3	0.212	41.2
June ...	1.89	79.0	64.4	74.0	66.2	40.8	54.3	19.7	64.1	70.0	59.0	64.7	...	20.8	80.5	0.154	34.4
July ...	4.27	79.1	67.4	72.4	67.0	38.1	51.8	20.6	62.1	68.0	58.4	63.1	...	21.2	74.5	0.200	31.1
August ...	0.80	83.1	67.5	76.6	65.0	36.6	56.9	19.7	66.7	69.0	65.0	67.5	...	19.8	74.7	0.224	30.2
September	0.62	87.3	66.0	78.8	65.9	39.5	54.1	24.7	66.4	64.4	59.1	61.7	...	18.0	62.6	0.283	31.9
Total ...	46.84	...	...	...	...	...	...	...	...	...	...	...	7.0	...	...	...	...

NEW EXPERIMENTS ALREADY INITIATED AND TO BE UNDERTAKEN.

EXPERIMENTS WITH SIX NEW QUEENSLAND SEEDLINGS, MAURITIUS MALAGACHE, AND BARBADOS 147.

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

Sufficient cane having been propagated from the sets originally purchased by the end of July, 1909, these varieties were planted out under experimental conditions at the end of that month. The treatment of the land was as follows:—After removal of stoles and rubbish from the previous crop, the

land was deeply ploughed to turn soil so as to admit sun and air to do their restorative work and sweeten the soil. About two months afterwards the ground was again deeply ploughed and subsoiled. This was followed by the sowing of a crop of Mauritius Bean in November, 1908. By the beginning of May, 1909, a splendid crop of green manure, standing 3 ft. high, was ploughed under, which crop took two months to thoroughly rot down below the surface. Two further cross ploughings were now given, and the cane was planted in drills 5 ft. apart, the plants having three eyes, and being placed 6 in. apart. Subsequent surface cultivation is now being done with the Planet Junior cultivator, fitted with the broad duck-foot hoes in the manner and for the reasons given in the account of the Hambledon seedlings. These varieties will be fertilised, but not irrigated. On the same piece of ground is also planted Mauritius Malagache and Barbados 147, so that the whole of these eight varieties will be in competition with one another.

The result of these experiments will come to hand next year, and, with the succeeding ratoon crops, will determine their suitability as croppers and sugar producers. The best all-round cane of the Queensland seedlings so far as present observation goes is Queensland 116. It is a stout erect cane of good sugar content. It has the disadvantage of being the first cane on the station to arrow, but this does not appear to affect its analysis. Queensland 102 is a fine stout pleasing cane, but its analysis does not hold out the same promise as the Q. 116. The following table gives the result of analyses made of the first ratoons of these varieties in September, 1909:—

ANALYSES OF QUEENSLAND SEEDLINGS: FIRST RATOON CROP—SEPTEMBER, 1909.

Variety of Cane.						Date of Analysis.	Age of Cane.	Density of Juice (Brix).	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Date of Arrowing.
Queensland	6	...	...	...	...	21-9-09	13 months	20.5	19.20	.19	93.6	31 July
	30	...	...	...	...	21-9-09	do.	19.2	18.15	.14	94.5	1 July
	102	...	...	...	...	21-9-09	do.	18.6	15.79	.91	84.8	5 July
	116	...	...	...	...	21-9-09	do.	21.5	19.75	.13	91.8	9 May
	121	...	...	...	...	21-9-09	do.	19.9	18.39	.19	92.4	18 July
	176	...	...	...	...	21-9-09	do.	20.8	19.37	.41	93.1	31 July

TRASHING EXPERIMENTS.

It is proposed next year to commence a series of trashing experiments, with the object of ascertaining whether trashing the cane is a benefit to the crop or otherwise. The ground to be selected for these tests will be of uniform quality, and will, as to cultivation and fertilising, receive uniform treatment. The ground chosen will be divided into three large plats, the cane on which will receive the following treatment:—Plat No. 1 will receive two trashings during growth, Plat No. 2 will not be trashed at all, while Plat No. 3 will be trashed once during growth.

The question of stripping or trashing is a most important one, and one which directly affects the pockets of our farmers. It has been found, most certainly, in similar experiments carried out at the experiment station at Hawaii, quite contrary to what has usually been assumed, that the stripping, or trashing of the cane, considerably lowers the weight of cane and sugar produced, and causes a very large loss. The following data, abridged from Bulletin No. 25 of the Experiment Station of the Hawaiian Planters' Association, shows this very clearly:—

RESULTS OF STRIPPING OR TRASHING EXPERIMENTS, HAWAIIAN EXPERIMENT STATION.

*Weight of Cane—*Tons per Acre.*

Average of plant and ratoons ... 68.01 trashed ... 87.00 not trashed

*Available Sugar per Acre—*Tons.*

Average of plant and ratoons ... 8.99 trashed ... 12.21 not trashed

Sucrose in Juice.

Plant cane ... 16.8 trashed ... 17.7 not trashed
Ratoons ... 15.8 do. ... 16.8 do.

Purity of Juice.

Plant cane ... 89.3 trashed ... 90.3 not trashed
Ratoons ... 87.0 do. ... 88.0 do.

Number of Dead Canes per Acre.

Average of plant and ratoons ... 7,516 trashed ... 5,519 not trashed.

* These are short tons of 2,000 pounds.

It is, therefore, a matter of great moment that similar experiments should be carried out in Queensland, for, although many growers have now abandoned trashing owing to the cost, yet there remain a large number who thoroughly believe in the practice, and who go to great expense every year to carry out their ideas.

CULTIVATION OF RATOONS.

Another projected series of experiments has for its object the best method of cultivating ratoons. A plant crop will be put in next year, the ratoons from which will be treated in four separate ways. No. 1 will be treated by burning trash, deeply cultivating between the rows, and subsequent cultivation between the rows with the Planet Junior. No. 2 will have the trash buried between the rows. In No. 3 the trash will be left in every other row, while the alternate rows are cultivated, while in No. 4 the ratoons will be allowed to come up through the trash without any cultivation at all. This last method is much practised in Mackay. These experiments, of which merely an outline is given, will be elaborated later.

MANURING EXPERIMENTS.

Experiments with single elements and mixed manures will also be made at a later date.

EXPERIMENTS WITH NITRO-BACTERINE AND GREEN MANURING.

A trial of Professor Bottomley's nitro-bacterine on Mauritius Bean seed, *versus* the same quality seed not so treated, will also be made during the coming year, at the request of many of the Northern farmers.

FURTHER ATTEMPTS TO RAISE SEED FROM ARROWS.

Fresh trials were made of the few arrows that came to maturity at the station, but no results were obtained, nor could any seed be discovered. Although the arrowing this year in Mackay was greatly in excess of any previous year since the establishment of the station, very few arrows came to maturity, and those that did matured at different times, thus preventing cross-fertilisation. A recommendation will be made to the Department of Agriculture with the view of raising seedlings at the Kamerunga State Nursery, Cairns.

NEW VARIETIES INTRODUCED.

The following new varieties were introduced to the Mackay Station during the past year:—Hambleton Queensland 426 and 452, 1900 Seedling, B 208 (reintroduced), and Mauritius 189, through the courtesy of the Colonial Sugar Company; also Mauritius Couve. by courtesy of the Mossman Central Mill Company. These will be the subject of further experiment when sufficient seed has been raised. The Department of Agriculture have also written to the Louisiana, Mauritius, and West Indian sugar centres for five of the best varieties of each place. When these arrive they will be planted out for further experiment and trial.

DISTRIBUTION OF HIGH-CLASS VARIETIES.

Specially built crates and packages of cane have been sent to farmers' associations and other parties during the year, at Takura, Pialba, Nikenbah, Lower Burdekin, Bundaberg, Proserpine, Beenleigh, Cairns, and the North Coast line. Some of the best of the New Guinea canes have also been forwarded to Mauritius, West Indies, and German New Guinea, as well as to Formosa. The annual distribution of varieties at Mackay was also carried out, a large number of farmers applying for and receiving cane. Crates of third ratoon matured and unmanured cane were also sent to the Jubilee Brisbane Exhibition.

VARIETIES IN HOSPITAL.

In August, 1906, twenty-two varieties of cane originally having a good record, but which had latterly developed disease, were segregated in a special enclosure called the "station hospital." This was a piece of virgin ground, and has been previously fully described. It was hoped that under favourable conditions some at least of these canes would recover and take their place again as healthy croppers.

These varieties have now passed through three crops under hospital conditions—namely, plant, first, and second ratoons; but, unfortunately, so far from recovering, they have gone from bad to worse, and, as originally intended, if no recovery were made, they have been ploughed out and abandoned.

The following are the names and numbers of the canes in question:—Mayoe, Chenoma, Oiva, Batoe, 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 S202, New Guinea 3, and New Guinea 7.

As in previous years, strict inspections were made from time to time, and notes made upon the condition and appearance of the canes. Oiva, Batoe, Kikarea, Iduari, and T. 202 were very stunted and unhealthy, and produced scarcely any cane, while New Guinea 3 died out altogether. No root or

fungoid disease was discoverable, but the gumming disease was very prevalent, and showed plainly enough to the naked eye, when sticks were cut, without the necessity of appeal to the microscope. The number of varieties found in the hospital plot suffering from the gumming disease this year amounted to fifteen out of twenty-one. The remainder apparently suffer from a perishing of the leaf system and an extreme pithiness of the stalk, which takes place before there is any appearance of arrowing. It has to be stated, however, that five of the canes having this appearance last year (when no gum was found) have decidedly developed gum this present year, so that it may, very probably, be another symptom of this disease. The whole subject of gumming has been dealt with very exhaustively by Dr. Cobb, both in New South Wales and upon the Sugar Experiment Station in Hawaii, and also by our own Vegetable Pathologist, Mr. Tryon. All the symptoms described by Dr. Cobb have been recognised in the hospital canes at the Experiment Station, and that writer is satisfied that the disease is caused by a bacteria, which he terms *Bacterium vasculorum*, in consequence of its occurrence in the vessels of the cane. This organism, which is exceedingly minute, has been isolated at the station under the microscope, and is found to be identical with the bacteria described in Dr. Cobb's Bulletin. Unfortunately no means for bacteriological investigation exist at the Mackay Station, so that inquiries along these lines could not be carried out. The gumming of sugar-cane, happily, is not nearly such a serious disease as it was some years ago in Mackay and in the South. As far as the present writer's observation goes no case of gumming has been detected by him north of Mackay, so that it might appear to be a purely climatological question. Dr. Cobb also stated in 1905 (Bulletin No. 3, Div. Pathology and Physiology of the Hawaiian Experiment Station), that he had not, up till that date, observed a case of gumming at Hawaii.

During August, 1909, the varieties were crushed in the experimental mill at the station, and the juice analysed. The density and sucrose in many of the canes is still high, and it is a great pity that the old high-class canes such as Meerah, Rose Bamboo, White Bamboo, and Striped Singapore should have developed disease so badly as to necessitate their being thrown out of cultivation. It may be said in passing that the three latter canes were reintroduced to the station some six years ago from other districts in the North, where these canes were quite healthy. This experience at the station is very largely the experience of the Mackay district with regard to these canes.

The following table gives the results of the analyses for the last time of these canes:—

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	5-8-09	12 mo's	17.5	14.99	1.22	85.6	6.0
2	Do.	Chenoma	5-8-09	do.	17.2	15.56	.66	90.4	6.0
3	Do.	Oiva	5-8-09	do.	12.8	9.01	1.63	70.3	5.5
4	Do.	Batoe	5-8-09	do.	11.7	8.31	1.56	71.0	5.5
6	Do.	Mabuan	5-8-09	do.	13.2	9.28	2.10	70.3	5.0
7	Do.	Moo Moo	5-8-09	do.	15.1	11.94	1.74	79.0	4.0
8	Do.	Oraya	5-8-09	do.	16.9	14.17	1.19	83.8	4.5
9	Queensland	Meerah	5-8-09	do.	18.7	18.18	.14	97.2	3.5
10	New Guinea	Iduari	5-8-09	do.	11.8	7.69	2.03	65.1	5.5
11	Do.	Akewa	5-8-09	do.	16.2	13.23	1.29	81.6	4.0
12	Do.	Oihoku	5-8-09	do.	15.5	12.58	1.33	81.1	5.0
13	Queensland	White Bamboo	5-8-09	do.	19.3	17.98	.31	93.1	4.0
14	Do.	Striped Singapore	5-8-09	do.	18.6	17.63	.27	94.7	3.5
15	Do.	Rose Bamboo	5-8-09	do.	17.9	17.08	.26	95.4	3.5
16	Louisiana	Louisiana Striped	5-8-09	do.	18.3	16.91	.32	92.4	5.5
17	Do.	Louisiana Tiboo Merd	5-8-09	do.	18.0	17.05	.19	94.7	4.0
18	Demerara	Demerara 74	5-8-09	do.	15.2	12.53	.95	82.4	5.0
19	Do.	Do. 95	5-8-09	do.	18.7	17.39	.31	92.9	5.0
20	Trinidad	Trinidad S. 202	5-8-09	do.	16.4	14.63	.48	89.2	4.5
22	New Guinea	New Guinea 7	5-8-09	do.	19.4	18.21	.22	93.8	3.5

As far as the experiments with bulk samples have been carried out in Mackay, the opinion expressed by Dr. Erwin Smith, of Washington, that canes containing higher acidity may be immune to the disease, has not been confirmed.

From the analyses no definite information can be drawn as to whether gumming affects the sucrose and purity of the cane, as many of the canes with gum have given a higher analyses than those in which gum was not detected.

The table following is the record of general observations made as to the appearance of the canes during the year, the examination of sticks and sections for gum, and finally the number of sticks per acre carrying a tolerably healthy leaf system, and the number carrying unhealthy and dead foliage.

No. or Name of Variety.	General Appearance of Foliage and Cane. April, 1909.	Result of Examination of Sections of Individual Sticks. August, 1909.	Number of Sticks per Acre Carrying a Fairly Healthy Leaf System. August, 1909.	Number of Sticks per Acre Carrying Unhealthy or Dead Foliage. August, 1909.
Mavoe	Foliage unhealthy	Gum found	816	16,879
Chenoma	„ very poor	„ „	3,539	30,492
Oiva ... ..	„ „ ... ..	„ „ ... ..	...	16,335
Batoe	„ poor ... ..	„ „ ... ..	...	22,052
Kikarea	„ very poor ... ..	„ „ ... ..	...	13,340
Mabuan ... ..	„ „ ... ..	„ „ ... ..	...	21,507
Moo Moo	„ poor ... ..	„ „ ... ..	...	23,685
Oraya	„ „	No gum found ... ..	...	29,675
Meerali	„ „	Gum found	7,330	32,869
Iduari	„ very poor ... ..	„ „ ... ..	...	7,623
Akewa	„ „	No gum found ... ..	...	29,463
Oiboku	„ „	Gum found ... ..	...	26,592
White Bamboo	„ stunted ... ..	„ „ ... ..	...	10,073
Striped Singapore	„ poor ... ..	„ „ ... ..	...	21,507
Rose Bamboo ... ..	„ „ ... ..	„ „ ... ..	...	24,744
Louisiana Striped	„ not healthy ... ..	„ „ ... ..	...	16,879
Louisiana Tiboo Merd	„ „	No gum found ... ..	...	34,303
D. 74	„ all dead ... ..	„ „ ... ..	...	22,596
D. 95	„ unhealthy	Gum found ... ..	...	29,947
Trinidad S. No. 202	„ dead	No gum found ... ..	...	23,143
New Guinea 3	Died out ... ..	...	...	...
New Guinea 7	Foliage unhealthy	Gum indicated	10,073	9,528

VARIETIES OF CANE DISTRIBUTED FROM THE MACKAY EXPERIMENT STATION.

The varieties of cane distributed to the various sugar centres throughout the State in 1906 have now been under observation for three years, and as far as the districts north of Mackay are concerned, a definite opinion upon their value, as canes of promise for the future, can now be given. With reference to Southern localities, this is not so easy to do, as, owing to dry weather, frosts, and other unfavourable conditions, the varieties have scarcely had a fair chance.

The general history of the varieties distributed in 1906 will be found in the 1903-4 Report of the Bureau of Sugar Experiment Stations. Other canes, however, have been subsequently distributed, and reference will also be made to them hereafter.

The varieties selected in 1906 for sending out were chosen out of 105 different canes then under trial at the Mackay Station, and were New Guinea 8A, New Guinea 15 (or Badila), New Guinea 24 (or Goru), New Guinea 24A, New Guinea 24B, New Guinea 64, Trinidad Seedling 60, Mauritius Bois Rouge, and Mauritius Settlers.

Of these, the kinds best suited to the North are undoubtedly the three canes of the 24 or Goru series, with New Guinea 15 (or Badila). Mauritius Settlers, however, on the Herbert River, has proved a valuable cane, and is now being grown on relatively large areas.

During late June and early July of the present year the writer visited the Northern sugar centres, and was enabled personally to inspect the varieties, and to ascertain how each was behaving under diverse soil and climatic conditions, and also how far the observations made in previous years were being confirmed.

As to cane distributed south of Mackay, the various farmers' associations and other parties receiving plants have been written to asking them to furnish reports upon the behaviour of the varieties. In many cases this has been done, and the reports are appended hereto.

Before considering the behaviour of the varieties, tables presenting the analytical data and yield of cane and sugar per acre from 1904 to 1909 at the Mackay Station are now given. These are the

results, in the case of New Guinea 8A, 15, 21A, 21B, and 64, of six crops—namely, plant, first, second, third, fourth, and fifth ratoons. In the final column of these tables are shown:—

(a) The mean sugar and purity of the six years' analyses;

(b) The total yield of cane and sugar per acre from the six years' crops, five 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.					
	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.
New Guinea 8a	19.8	17.74	1.20	80.0	19.7	17.09	1.78	81.3	21.0	19.01	1.20	83.3	20.7	19.16	1.57	82.5
15 (Bardila)	20.8	19.71	1.53	91.7	22.0	20.88	1.26	94.8	21.9	20.55	1.27	93.9	22.2	20.75	1.28	93.5
21 (Goru)	20.5	19.60	1.27	96.6	19.8	19.50	1.83	93.4	20.5	19.89	1.28	93.0	20.0	18.47	1.32	92.3
21A	19.8	17.66	1.43	90.2	21.2	19.70	1.37	93.2	20.8	19.11	1.41	92.0	20.5	19.10	1.45	93.1
21B	18.6	16.20	1.19	87.6	20.6	19.03	1.59	92.3	20.8	18.84	1.78	90.5	20.7	19.04	1.59	91.9
64	19.0	16.85	1.81	89.9	18.9	18.93	1.98	89.8	18.6	18.18	1.54	82.7	18.1	15.64	1.00	87.5
Trinidad 8. 60	18.3	16.96	1.71	92.7	20.5	19.28	1.37	94.0	19.1	17.81	1.28	83.3				Not grown.
Mauritius Bois Rouge	22.7	20.60	1.31	91.1	21.4	19.63	1.15	91.7	20.5	19.10	1.20	93.1				Not grown.
Mauritius Settlers	21.7	20.88	1.34	96.2				Cut for seed and not ratooned.								

Name or Number of Variety.	FOURTH RATOON CROP, 1908.				FIFTH RATOON CROP, 1905.			AVERAGE OF THE SIX 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.	Sucrose.	Purity.
New Guinea 8a	21.3	17.63	1.28	92.1	21.4	20.09	1.17	93.8	19.08	92.3
15 (Bardila)	22.1	20.71	1.21	93.7	22.7	21.48	1.15	94.6	20.68	94.4
21 (Goru)	19.9	18.53	1.28	93.1		Not grown.			18.70	93.1
21A	20.9	19.32	1.38	92.4	20.9	20.00	1.17	95.7	19.10	93.1
21B	20.4	18.83	1.46	92.3	20.0	18.50	1.39	92.5	18.42	91.6
64	18.3	16.33	1.71	89.1	17.4	15.28	1.85	87.8	15.75	87.9
Trinidad 8. 60									18.01	93.3
Mauritius Bois Rouge									18.80	91.9
Mauritius Settlers										

CROP RESULTS, 1904-1909.

Name or Number of Variety.	PLANT CROP, 1904.		FIRST RATOON CROP, 1905.		SECOND RATOON CROP, 1906.		THIRD RATOON CROP, 1907.		FOURTH RATOON CROP, 1908.		FIFTH RATOON CROP, 1909.		TOTAL YIELD, SIX 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.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.
New Guinea 8a	38.9	9.7	40.5	8.0	32.7	5.6	41.8	7.2	37.7	6.7	32.6	5.9	258.2	43.1
15 (Bardila)	59.8	10.3	53.8	10.1	41.6	7.5	43.0	7.9	34.0	6.3	38.3	7.4	270.5	50.2
21 (Goru)	68.5	11.1	51.8	8.3	33.0	5.5	34.0	8.0	31.6	10.2	Not ratooned		263.9	44.2†
21A	58.9	9.8	51.3	8.0	36.7	6.3	41.0	6.9	42.1	7.3	36.7	6.5	266.7	45.6
21B	60.8	8.9	49.0	8.4	34.7	5.8	40.0	6.7	39.4	6.6	34.0	5.6	257.5	42.0
64	56.7	8.6	43.2	6.4	27.6	3.3	30.5	4.3	30.9	4.3	27.2	3.7	235.2	30.6
Trinidad Seedling No. 60	55.7	8.4	35.4	3.4	34.8	3.5	Not ratooned						145.9	23.3
Mauritius Bois Rouge	58.3	9.4	33.1	6.5	19.5	3.2	Not ratooned						198.9	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 mill, which is a variable factor, depending on the modern or older character of each factory. † Three crops only. ‡ Five crops only.

The following short description of the canes are also given with the view of preventing confusion and mixing of names, which frequently takes place, even with the best intentions; a table of general particulars is also included:—

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 lodging. 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 until 1909. 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 Secla Seclana).—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 until 1909.

New Guinea 24n (New Guinea name, Goru Bunu Bunann).—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 24n 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-Flag Crop.	Best Time to Plant, Spring or Autumn.	Fibre Content Average.	Milling 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 months	Either	9.52	Good if mixed with other canes, or if prepared for roller by shredder.
No. 34	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.	10.28	Good.
No. 24n	Do.	Generally erect	Thick	do.	do.	do.	do.	do.	9.87	do.
No. 61	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	11.40	Tough; requires mixing with other canes.
Settlers	Do.	do.	do.	do.	do.	Not too good	12 to 18 months	do.	10.35	Fair.

The districts visited this year in the North were as follows:—Mossman, Cairns, Johnstone and Herbert Rivers, and Burdekin. Unfortunately the writer had not as much time at his disposal as he could have wished, and this, joined to the fact that steamers from port to port are not matters of daily occurrence in the North, led to very curtailed visits to Burdekin and Cairns.

As has been previously noted, with the exception of the Burdekin district, the two varieties known as Badila and Goru, have been very largely grown in the North for many years. In fact about 75 to 80 per cent. of the cane grown at Mossman and Cairns may be said to be New Guinea 24 (or Goru), while the remainder is practically Badila. At Geraldton fully 60 per cent. of the crop is Badila. These two canes yield such fine results, both to growers and the mills, that it is difficult to get other varieties given a trial. The New Guinea 24A and 24B, however, are very fine canes, and, where growers have become interested, they are planting same out in larger areas. All these four canes were originally introduced by the Department of Agriculture in or about 1896 with many others, having been collected in New Guinea by Mr. Tryon, the State Entomologist. In this connection it is worth while remembering that the Department were actually recommended to burn the whole consignment, because a few borers were found. If this had been done, Goru and Badila, which it is no exaggeration to say have been the salvation of growers in the far North, would have been destroyed also. To the Colonial Sugar Company, before the advent of a Sugar Experiment Station, is due the credit of having tested and recommended the growth of these two varieties to the farmers at Hambleton.

The need for the constant introduction and careful trial of new varieties is too important to require much comment. The history of the sugar-cane plant in Queensland and other countries makes it abundantly clear that no variety of cane, however good, can be relied upon for all time. The Rose Bamboo or Rappoe cane has come the nearest to fulfilling requirements, but there are a number of districts in Queensland now where Rappoe, free from disease, cannot be grown.

One of the principal objects the Experiment Station has set before it is the frequent introduction of new varieties, whether raised from seed or otherwise, and whether growing in Queensland or other countries. This work is a very tedious one, and large numbers of canes have to pass through examination and continued trial through plant and ratoon crops before even one or two of them can be selected and pronounced fit for distribution. When the canes are selected the farmer can, if he will, give the most valuable assistance. To prepare a small nursery and carefully watch and note results should not be too much to ask. With regard to the varieties under discussion, great disappointment was felt in finding in so many cases that goats, horses, or cattle had eaten up the varieties distributed, before they had ever had a chance to show if they were suitable or not. On the other hand, those farmers who took an intelligent interest in the canes have the hearty thanks of the station for their co-operation and also have the satisfaction of finding that they have one or two new and valuable canes to take the place of older varieties.

The observations now following on the appearance of the canes are more briefly summarised than in previous years:—

MOSSMAN DISTRICT.

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

Rainfall average, about 170 in.

The varieties sent in 1906 were originally taken in hand by the Mossman Central Mill Company, and by them planted in a nursery. They were subsequently distributed to farmers.

The varieties New Guinea 8A, 64, Trinidad Seedling 60, and Mauritius Bois Rouge have not done sufficiently well to warrant further trial. The growth is poor in the case of 8A and T.S. 60, while N.G. 64 does not stolon out well. Mauritius Bois Rouge is too thin and arrows early and freely.

New Guinea 15, Badila, and 24 Goru, are established favourites, and do remarkably well on Mossman soils.

New Guinea 24A has proved itself a favourite where tried. It does not arrow in the North to anything like the same extent as its sister cane Goru, and contains more sucrose. The germination, growth, and appearance of this cane, both as plant and ratoons, were good.

New Guinea 24B.—This cane was considered by many growers to be the pick of those sent from Mackay. It has turned out a fine healthy cane, a good stolon and ratooner, and is already being planted out to a great extent.

CAIRNS DISTRICT.

Soils: Alluvial and volcanic.

Rainfall: Average, 76 in. 30th June, 1908, to 1st July, 1909, 89.72 in

The local farmers' association and the Hambleton Plantation were sent the varieties in 1906 and 1907. Unfortunately, partly owing to the ravages of the grub pest in some cases, and to carelessness in allowing stock to have access to the canes, very little cane could be seen. At Hambleton the New Guinea 24A and 24B were doing well as ratoons, and Trinidad Seedling 60 was also looking healthy and vigorous.

Very large crops of New Guinea 24 (or Goru) are grown in the Cairns district, in fact the greater part of the crop may be said to be of this variety.

New Guinea 15 (Badila), however, is coming greatly into prominence, especially on the rich river flats about Mulgrave and the new lands being opened at Harvey's Creek, and nearer Geraldton. Growers on some of these lands expect to cut from 6,000 to 10,000 tons of this fine variety.

GERALDTON DISTRICT.

Soils: Alluvial soils with clay, sandy, and gravelly subsoils. Some volcanic.

Rainfall: Average for past ten years about 143.5 in. Rainfall from 1st July, 1908, to 30th June, 1909, 166.16 in.

At Geraldton the local farmers' association received and distributed the varieties.

The varieties New Guinea 8A, N.G. 64, Mauritius Bois Rouge, and Trinidad Seedling 50 evidently do not suit this locality, and no more will be planted of these kinds.

New Guinea 15 is still doing exceedingly well, and is very largely planted. Fully 60 per cent. of the crop this year at Geraldton consists of Badila. It is a great favourite both with growers and cutters, while its exceptionally high density throughout the crushing season renders it very valuable to the manufacturer.

New Guinea 24 is not here such a favourite as farther north. Complaints are made as to its ratooning quality, and it is stated to very often fail to provide a good stand.

New Guinea 24A.—This variety is now giving very fine results, and is being planted out somewhat extensively. It does not arrow so freely as Gora, is of higher density, and it is thought will ratoon better. It also stoles out well.

New Guinea 24B.—This cane is also doing well, its appearance was healthy, stoling power and germination good, and appears well suited to the poor Mundoo soils.

During August of 1908 the following New Guinea canes were analysed at Goondi Mill with the following results:—

Variety.	P.O.C.S.
New Guinea 15 (Badila)	15.25
New Guinea 24	12.75
New Guinea 24A	16.60
New Guinea 24B	16.25

HERBERT RIVER DISTRICT.

Soils: Alluvial sandy loams, with sandy subsoils; and alluvial river flats, with sandy subsoils.

Rainfall: Average for past ten years about 82.7 in. Rainfall at Ingham from 1st July, 1908, to 30th June, 1909, 60.94 in. Rainfall at Halifax for same period, 69.90 in.

On the Herbert River the canes were taken charge of by the local farmers' associations and by them distributed to individual farmers. The varieties are making much better progress at Ingham than at Halifax, and on the Stone River they were found to be giving excellent results.

New Guinea 8A, 64, Mauritius Bois Rouge, and Trinidad Seedling No. 60 are all doing fairly well around Ingham, though it is not considered that N.G. 64 will be worth proceeding with, owing to its poor stoling power.

New Guinea 15 and 24, though grown on a somewhat extensive scale, are not such general favourites as they are farther north. On the whole they are healthy and do well.

New Guinea 24A.—This cane has done remarkably well and is now being planted out on much larger areas. Its germination is excellent, stoling and ratooning power good.

New Guinea 24B.—This variety is also coming into prominence and many farmers are now planting same out on a large scale. Germination, appearance, growth, and ratooning power excellent.

Mauritius Bois Rouge is not liked and will not be further tested.

Mauritius Settlers.—This has developed into a very fine cane on the Herbert River, but with the exception of one or two places south of Mackay, it is the only district in which it has done well. On several of the farms visited large areas had been planted with Settlers. It is stated that when blown over the stoles do not come out of the ground. Its germination and ratooning power is good, while its obtainable cane sugar is high.

At Halifax New Guinea 24A and 24B were found to be doing well, and being planted out by some growers in larger areas. The other varieties have been practically thrown out of cultivation.

B. 208 is grown both at Halifax and other parts of the Herbert River district to a very great extent. This is the only part of the North, however, where it does really well.

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, 1908, to 30th June, 1909, about 40 in.

At this place the varieties were sent to the local farmers' association, and were taken charge of by Mr. George Mackersie. He very carefully planted same out in a nursery and gave them every attention, finally distributing the cane when grown to the farmers in the district. The whole of the varieties, including New Guinea 15 and New Guinea 24 were sent to this district, and it is gratifying to find that they have been so widely appreciated and well cared for. The Lower Burdekin is a highly favoured district, for up to the present it has no grubs or other pests to contend with, and weeds are not nearly the heart-breaking factors they are in the wetter localities of the North. In consequence of this the varieties have had a better chance all through. During April of the present year Mauritius Malagache was also forwarded to the farmers' association at Burdekin.

New Guinea 8A. This variety has done well on some farms, but on the whole has not proved itself of high promise for the future. It will, therefore, be discontinued by the majority.

New Guinea 15 (Badila), 24 (Goru), 24A, and 24B are all doing excellently, and are now being planted out extensively. They are very highly spoken of by growers, and the cane inspected was healthy and vigorous. These four canes are all well adapted for irrigation, and for that reason may be expected to take their place among the standard canes of the district.

New Guinea 64 is on the whole poor, and will not be further experimented with.

Trinidad Seedling 60 is on many farms turning out a fine cane, though it is somewhat backward in growth.

Mauritius Malagache germinated well and was commencing to stole at time of inspection.

GENERAL SUMMARY OF CANES DISTRIBUTED IN THE NORTH.

Of the varieties distributed in 1906 (excluding in the far North New Guinea 15 and 24, as already established), the New Guinea 24A and 24B as far south as Ingham, with the Mauritius Settlers in the latter place, are undoubtedly going to come into prominence as croppers and sugar producers, and it seems only a question of a little more time when they will be very largely grown. On the Burdekin these two canes with the New Guinea 15 and 24 have all been selected by growers as of high value, and Trinidad 60 and N.G. 8A will also be grown on certain areas.

PROSERPINE AND SOUTHERN DISTRICTS.

The following descriptions are from written reports:—

PROSERPINE DISTRICT.

Various parties in the Proserpine district have been sent varieties during the past four years. The manager of the Proserpine Central Mill has been good enough to report as follows:—

"The Goru or N.G. 24 is giving very good results both as regards plant crops and ratoons, and appears to grow well on flat lands as well as on the hill country. A big per cent. of the crop at Proserpine consists of this variety and growers favour it very much.

"New Guinea 24B is also doing well but there is very little grown so far.

"Badila does well on scrub land, but is a very slow grower.

"Trinidad Seedling 60 also does very well, and a few tons of this variety is now on delivery at the mill.

"The plants sent here from the station on 8th April last are coming on very well.

"The rainfall from July, 1908, to end of June, 1909, has been 54.70 in."

BUNDABERG DISTRICT.

Soils: Rich deep volcanic, with alluvial areas. Average rainfall for past ten years about 40 in. Rainfall from 1st July, 1908, to 30th June, 1909, 28.87 in.

QUNABA SUB-DISTRICT.

Varieties of cane were sent to Qunaba Plantation in August, 1907, and the manager reports under date 22nd June, 1909, as follows:—

"I herewith forward a report of the canes as a ratoon crop growing on this estate.

"Rainfall for twelve months 32.37 in.

"Nature of soil: Red volcanic.

"New Guinea 15 (Badila).—This cane on the experimental block ratooned very well, showing now an average of 4 ft. of cane, but the land was heavily manured last year with stable manure. On a block of 15 acres, which cut last year at the rate of 25 tons per acre, the cane has not ratooned at all well, although it was manured twice with nitrate of soda during wet weather. The cane at present is covered on its lower leaves with aphids, very similar to that which attacks orange trees and turns the leaves quite black.

"New Guinea 24 (Goru).—None of this cane was received by us from the Experiment Station, but the block we have of it has stoled very well, and has had two applications of nitrate of soda.

"New Guinea 24A, 24B, 47, and 48.—All these canes have ratooned well, the plants being planted on heavily manured land; 5 to 6 ft. of crushable cane showing at the present time.

"New Guinea 64.—This cane has ratooned very well, but lays about all over the ground. Land planted with this variety would be very hard to keep clear of weeds.

"Mauritius Settlers.—This is the slowest growing cane of the lot, but I think it would do better on moist ground."

HUMMOCK PLANTATION SUB-DISTRICT.

Messrs. Farquhar and others, proprietors of the Hummock Plantation, Bundaberg, received varieties in 1906 and 1907. In their report, dated 15th July, 1909, upon these canes they state:—

"Of the three varieties which failed to reach satisfactory growth in the first year, we managed to secure a few cuttings from suckers of Mauritius Bois Rouge and New Guinea 24, and planted them out in November last.

"Mauritius Bois Rouge.—This cane is doing no better than in the first trial, and is very slow growing.

"New Guinea 24.—Showing much better results, and we intend putting this variety out in the field when planting next.

"New Guinea 15.—This was two years old when cut, and failed to ratoon. Plants in the field look very promising at present.

"The remaining five varieties received in 1906 were cut again last year and ratooned. Some are now showing fair crops of second ratoons, particularly New Guinea 24B, which variety is undoubtedly giving the best results with us. These five varieties stand in the following order of merit with us:—

"1. New Guinea 24B in second ratoons, first ratoons, and plants set out in November last. The second ratoons show the heaviest crop, no doubt owing to being planted in land heavily dressed with stable manure. First ratoons and plants in the field are doing well, but during the last three weeks show signs of rust.

"2. New Guinea 24A, also in second and first ratoons and plants, follows closely on N.G. 24B. Sticks are thinner and lighter. First ratoons and plants also showing rust.

"3. Trinidad Seedling 60, ratoons well, but shows very thin sticks on which the trash sticks closely. Do not think this variety suitable for this district.

"4. New Guinea 64.—Ratoons with very few sticks to the stool.

"5. New Guinea 8a.—Ratoons well, very slow growing and trashy.

"The two varieties received in 1907—viz: Mave and New Guinea 48 (Green Baruma)—were damaged last year by frost, but came again and are showing fair cane. New Guinea 48 is likely to prove the best; the trash on Mave sticks very closely to the cane and is difficult to remove. Further plantings of these varieties were put out in November last, but are showing poor growth.

"The season here has been dry and unfavourable, and the cane crop on the whole is very unsatisfactory."

KOLAN SUB-DISTRICT.

The secretary of the Kolan Cane-growers' and Farmers' Association reports that no care having been taken of the names and numbers of the cane supplied, no information can be furnished.

GIN GIN SUB-DISTRICT.

Varieties were sent to the Gin Gin Central Mill in 1906 and 1907. The following brief report has been received from the manager, dated 19th June, 1909:—

"B. 208.—Good on moist ground, easily affected by dry weather.

"New Guinea 8a and 15.—Very slow and generally poor, easily affected by dry weather.

"New Guinea 24 (Goru).—Generally slow, poor ratooner, better in special localities.

"New Guinea 24A, 24B, and 22.—All generally slow, poor ratooners, and very yellow in appearance.

"New Guinea 47, 48, and 54.—Ratooning fairly well and are more promising.

"Mauritius Bois Rouge.—Not promising well.

"The rainfall for the last twelve months has been about 28 in."

PIALBA DISTRICT.

Varieties of cane were supplied to the Pialba Sugar-cane Growers' Association in August, 1908. Mr. Ritchie has forwarded the following report bearing date 26th June, 1909:—

"The varieties have had a very trying time. We keep no rainfall record, but the plants have had very little moisture. The soil where they were planted was brown in colour and of good quality, and has been kept well worked. No doubt, however, owing to the dry weather, they have made very little headway.

"New Guinea 8A.—Poor growth, average number of sticks to a stole 6. Badly affected by long dry spell.

"New Guinea 15.—Average number of sticks to stole 7, very poor growth, has been tried in this district before, but does not do well here.

"New Guinea 24 (Goru). Average stool 5 sticks. Has also been tried here before, but only yields a fair crop.

"New Guinea 24A.—Average stole 7 sticks, very fair growth.

"New Guinea 24B.—Average stole 6 sticks, very fair growth.

"Mauritius Settlers.—Average stole 12 sticks, very healthy appearance. In a good season would no doubt be a good cropper."

The Takura Farmers' Progress Association were sent varieties of cane plants in April of the present year, and the secretary, Mr. W. J. Sorensen, has forwarded the following report upon their behaviour, up to the date of his letter, 22nd July, 1909.

Mr. Sorensen says: "It would not be fair to take this report as a guide as to the capabilities of the different varieties, owing to the short period under review. All the plants were carefully planted by hand on 27th April, 1909, in a rich volcanic black soil, which had previously grown cane, had just been ploughed, and was in good tilth. For the first six weeks after planting there was practically no rain, since then we have had about 6 in., and favourable conditions generally.

"New Guinea 15 (Badila).—This variety has been rather slow in coming up and there are a good few misses, seems fairly healthy, but as noted above the period is too short to give any idea as to its stoling power.

"New Guinea 24, 24A, 24B.—These varieties have all done well. Very few misses and generally healthy appearance, though not as strong looking as Bois Rouge.

"Mauritius Bois Rouge.—This variety has done well, with no misses, has made about 20 in. growth in the three months since planting, and has a strong healthy appearance.

"Mauritius Malagache.—This variety has also done well; no misses, and very strong plants; if same progress continues, is likely to be a favourite in this locality.

"I may state that there has been no frost to interfere with the growth of the above canes."

BEENLEIGH DISTRICT.

Soils: Alluvial river banks.

Average rainfall for past ten years about 42 in. Rainfall from 1st July, 1908, to 30th June, 1909, 26.67 in.

Mr. W. Kleinschmidt, of Beenleigh, to whom the varieties were sent in August, 1906, has been good enough to send the following particulars:—

"The story this year is, I fear, a very sad one. After reporting to you last year, we experienced the heaviest frost that has ever been known in this district. It did not make fish of one and flesh of another, it simply cut down everything to the ground. Usually the heavy types of canes enjoy an advantage in an ordinary winter, but in this case the frost was so severe that everything was treated alike. Of all the varieties the No. 15 (Badila) is the best suited to withstand a frost, it being a good heavy upstanding type of cane. The only other heavy type of cane is the Trinidad Seedling 60, and the growth in this being too poor for a one-year-old crop, puts it to a disadvantage. All the other varieties would be about the same in their capacity for withstanding frost, with perhaps the exception of N.G. 64, which, being of very vigorous growth, is more apt to fall and expose itself to the cold. Even when standing it is at a disadvantage, for its top appears to be lighter.

"For this season there is scarcely any cane to report upon, the cold winter being followed by an extraordinary dry spring.

"There is little or nothing to be said about any of the canes, with perhaps the exception of the Goru and 64. They are the only varieties showing cane at all. Of these two the 64 shows the best growth. My choice of all the canes is the Goru. This cane, I think, has come to stay. It does well on any soil, and appears to mature early, which with us is an important item. Of the others, 64 is not bad for highland cane, but seems to have a great tendency to crack. The Badila is of all the most suitable as a frost-proof cane on highlands, where it is possible to let it stand over."

NERANG DISTRICT.

Mr. E. Hicks, of Nerang, reports concerning the varieties:—

New Guinea 8A.—This variety made good plant cane, came up well, and grew well right through. It ratoons well, and I consider it to be a very good cane, and replanted the whole of it again this season.

"New Guinea 15 (Badila).—A good cane, stunted in growth, but a good stand-over cane. A heavy cropper and free from disease.

"New Guinea 24 (Guru).—This is also a good cane. Came up and grew well, and the ratoons are also good. It is affected with rust, but is a good stand-over cane.

"New Guinea 24u.—A fairly good plant cane. Trashes badly, and is not a good ratooner. I only planted a small lot, as I do not consider it suitable for the district.

"New Guinea 22 (Mahona).—A fairly good cane, also ratoons well.

"New Guinea 47 and 48.—Came up well after planting, but poor in quality, and ratoons were bad. Most of the stoles died out.

"New Guinea 54.—Grew fairly well, but did not ratoon well.

"I would place the canes as to suitability for our district in the following order:—

New Guinea 8A. New Guinea 24. New Guinea 24u. New Guinea 15.

SUBSIDIARY CROPS.

SORGHUMS.

Sufficient sorghum of different varieties has been grown during the year to provide feed for station horses and seed for distribution. The kinds grown are:—Mixed American, Planter's Friend, Early Orange, Sorghum Saccharatum, and Giant Honduras. Of these, the Mixed American and Early Orange give the best results, furnishing, during twelve months, a higher yield per acre and a better class of feed. Some difficulty is found in keeping seed for any length of time. Bisulphide of carbon has been used, and while it certainly keeps away weevils and other insects, it, unfortunately, appears to kill the germinating power of the seed. Seed is now only being sent out immediately after gathering.

SISAL HEMP.

As anticipated in last year's report, the sisal hemp planted in August, 1905, is now poling. The plants have made immense growth, and the distances originally selected for planting after the Hawaiian method (8 ft. by 8 ft.) have proved altogether too close, and it is now impossible to get in between the plants, as the leaves considerably overlap. The piece of land on which the plants are growing is poor in quality, with clay cropping out in places. The land was cultivated with a Planet Junior cultivator till the growth of sisal was too big. Growers of sisal are recommended to cultivate while the plants are small, and they may be assured that it will be found profitable.

It does not appear probable that machinery will be provided for treating the plants, so that when poling is completed the large plants will die down. The suckering has been great, but scarcely any applications have been received for these from cane-growers. About 2,000 suckers were given out, but these principally went to non-sugar-growing districts.

COTTON.

Since last issue of the report the Cararonica cotton-trees on the larger area have been pruned, but the yield has again proved very disappointing, being only 193 lb. of unginned cotton per acre during the past twelve months. It has been stated by other experimenters with this cotton that it does not stand too moist a climate, and this has been the experience at Mackay. No further experiments will be carried out with this variety, which has now been under observation for five years.

FRUIT TREES.

The fruit produced by the sole remaining paw-paw tree grown from seed brought by Dr. Maxwell from Hawaii produced no seed at all, and the variety subsequently died out. The improved mango-trees are still subject to the blackening of the foliage by the pink wax scale. This is kept in check by the use of resin emulsion. Seedlings from these trees have been distributed and grown at the station, and are practically free from scale.

GRAPE VINES AND PINEAPPLES.

Distribution of pineapple suckers and vine cuttings of approved sorts have been made at the usual times. The latter have been pruned and painted with lime and sulphur.

GRASSES.

Through the courtesy of Mr. Landells, head master of the Alligator Creek State School, the following new grasses have been introduced upon the station:—*Eragrostis pilosa*, Mystery grass, *Panicum muticum*, and *Paspalum virgatum*. The *Panicum muticum* is a very fine fodder grass in the North, and when sufficient of these new grasses are available, farmers may have same upon application. A steady demand still exists for *Paspalum dilatatum* and Rhodes grass, and a quantity has been given out during the year.

GREEN MANURES.

Green manure crops have been grown during the year, and, where possible, seed collected. A good deal of this has been distributed, and further areas of the small red Mauritius Bean are now coming on for further gathering.

MISCELLANEOUS.

The following analyses of Hatton soils were carried out at the Mackay Laboratory:—

ANALYSES OF THIRTEEN HATTON (MACKAY) SOILS.

Serial Number.	Total Elements in Soil.				Available Elements in Soil.		
	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
11	1.450	0.362	0.268	0.152	0.1400	0.0054	0.0034
12	0.430	0.239	0.198	0.161	0.1260	0.0075	0.0029
13	0.360	0.255	0.204	0.180	0.0569	0.0032	0.0024
14	0.390	0.177	0.217	0.152	0.0843	0.0039	0.0013
15	0.580	0.205	0.230	0.133	0.1008	0.0032	0.0012
16	0.420	0.188	0.211	0.155	0.0528	0.0033	0.0015
17	0.500	0.231	0.153	0.122	0.0860	0.0033	0.0021
19	0.600	0.272	0.166	0.149	0.1533	0.0041	0.0033
20	0.740	0.310	0.268	0.191	0.1666	0.0056	0.0022
21	0.860	0.330	0.211	0.214	0.1834	0.0046	0.0032
22	0.440	0.098	0.179	0.115	0.1052	0.0028	0.0029
23	0.600	0.235	0.179	0.133	0.1173	0.0051	0.0025
24	0.630	0.155	0.160	0.141	0.0728	0.0053	0.0021
Means	0.615	0.235	0.203	0.154	0.1112	0.0046	0.0024

Serial Number.	Total Pounds per Acre.				Available Pounds per Acre.		
	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
11	36,250	9,050	6,700	3,800	3,500	135	85
12	10,750	5,975	4,950	4,025	3,150	187	72
13	9,000	6,375	5,100	4,500	1,422	80	60
14	9,750	4,425	5,425	3,800	2,107	97	32
15	14,500	5,125	5,750	3,325	2,520	80	30
16	10,500	4,700	5,275	3,875	1,320	82	37
17	12,500	5,775	3,825	3,050	2,150	82	52
19	15,000	6,800	4,150	3,725	3,832	102	82
20	18,500	7,750	6,700	4,775	4,165	140	55
21	21,500	8,250	5,275	5,350	4,585	115	80
22	11,000	2,450	4,475	2,875	2,630	70	72
23	15,000	5,875	4,475	3,325	2,932	202	62
24	15,750	3,875	4,000	3,525	1,820	132	52
Means	15,385	5,879	5,085	3,842	2,779	116	59

In comparison with others analysed, these soils are good. Farmers at Hatton, from whose lands these samples were taken, may obtain copies and advice on application to the Sugar Experiment Station.

The following table shows the total number of analyses carried out at the Mackay Station Laboratory during the year from 1st July, 1908, to 30th June, 1909.

ANALYSES MADE AT THE MACKAY SUGAR EXPERIMENT STATION LABORATORY FROM 1ST JULY, 1908,
TO 30TH JUNE, 1909.

Materials.	No. of Samples Analysed.	No. of Analyses.
Sugar Canes for Experiment Station	309	718
Sugar Cane Fibres for Experiment Station	85	172
Fertilisers	6	12
Sugars	3	6
Soils, Agricultural Method	16	32
Soils, Maxwell's Aspartic Method	15	15
Waters	2	4
Subsoil	1	2
Total	438	961

Price 1s. 2d.]

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