

1907.
QUEENSLAND.

ANNUAL REPORT OF THE BUREAU OF SUGAR EXPERIMENT STATIONS.

Presented to both Houses of Parliament by Command.

TO THE HONOURABLE THE MINISTER FOR AGRICULTURE.

Brisbane, 4th November, 1907.

STR,—I have the honour to submit the Seventh Annual Report upon the Sugar Experiment Stations, and the Administration of the Sugar Fund, as required by "*The Sugar Experiment Stations Act of 1900.*"

I have, &c.,

WALTER MAXWELL, Director.

The report of this year (1907) is again confined to a statement of the work of the laboratories, to the results of the Sugar Experimental Station, Mackay, and of two sub-stations located in sugar districts, and, finally, to the economic and financial statements.

SOILS OF NON-SUGAR DISTRICTS.

In addition to the examination of soils from sugar-bearing lands, some analyses have been made of soils, for specific reasons, from localities that are not engaged in sugar production.

The non-sugar districts from which soil samples have been taken are as follow :—

Localities.	Number of Samples.	Number of Sub-samples.
Cambooya	9	36
Drayton	12	48
Toowoomba	12	48
Westbrook State Farm	13	52
Hermitage State Farm	6	24
Biggenden State Farm	6	24
Albion	1	4
Clayfield	1	4
Nundah	11	44
Nudgee	20	80
Geebung	1	4
Zillmere	12	48
Sunnybank	10	40
Barcaldine	8	32
Dallarnil	10	40
Warwick	49	196
Atherton	99	396
Totals	280	1,120

ANALYSES OF THE SOILS OF THE NON-SUGAR DISTRICTS.

Localities.	TOTAL ELEMENTS IN SOIL.				AVAILABLE ELEMENTS IN SOIL.		
	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime	Potash.	Phosphoric Acid.
	%	%	%	%	%	%	%
Barcaldine	·812	·249	·176	·026	·0926	·0177	·0008
Sunnybank (red soils)	·076	·051	·165	·069	·0484	·0117	trace
Sunnybank (black soils)	·980	·087	·108	·109	·0961	·0359	trace
Sunnybank (grey soils)	·110	·047	·156	·038	·0312	·0201	trace
Sunnybank (light soils)	·080	·040	·134	·067	·0256	·0095	trace
Albion (grey soils)	·140	·231	·358	·136	·0458	·0096	0·124
Clayfield (grey soils)	·180	·176	·249	·151	·0705	·0181	·0082
Nundah (red soils)	·195	·083	·204	·098	·0542	·0190	·0020
Nundah (grey soils)	·168	·119	·270	·076	·0629	·0264	·0124
Nudgee (red soils)	·268	·086	·179	·109	·0939	·0304	·0014
Nudgee (grey soils)	·220	·097	·170	·082	·0633	·0176	·0051
Nudgee (light soils)	·245	·098	·160	·078	·0689	·0140	·0041
Geebung (grey soils)	·220	·042	·134	·042	·0476	·0183	·0058
Zillmere (red soils)	·201	·077	·116	·109	·0615	·0207	·0009
Zillmere (grey soils)	·140	·078	·153	·072	·0657	·0191	·0053
Zillmere (light soils)	·260	·140	·156	·101	·1018	·0369	·0056
Cambooya (red soils)	·686	·260	·209	·124	·1634	·0292	·0086
Cambooya (black soils)	3·689	·274	·321	·136	·2369	·0227	·0014
Drayton (red soils)	·638	·194	·224	·149	·1264	·0297	·0015
Drayton (black soils)	1·090	·270	·160	·145	·1387	·0329	·0024
Toowoomba (red soils)	·510	·162	·220	·167	·1888	·0426	·0085
Toowoomba (black soils)	·567	·135	·118	·138	·1302	·0319	·0006
Westbrook State Farm (red soils)	1·018	·254	·249	·164	·1960	·0283	·0015
Westbrook State Farm (black soils)	1·905	·284	·234	·125	·2551	·0246	·0011
Higgenden State Farm	1·787	·097	·185	·119	·1476	·0432	·0027
Hermitage State Farm (black soils)	1·393	·261	·184	·097	·1387	·0332	·0017
Dallarnie	2·584	·427	·308	·314	·3158	·0062	·0012
Warwick	1·423	·335	·225	·148	·2986	·0093	·0042
Atherton ... ..	...	...	...	·239	·2748	·0108	·0041

ELEMENTS PER ACRE TO THE DEPTH OF ONE FOOT.

Localities.	TOTAL POUNDS PER ACRE.				AVAILABLE POUNDS PER ACRE.		
	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
	Barcaldine	20,295	6,225	4,412	650	2,315	442	21
Sunnybank (red soils)	2,298	1,548	4,950	2,070	1,302	351	trace
Sunnybank (black soils)	24,500	2,175	2,700	2,725	2,402	897	trace
Sunnybank (grey soils)	2,750	1,175	3,900	975	780	502	trace
Sunnybank (light soils)	2,000	1,000	3,350	1,675	640	237	trace
Albion (grey soils)	3,500	5,325	8,950	3,400	1,145	240	310
Clayfield (grey soils)	4,500	4,175	6,225	3,775	1,762	452	205
Nundah (red soils)	5,850	2,496	6,126	2,946	1,626	570	60
Nundah (grey soils)	4,200	2,975	6,750	1,920	1,572	660	310
Nudgee (red soils)	8,040	2,580	5,370	2,370	2,817	912	42
Nudgee (grey soils)	5,500	2,425	4,250	2,100	1,582	440	127
Nudgee (light soils)	6,125	2,450	4,000	1,950	1,720	350	110

ELEMENTS PER ACRE TO THE DEPTH OF ONE FOOT—continued.

Localities.	TOTAL POUNDS PER ACRE.				AVAILABLE POUNDS PER ACRE.		
	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
Geebung (grey soils)	5,500	1,050	3,350	1,050	1,190	457	145
Zillmere (red soils)	6,042	2,331	3,501	3,279	1,845	621	27
Zillmere (grey soils)	3,500	1,905	3,825	1,815	1,642	479	132
Zillmere (light soils)	6,500	3,500	3,900	2,525	2,545	922	140
Cambooya (red soils)	20,598	7,800	6,270	3,720	4,903	577	18
Cambooya (black soils)	92,225	6,850	8,025	3,400	5,922	567	35
Drayton (red soils)	19,140	5,820	6,720	5,476	4,792	891	45
Drayton (black soils)	27,270	6,752	4,012	3,637	3,467	824	60
Toowoomba (red soils)	15,315	4,873	6,009	5,028	5,664	1,278	25
Toowoomba (black soils)	14,175	3,375	2,950	3,450	2,580	797	15
Westbrook State Farm (red soils)	30,540	6,620	7,470	4,920	5,880	849	46
Westbrook State Farm (black soils)	47,625	7,100	5,850	3,125	6,380	615	23
Biggenden State Farm	53,610	2,910	5,550	3,570	4,428	1,296	71
Hermitage State Farm (black soils)	34,832	6,525	4,500	2,425	3,467	880	42
Dallarnil	77,520	12,310	9,240	9,420	9,474	186	36
Warwick	35,575	8,375	5,625	3,700	7,465	233	105
Atherton ... ..	...	...	...	8,170	8,244	824	33

TYPICAL EXAMPLES OF GOOD AND BAD SOILS FOR SUGAR OR ANY OTHER KINDS OF AGRICULTURAL CROPS.

Soil.	District.	TOTAL ELEMENTS IN SOIL.				AVAILABLE ELEMENTS IN SOIL.		
		Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
Good ...	Burdekin ...	%	%	%	%	%	%	%
Bad ...	Waterloo ...	·916	·344	·188	·103	·1650	·0344	·0078
Wallum ...	North Coast Line ...	·210	·250	·160	·173	·0087	·0049	·0003
Wallum ...	North Coast Line ...	·063	·061	·072	·942	·0097	·0036	·0012

ELEMENTS PER ACRE TO THE DEPTH OF ONE FOOT.

Soil.	District.	TOTAL POUNDS PER ACRE.				AVAILABLE POUNDS PER ACRE.		
		Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
Good ...	Burdekin ...	27,380	10,320	5,640	3,600	4,500	1,932	234
Bad ...	Waterloo ...	3,290	7,500	4,800	5,100	251	147	9
Wallum ...	North Coast Line ...	1,575	1,525	1,800	1,050	243	90	30

These examples are given—first, on account of their general value, showing the wide differences in the chemical composition of “good” and “bad” soils; and, secondly, because of special examples that have come before the Director during the year, which accentuate the great difference described, and also showing the essential need of soil analyses. The following letter is of interest, as it relates to one of the examples under consideration:—

“MIRA, Yandaran,

“24th June, 1907.

“DEAR SIR,—The soil at the corner of Waterloo, which you analysed for me, has been cropped for a number of years with maize and cane. The last crop of cane proved an utter failure, though it received the usual attention in deep ploughing and cultivation.

“I, therefore, thank you for the analyses and your comments re the same, particularly where you say, ‘You would not advise me to use costly manure,’ which has saved me a considerable expense.

“I remain, &c.,

“A. M. BROOM.

“Dr. Maxwell, Director Sugar Experiment Stations, Bundaberg.”

ANALYSES OF SUGAR-CANES GROWN BY FARMERS:

Results of analyses of farmers' canes are furnished, comparing with last year:—

Name of Sender.	Address.	Variety of Cane.	ANALYSIS OF JUICE.		
			Brix.	Sucrose.	Purity.
			Per cent.	Per cent.	Per cent.
Christesen, H. P.	Bullyard	Mavoe	18.5	16.56	89.3
Buss Bros.	Bonna	Rappoe	18.4	16.46	89.4
Ditto	Pemberton	ditto	15.9	13.1	82.4
Dunlop, J.	Maryborough	Badilla	17.8	14.8	83.1
Anderson, E.	North Kolan	Rappoe (2nd ratoon)	18.7	16.9	90.4
Ditto	ditto	ditto (3rd ratoon)	20.1	17.9	89.0
Ditto	ditto	ditto (4th ratoon)	18.8	17.23	91.1
Larsen, Oscar	ditto	ditto (1st ratoon)	17.8	15.7	88.2
Ditto	ditto	ditto (4th ratoon)	17.3	15.53	89.8
Ditto	ditto	ditto (4th ratoon)	19.6	18.36	93.7
Ditto	ditto	ditto (1st ratoon)	18.5	17.2	92.9
Green, S.	ditto	Rappoe (low land cane)	17.6	16.13	91.6
Ditto	ditto	Rappoe (high land cane)	18.4	16.93	92.0
Larsen, Oscar	ditto	Rappoe	17.4	15.27	87.7
Ditto	ditto	ditto	18.1	15.43	85.2
Blissett and Hart	Goodwood	New Guinea No. 15	18.6	17.0	91.4
Ditto	ditto	ditto No. 64	17.7	15.63	88.3
Haig, A. C.	Bemerysd, Kolan River	Rappoe	18.9	18.03	95.4
Ditto	ditto	ditto	19.0	18.13	95.4
Lucke, H. A. F.	Bucca, Kolan River	ditto	21.1	17.86	84.6
Ditto	ditto	ditto	19.1	14.16	74.1
Ditto	ditto	Rappoe (high land cane)	21.8	20.16	92.5
Haig, A. C.	Bemerysd, Kolan River	Striped Singapore (low land cane)	15.9	13.8	86.8
Ditto	ditto	Striped Singapore (high land cane)	17.5	15.86	90.6
Ditto	ditto	Rappoe	20.2	19.36	95.8
Lucke, H. A. F.	Bucca, Kolan River	Rappoe (high land cane)	20.5	19.56	95.4
Ditto	ditto	ditto	19.8	18.13	91.6
Mackrill, B.	South Kolan	Rappoe	22.8	20.33	93.3
Ditto	ditto	Batoe	19.5	17.63	90.4
Ditto	ditto	Rappoe	22.5	20.96	93.2
Storrie, Jn. S.	Gooburum	Demerara (20 months old)	20.0	18.7	93.5
Larsen, Oscar	North Kolan	Rappoe	18.4	16.9	91.8
Ditto	ditto	ditto	19.8	18.56	93.7
Ditto	ditto	ditto	19.6	18.53	94.5
Ditto	ditto	...	19.0	16.96	89.3
Ditto	ditto	New Guinea, 8A	20.0	17.53	87.6
Ditto	ditto	ditto 24B	18.2	15.03	82.6
Ditto	ditto	ditto 64	16.5	13.23	80.2

ANALYSES OF SUGAR-CANES GROWN BY FARMERS—continued.

Name of Sender.	Address.	Variety of Cane.	ANALYSIS OF JUICE.		
			Brix.	Sucrose.	Purity.
Haig, A. C.	Bemersyd, Kolan River	Rappoe	21.0	19.8	94.3
Ditto	ditto	Striped Singapore	19.1	17.63	92.3
Ditto	ditto	ditto	18.6	16.96	91.0
Ditto	ditto	Rappoe	20.3	19.73	97.6
Buss Bros.	Bonna Plantation, Bundaberg	...	22.6	20.63	91.3
Ditto	ditto	Rappoe	20.5	19.5	95.1
Ditto	ditto	Striped Singapore	21.5	20.4	94.9
Ditto	ditto ... ..	...	24.7	23.0	93.1
Ditto	ditto ... ..	...	22.8	19.93	87.4

FIRST ASSISTANT CHEMIST'S REPORT.

Material.	Method of Analysis.	Number of Samples Analysed.	Number of Analyses.
Soils	Agricultural Method	1,125	2,250
Ditto	Maxwell's Aspartic Acid Method	1,028	1,028
Ditto	Soluble Silica (Special)	114	228
Ditto	Nitrogen (Special)	1,168	2,336
Ditto	Humus (Special)	1,017	2,034
Ditto	Insoluble Residue (Special)	94	188
Ditto	Mechanical Analyses	1,174	1,174
Waters	Irrigation Waters	426	852
Manures	For Fertilisation Uses	98	196
Limes	ditto	35	70
Canes and Juices	Polarisation Tests	253	506
Sugar	ditto	11	22
Molasses	Complete Analyses	39	78
Sugar	ditto	60	120
Water	Complete Analyses, Total Solids	50	100
Basalts	ditto	10	20
Miscellaneous Analyses	ditto	187	374
		6,889	11,576

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

Much credit is due to Messrs. McCready and Foster, who have done very good work.

GEORGE E. PATTEN, First Assistant Chemist.

WORK OF THE MACKAY CENTRAL SUGAR EXPERIMENT STATION.

The experimental work at the Mackay Station has been carried out by the Assistant Director, Mr. H. T. Easterby, with the same rigid and careful attention to instructions that has uniformly marked that officer's execution of duty. In addition to having had the detailed charge of the field work, the following part of the report, relating to the Mackay Station, has also been prepared by Mr. Easterby; likewise the report upon the varieties of cane distributed in the several sugar districts which is embodied in his letter to the Director.

The work of the Mackay Experiment Station during the year has been the continuation of experiments upon the definite lines set out in preceding reports; the initiation of a new series of experiments with the ten best seedlings obtained from the Hambledon Plantation, Cairns; the further distribution of tested varieties of high promise to growers throughout the State, together with the raising of subsidiary crops, such as sorghums, sisal hemp, cotton, grasses, &c.

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

It will be remembered that, in the experiments with varieties of cane from different countries which, up to last year, had passed through the plant, first ratoon and second ratoon crops, a table was published in the last annual report showing the final action taken with each variety. Thus certain canes were abandoned as being worthless from a sugar-producing standpoint, others, which had previously been of promise, had contracted disease and were segregated in a station hospital to try the effect of new planting in virgin soil, while yet others were continued in cultivation.

Among the latter canes some varieties comprised in the original experiment were again ratooned for a fourth crop.

These third ratoons consisted of the following varieties:—New Guinea 4, 8A, 15, 24, 24A, 24B, 26, 37, 38, 40, 64, and 66.

The reasons given in last year's report for continuing these canes in a third ratoon crop were—They had given such satisfactory results as second ratoons, and had not, up to that date, shown any sign of debility or disease. But the principal and especial reason was that the scarcity and cost of labour was becoming more and more a controlling factor in sugar production.

It will be noted that all the canes in this third ratoon experiment are New Guinea varieties. Seven of them are included in the ten leading varieties forming the subject of another series of experiments.

The cultivation of the ratoons consisted of ploughing and subsoiling between the rows. Afterwards, until the cane was well up, it received light cultivation with a Planet Junior cultivator with broad hoes. Mixed fertilisers were applied to all the varieties; cultivation and fertilisation being exactly the same in each case. Immediately after ratooning good rains set in and continued till the end of the year, during which time the crop made a remarkably fine growth. The rainfall for the rest of the period of growth was small compared with recent years, but the crop, being well established, made great progress notwithstanding.

Progressive analyses of the varieties were carried out as usual up to the time of cutting. The value of these analyses as a guide to farmers and millowners has already been insisted on. The tables set out hereunder give the analytical results for the months of June, July, and August.

FIRST PRELIMINARY EXAMINATION OF THIRD RATOON CROP OF THE VARIETIES—JUNE, 1907.

Serial No.	Country.	No. or Name of Variety.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH.
28	New Guinea	New Guinea 4	5-6-07	8½ months	15.8	12.96	1.27	82.0	4.0
32	Do.	8A	5-6-07	do.	18.0	15.48	1.01	86.0	5.0
35	Do.	15	5-6-07	do.	18.1	16.14	.71	89.1	5.0
40	Do.	24	5-6-07	do.	16.2	13.23	1.27	81.6	5.0
41	Do.	24A	5-6-07	do.	17.5	15.48	.67	88.4	4.0
42	Do.	24B	5-6-07	do.	16.9	14.11	1.45	83.5	4.0
43	Do.	26	6-6-07	do.	16.1	13.36	1.30	82.9	4.0
46	Do.	37	6-6-07	do.	17.0	13.67	1.42	80.4	5.0
47	Do.	38	6-6-07	do.	17.2	14.06	1.45	81.7	5.0
49	Do.	40	6-6-07	do.	15.4	12.37	1.45	80.3	5.0
50	Do.	64	6-6-07	do.	16.3	12.89	1.64	79.0	5.0
61	Do.	66	6-6-07	do.	13.9	8.60	3.29	61.8	5.0

SECOND PROGRESSIVE EXAMINATION OF THIRD RATOON CROP OF THE VARIETIES—JULY, 1907.

Serial No.	Country.	No. or Name of Variety.	Date of Analysis.	Age of Cane.	Density of Juice (Brix)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH.
28	New Guinea	New Guinea 4	4-7-07	9½ months	17.0	14.82	.66	87.1	4.0
32	Do.	8A	4-7-07	do.	19.2	17.24	.66	89.7	4.0
35	Do.	15	4-7-07	do.	20.2	18.66	.28	92.3	4.0
40	Do.	24	4-7-07	do.	17.8	15.69	.73	88.1	3.0
41	Do.	24A	4-7-07	do.	17.9	15.69	.72	87.6	3.5
42	Do.	24B	4-7-07	do.	17.1	14.44	1.20	84.4	2.6
43	Do.	26	8-7-07	do.	16.8	14.44	.97	85.9	4.5
46	Do.	37	8-7-07	do.	16.9	13.56	1.56	80.2	4.0
47	Do.	38	8-7-07	do.	19.9	18.50	.56	92.9	4.5
49	Do.	40	8-7-07	do.	16.9	14.82	.78	87.6	3.5
59	Do.	64	8-7-07	do.	15.4	12.48	1.62	81.0	5.0
61	Do.	66	8-7-07	do.	17.6	13.50	2.08	76.7	5.5

THIRD PROGRESSIVE EXAMINATION OF THIRD RATOON CROP OF THE VARIETIES—AUGUST, 1907.

28	New Guinea	New Guinea 4	6-8-07	10½ months	17.3	15.48	.41	89.4	3.0
32	Do.	8A	6-8-07	do.	19.5	17.85	.36	91.5	5.0
35	Do.	15	6-8-07	do.	20.3	18.80	.27	92.6	4.0
40	Do.	24	6-8-07	do.	19.4	17.77	.32	91.6	2.5
41	Do.	24A	6-8-07	do.	19.6	18.19	.29	92.8	3.0
42	Do.	24B	6-8-07	do.	19.5	17.55	.68	90.0	2.5
43	Do.	26	7-8-07	do.	17.9	16.36	.53	91.4	4.5
46	Do.	37	7-8-07	do.	19.0	17.23	.38	90.7	4.0
47	Do.	38	7-8-07	do.	20.0	18.05	.55	90.2	4.0
49	Do.	40	7-8-07	do.	18.4	16.51	.47	89.7	4.5
59	Do.	64	7-8-07	do.	18.6	16.94	.55	91.0	4.6
61	Do.	66	7-8-07	do.	18.3	15.18	1.31	82.9	5.5

The final juice analyses, and estimation of the fibre in these varieties, were carefully carried out by Messrs. Anderssen and McCready early in September, immediately prior to the cutting and weighing of the crop. Bulk samples, consisting of all cane growing on 40 running feet, were used for analyses, the results of which appear below:—

FINAL EXAMINATION OF THIRD RATOON CROP OF THE VARIETIES—SEPTEMBER, 1907.

Serial No.	Country.	No. or Name of Variety.	Date of Analysis.	Age of Cane.	Density of Juice (Brix).	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH.	Fibre in Cane.	Sucrose in Cane.	Date of Harvesting.
28	New Guinea	New Guinea 4	4-9-07	11½ mos.	18.7	17.01	.41	90.9	5.0	13.52	13.22	
32	Do.	8A	4-9-07	do.	20.7	19.15	.37	92.5	5.5	9.30	17.27	
35	Do.	15	4-9-07	do.	22.2	20.76	.28	93.5	3.5	11.61	18.35	
40	Do.	24	4-9-07	do.	20.0	18.47	.33	92.3	5.5	10.47	16.53	
41	Do.	24A	4-9-07	do.	20.5	19.10	.35	93.1	4.5	10.92	17.61	
42	Do.	24B	4-9-07	do.	20.7	19.04	.59	91.9	4.5	11.25	14.58	
43	Do.	26	4-9-07	do.	18.2	16.36	.53	89.8	6.5	12.48	14.32	
46	Do.	37	4-9-07	do.	19.0	16.71	.35	87.9	5.0	11.47	14.79	22nd June
47	Do.	38	4-9-07	do.	19.5	17.77	.57	92.1	6.5	10.66	15.98	21st June
49	Do.	40	4-9-07	do.	18.2	16.63	.43	91.6	5.5	12.63	14.57	
59	Do.	64	4-9-07	do.	18.1	15.84	1.00	87.3	4.5	10.51	14.47	1st July
61	Do.	66	4-9-07	do.	19.0	15.73	1.35	83.0	4.5	9.22	14.32	28th May (July)

The balance of the crop was now cut, and most carefully weighed over the station weighbridge, the weights being subsequently checked by weighing at the Meadowlands Mill, to which place the cane was sent for crushing. The crop results, set out hereunder, are made up from the actual weighings, count of canes, and the analytical data provided by the laboratory:—

THIRD RATOON CROP—RESULTS OF THE VARIETIES, CONTINUED IN EXPERIMENT, 1907.

Serial No.	Country.	No. or Name of Variety.	Age of Cane.	Number of Canes per Acre.	Average Weight of the Sticks in Pounds	Weight of Cane per Acre in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
28	New Guinea	New Guinea 4	11½ months	52,635	1.9	45.8	15,621	6.9
32	Do.	8A	do.	37,389	2.5	41.8	16,275	7.2
35	Do.	15	do.	23,232	4.1	43.0	17,701	7.9
40	Do.	24	do.	48,520	2.4	54.0	20,001	8.9
41	Do.	24A	do.	30,855	2.9	41.0	15,652	6.9
42	Do.	24B	do.	30,492	2.9	40.0	15,157	6.7
43	Do.	26	do.	48,642	2.0	45.1	14,476	6.4
46	Do.	37	do.	41,403	2.0	38.4	12,744	5.6
47	Do.	38	do.	28,495	2.1	27.0	9,672	4.3
49	Do.	40	do.	31,581	3.4	48.3	15,787	7.0
59	Do.	64	do.	17,968	3.8	30.5	9,689	4.3
61	Do.	66	do.	54,450	2.5	61.7	10,791	8.8

It must be understood, as pointed out in several of the previous reports, that "Sugar per acre," in pounds and tons, shown in the above table, and in others appearing hereafter, means the sugar actually produced per acre, and not the amount recoverable by the mill, or "obtainable cane sugar," as it is frequently called, the latter phrase really depending on the skill of the manufacturer and the efficiency of his plant.

A table is now appended giving the total yield of cane and sugar per acre from the twelve varieties (which have been continued as a third ratoon crop) for the four years 1903 to 1907 inclusive:—

TOTAL RESULTS OF THE VARIETIES CONTINUED IN EXPERIMENT AS A THIRD RATOON CROP TO DATE: COVERING PLANT, FIRST RATOON, SECOND RATOON, AND THIRD RATOON CROPS, 1903-1907.

Serial No.	Country.	No. or Name of Variety.	Total Cane per Acre, English Tons (Four Crops).	Total Sugar per Acre, Pounds (Four Crops).	Total Sugar per Acre, English Tons (Four Crops).
28	New Guinea	New Guinea 4	188.6	61,969	27.6
32	Do.	8A	182.9	68,808	30.7
35	Do.	15	198.2	81,818	36.5
40	Do.	24	202.3	76,430	34.1
41	Do.	24A	187.9	71,415	31.8
42	Do.	24B	184.1	67,101	29.9
43	Do.	26	173.9	54,526	24.3
46	Do.	37	149.9	48,384	21.4
47	Do.	38	146.3	53,921	24.0
49	Do.	40	188.4	61,883	27.6
59	Do.	64	158.0	50,995	22.7
61	Do.	66	215.9	72,761	32.4

From the above table it will be seen that the leading varieties—New Guinea 8A, 15 (or Badila), 24 (or Goru), 24A, and 24B—are still maintaining the lead as sugar producers. Numbers 4, 26, 40, and 66 are not generally selected by growers. They are immense stolers, but the sticks are thin, and not adapted to white labour conditions.

The Director has frequently pointed out to farmers that continued ratooning over the second or third ratoon crop is, agriculturally speaking, bad practice; but the question of labour being at this time such a crucial and determining factor, he has decided to continue, for another crop at least, the ratooning of those varieties which still show a complete immunity from disease. As the Director tersely expressed it to the writer—"The final question is not how to get the biggest crop, but the getting of a crop that pays the biggest, and possibly the only kind of crop which the farmer, under present labour conditions, is able to get at all." As a matter of fact, the Director further stated: "High experimentation, and the best modern methods that are practised in other cane-growing countries, are gradually becoming impossible in Queensland, due to the want of labour power, at a paying cost, to carry such methods into practice."

EXPERIMENTS WITH THE TEN BEST VARIETIES TO DETERMINE THEIR RESPECTIVE AGRICULTURAL AND COMMERCIAL VALUES.

This new series of experiments, initiated in 1905, and of which the results of the plant crop were published in last year's report, has for its purpose the comparison and determination of the final commercial value of the ten leading varieties that have been brought into competition.

As explained last year, instead of limiting the experiment to a single and simple comparison, the series have been carried out in quadruplicate, and is 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.

As soon as the plant crop had been removed, the cane was ratooned. On the non-irrigated plats the middles were split open with the swing plough, followed by the sub-soiler to a depth of 18 inches. These furrows were then ploughed and subsoiled to a similar depth, thus ensuring all ground between the stoles being thoroughly stirred and subsoiled to a uniform depth. The manures were then applied to the manured plats, and covered by a furrow laid against the cane, the same act taking place with the plough on the plats with no manures. Finally, the whole ground between the stoles was levelled with a Planet Junior cultivator with broad hoes; the cane, until too large, being cultivated at intervals with the same implement. Thus, all cultivation on the non-irrigated plats was identical. On the irrigated plats cultivation was the same with regard to all the irrigated plats, but was not done with horse implements.

During the ratooning, and up till the end of the year 1906, wet weather was experienced, and it was not necessary to resort to irrigation. The usual volume of rain, however, did not fall during the wet season; but the amount was well distributed, and the non-irrigated cane suffered very little. The amount of irrigation water applied to the irrigated plats was only 4 inches, so that this year, on the average, no benefit has accrued from irrigation, the cultivation on the non-irrigated plats fully compensating for any lack of moisture. May and June of 1907 were very wet and warm, and a fair amount of growth took place during these months. The weather from that time till the harvesting of the crop has been abnormally dry and cool, scarcely any growth being made since June. The first preliminary examination of the quality of these ratoons was made in June, and a second and third progressive examination in July and August respectively. The data of these analyses are set out below:—

FIRST PRELIMINARY EXAMINATION OF IRRIGATED FIRST RATOON CANE: PLATS WITH MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JUNE, 1907.

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.	Acidity per 100 Juice Expressed in c. N/30 NaOH.
26	New Guinea	New Guinea 24	14-6-07	7 months...	16.1	12.46	1.95	77.3	4.0
37	Do.	24A	14-6-07	do. ...	16.3	12.80	1.86	78.5	4.0
18	Do.	24B	18-6-07	do. ...	15.6	11.86	1.98	76.0	4.0
19	Trinidad	Trinidad S. 60	18-6-07	do. ...	11.6	7.63	2.50	65.7	4.0
25	New Guinea	New Guinea 4	19-6-07	do. ...	16.2	12.82	1.78	79.1	4.0
26	Mauritius	Bois Rouge	19-6-07	do. ...	16.7	13.66	1.78	81.8	4.0
27	Do.	Settlers	19-6-07	do. ...	13.8	10.01	2.35	72.5	5.0
28	New Guinea	New Guinea 8a	20-6-07	do. ...	16.6	12.32	2.35	74.2	5.0
29	Do.	15	20-6-07	do. ...	20.3	18.63	.44	92.7	6.0
30	Do.	64	20-6-07	do. ...	12.4	7.92	2.90	63.8	4.0

SECOND PROGRESSIVE EXAMINATION OF IRRIGATED FIRST RATOON CANE: PLATS WITH MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JULY, 1907.

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.
16	New Guinea	New Guinea 24	12-7-07	8 months	15.7	11.86	1.78	75.5	4.0
17	Do.	24A	12-7-07	do.	17.5	14.35	1.60	82.0	3.5
18	Do.	24B	12-7-07	do.	16.8	13.90	1.52	82.7	3.5
19	Trinidad	Trinidad S. 60	15-7-07	do.	13.8	10.72	1.73	77.6	4.0
25	New Guinea	New Guinea 4	15-7-07	do.	17.3	15.10	1.09	87.2	3.5
26	Mauritius	Bois Rouge	16-7-07	do.	16.6	12.80	2.01	77.1	3.5
27	Do.	Settlers	16-7-07	do.	18.2	16.22	.81	89.1	3.5
28	New Guinea	New Guinea 8A	16-7-07	do.	19.4	16.71	1.12	86.1	5.0
29	Do.	15	17-7-07	do.	21.2	19.82	.28	93.4	3.5
30	Do.	64	17-7-07	do.	13.1	9.48	1.92	72.3	3.5

THIRD PROGRESSIVE EXAMINATION OF IRRIGATED FIRST RATOON CANE: PLATS WITH MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—AUGUST, 1907.

16	New Guinea	New Guinea 24	13-8-07	9 months...	19.5	17.34	.81	88.9	4.5
17	Do.	24A	14-8-07	do.	19.7	18.27	.52	92.7	3.5
18	Do.	24B	14-8-07	do.	18.7	16.86	.75	90.1	4.0
19	Trinidad	Trinidad S. 60	14-8-07	do.	12.4	8.08	2.19	65.1	4.5
25	New Guinea	New Guinea 4	15-8-07	do.	19.5	18.43	.28	94.5	3.0
26	Mauritius	Bois Rouge	15-8-07	do.	19.6	18.51	.41	94.4	3.5
27	Do.	Settlers	15-8-07	do.	18.7	17.66	.30	94.4	3.5
28	New Guinea	New Guinea 8A	16-8-07	do.	20.9	19.24	.41	92.0	3.5
29	Do.	15	16-8-07	do.	22.7	21.47	.14	94.5	3.0
30	Do.	64	16-8-07	do.	16.7	13.69	1.62	81.9	3.0

FIRST PRELIMINARY EXAMINATION OF IRRIGATED FIRST RATOON CANE: PLATS, NO MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JUNE, 1907.

16A	New Guinea	New Guinea 24	14-6-07	7 months...	16.7	14.20	1.33	85.0	4.0
17A	Do.	24A	18-6-07	do.	16.8	14.06	1.47	83.6	5.0
18A	Do.	24B	18-6-07	do.	16.7	14.06	1.45	84.1	5.0
19A	Trinidad	Trinidad S. 60	18-6-07	do.	16.1	13.53	1.48	84.0	4.0
25A	New Guinea	New Guinea 4	19-6-07	do.	16.5	13.79	1.27	83.5	5.0
26A	Mauritius	Bois Rouge	19-6-07	do.	16.0	12.82	2.05	80.1	5.0
27A	Do.	Settlers	19-6-07	do.	16.2	13.39	1.68	82.6	5.0
28A	New Guinea	New Guinea 8A	20-6-07	do.	19.9	16.99	.62	85.3	6.0
29A	Do.	15	20-6-07	do.	20.4	18.77	.49	92.0	7.0
30A	Do.	64	20-6-07	do.	16.4	13.79	1.52	84.0	4.0

SECOND PROGRESSIVE EXAMINATION OF IRRIGATED FIRST RATOON CANE: PLATS, NO MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JULY, 1907.

16A	New Guinea	New Guinea 24	12-7-07	8 months...	18.3	16.19	.97	88.4	4.0
17A	Do.	24A	12-7-07	do.	16.9	13.77	1.78	81.4	3.0
18A	Do.	24B	15-7-07	do.	18.3	16.00	1.07	87.4	3.5
19A	Trinidad	Trinidad S. 60	15-7-07	do.	17.3	15.56	.67	89.9	4.5
25A	New Guinea	New Guinea 4	15-7-07	do.	18.8	17.48	.39	92.9	5.0
26A	Mauritius	Bois Rouge	16-7-07	do.	20.0	17.97	.57	89.8	5.5
27A	Do.	Settlers	16-7-07	do.	19.1	17.48	.56	91.5	4.0
28A	New Guinea	New Guinea 8A	16-7-07	do.	21.1	19.82	.22	93.9	5.0
29A	Do.	15	17-7-07	do.	21.3	19.99	.24	93.8	5.0
30A	Do.	64	17-7-07	do.	15.8	12.91	1.54	81.7	3.0

THIRD PROGRESSIVE EXAMINATION OF IRRIGATED FIRST RATOON CANE: PLATS, NO MANURES;
OTHER CONDITIONS OF CULTIVATION BEING EQUAL—AUGUST, 1907.

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 NHO ₃ .
16A	New Guinea	New Guinea 24	14-8-07	9 months...	19.3	17.74	.54	91.9	4.0
17A	Do.	24A	14-8-07	do. ...	18.4	15.79	1.16	85.8	3.0
18A	Do.	24B	14-8-07	do. ...	19.9	17.97	.71	90.3	3.0
19A	Trinidad	Trinidad S. 60	14-8-07	do. ...	18.2	17.16	.40	94.2	3.5
25A	New Guinea	New Guinea 4	15-8-07	do. ...	19.8	18.63	.23	94.0	5.0
26A	Mauritius	Bois Rouge	15-8-07	do. ...	21.0	19.25	.50	91.7	4.5
27A	Do.	Settlers	15-8-07	do. ...	19.1	18.04	.25	94.4	3.5
28A	New Guinea	New Guinea 8A	16-8-07	do. ...	21.4	20.20	.24	94.4	3.0
29A	Do.	15	16-8-07	do. ...	22.4	21.16	.16	94.4	4.5
30A	Do.	64	16-8-07	do. ...	20.3	18.85	.49	92.8	5.0

FIRST PRELIMINARY EXAMINATION OF NON-IRRIGATED FIRST RATOON CANE: PLATS WITH MIXED
MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JUNE, 1907.

1	New Guinea	New Guinea 24	7-6-07	7 months...	15.7	12.15	1.89	77.8	4.0
2	Do.	24A	7-6-07	do. ...	16.7	13.48	1.49	80.7	4.0
3	Do.	24B	7-6-07	do. ...	15.1	10.45	1.45	69.2	4.0
4	Trinidad	Trinidad S. 60	10-6-07	do. ...	9.9	5.44	1.78	54.9	5.0
10	New Guinea	New Guinea 4	10-6-07	do. ...	14.7	10.69	2.23	72.7	4.0
11	Mauritius	Bois Rouge	10-6-07	do. ...	16.5	13.10	1.86	79.3	4.0
12	Do.	Settlers	11-6-07	do. ...	13.5	9.57	2.40	70.8	5.0
13	New Guinea	New Guinea 8A	11-6-07	do. ...	17.5	13.34	2.19	76.2	4.0
14	Do.	15	11-6-07	do. ...	17.5	14.52	1.42	82.0	4.0
15	Do.	64	14-6-07	do. ...	13.6	9.60	2.31	70.5	4.0

SECOND PROGRESSIVE EXAMINATION OF NON-IRRIGATED FIRST RATOON CANE: PLATS WITH MIXED
MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JULY, 1907.

1	New Guinea	New Guinea 24	9-7-07	8 months...	17.6	15.10	1.21	85.8	3.5
2	Do.	24A	9-7-07	do. ...	17.8	15.45	1.06	86.8	3.5
3	Do.	24B	9-7-07	do. ...	16.5	12.89	1.86	78.1	3.5
4	Trinidad	Trinidad S. 60	9-7-07	do. ...	10.5	6.97	1.42	66.3	5.0
10	New Guinea	New Guinea 4	10-7-07	do. ...	15.3	11.67	1.64	76.2	3.0
11	Mauritius	Bois Rouge	10-7-07	do. ...	18.0	15.10	1.52	83.8	3.5
12	Do.	Settlers	11-7-07	do. ...	17.0	14.17	1.50	83.3	3.0
13	New Guinea	New Guinea 8A	11-7-07	do. ...	17.2	12.96	1.98	75.3	4.0
14	Do.	15	11-7-07	do. ...	18.0	15.98	.89	88.7	3.5
15	Do.	64	12-7-07	do. ...	12.8	8.91	1.98	69.6	3.5

THIRD PROGRESSIVE EXAMINATION OF NON-IRRIGATED FIRST RATOON CANE: PLATS WITH MIXED
MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—AUGUST, 1907.

1	New Guinea	New Guinea 24	7-8-07	9 months	19.4	16.79	.99	86.5	3.0
2	Do.	24A	8-8-07	do.	19.3	17.32	.69	89.7	3.5
3	Do.	24B	9-8-07	do.	17.3	14.41	1.42	83.3	3.0
4	Trinidad	Trinidad S. 60	9-8-07	do.	14.3	11.12	1.48	77.7	3.5
10	New Guinea	New Guinea 4	9-8-07	do.	17.8	15.15	1.07	85.1	3.5
11	Mauritius	Bois Rouge	12-8-07	do.	19.6	17.00	.48	89.8	3.5
12	Do.	Settlers	12-8-07	do.	16.8	13.34	1.73	79.4	3.0
13	New Guinea	New Guinea 8A	12-8-07	do.	18.0	14.65	1.35	81.3	3.5
14	Do.	15	13-8-07	do.	19.3	17.85	.45	92.4	4.0
15	Do.	64	13-8-07	do.	16.9	14.06	1.38	83.2	2.5

FIRST PRELIMINARY EXAMINATION OF NON-IRRIGATED FIRST RATOON CANE: PLATS, NO MANURES;
ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JUNE, 1907.

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.
1A	New Guinea	New Guinea 24	7-6-07	7 months...	16.9	13.72	1.56	81.1	4.0
2A	Do.	24A	7-6-07	do.	17.3	14.46	1.54	83.5	4.0
3A	Do.	24B	7-6-07	do.	15.6	12.02	2.08	77.0	4.0
4A	Trinidad	Trinidad S. 60	10-6-07	do.	14.2	10.63	2.08	74.8	5.0
10A	New Guinea	New Guinea 4	10-6-07	do.	14.9	11.40	1.64	76.5	5.0
11A	Mauritius	Bois Rouge	11-6-07	do.	17.4	14.52	1.56	83.4	5.0
12A	Do.	Settlers	11-6-07	do.	15.8	12.74	1.62	80.6	5.0
13A	New Guinea	New Guinea 8A	11-6-07	do.	17.7	14.22	1.84	80.3	5.0
14A	Do.	15	14-6-07	do.	18.0	15.71	1.20	87.2	4.0
15A	Do.	64	14-6-07	do.	15.2	12.07	1.98	79.4	4.0

SECOND PROGRESSIVE EXAMINATION OF NON-IRRIGATED FIRST RATOON CANE: PLATS, NO MANURES;
ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—JULY, 1907.

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.
1A	New Guinea	New Guinea 24	9-7-07	8 months...	17.7	18.84	1.39	83.8	4.5
2A	Do.	24A	9-7-07	do.	18.1	15.61	1.02	86.2	4.5
3A	Do.	24B	9-7-07	do.	17.7	14.79	1.64	83.5	3.5
4A	Trinidad	Trinidad S. 60	10-7-07	do.	16.6	14.14	1.25	85.1	5.0
10A	New Guinea	New Guinea 4	10-7-07	do.	13.9	9.88	2.08	71.0	6.5
11A	Mauritius	Bois Rouge	10-7-07	do.	19.2	17.06	1.07	88.8	4.0
12A	Do.	Settlers	11-7-07	do.	17.0	15.02	.93	88.3	4.0
13A	New Guinea	New Guinea 8A	11-7-07	do.	20.7	18.51	.59	89.4	4.0
14A	Do.	15	11-7-07	do.	19.8	18.16	.64	91.7	3.5
15A	Do.	64	12-7-07	do.	16.3	13.32	1.43	81.7	3.0

THIRD PROGRESSIVE EXAMINATION OF NON-IRRIGATED FIRST RATOON CANE: PLATS, NO MANURES;
ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—AUGUST, 1907.

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.
1A	New Guinea	New Guinea 24	8-8-07	9 months...	20.4	18.99	.41	93.0	3.5
2A	Do.	24A	8-8-07	do.	19.4	17.42	.77	89.8	3.0
3A	Do.	24B	9-8-07	do.	18.6	16.56	1.08	89.0	2.5
4A	Trinidad	Trinidad S. 60	9-8-07	do.	17.8	16.03	.62	90.0	5.0
10A	New Guinea	New Guinea 4	12-8-07	do.	15.4	12.10	1.30	78.5	4.5
11A	Mauritius	Bois Rouge	12-8-07	do.	19.7	17.90	.62	90.8	4.0
12A	Do.	Settlers	12-8-07	do.	19.8	18.36	.36	92.7	3.0
13A	New Guinea	New Guinea 8A	13-8-07	do.	20.4	18.75	.44	91.9	4.5
14A	Do.	15	13-8-07	do.	20.0	18.84	.31	94.2	3.5
15A	Do.	64	13-8-07	do.	18.4	16.42	.84	89.2	3.0

The fibre analyses and final examination of the varieties were carried out by Messrs. Anderssen and McCready in a most careful and accurate manner. All cane, great and small, growing on 40 running feet, was used for samples from each plat. The final tables of analyses are now given—

FINAL EXAMINATION OF IRRIGATED FIRST RATOON CANE: PLATS WITH MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—SEPTEMBER, 1907.

No. of Plat.	Country.	Variety of Cane.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Acidity per 100 Juice Expressed in c. c. N. 10 NaOH.	Fibre in Cane.	Sucrose in Cane.	Date of Arrowing.
16	New Guinea ...	New Guinea 24 ...	19-9-07	10 mo's	21.6	20.27	.44	93.8	3.5	9.67	18.31	8 August (very slightly)
17	Do. ...	24A ...	18-9-07	do.	19.6	17.07	.96	87.0	4.0	11.92	15.03	
18	Do. ...	24B ...	18-9-07	do.	21.1	19.37	.59	91.8	3.0	11.17	17.20	
19	Trinidad ...	Trinidad S. 60 ...	18-9-07	do.	15.6	12.91	1.25	82.7	3.5	11.44	11.43	
25	New Guinea ...	New Guinea 4 ...	18-9-07	do.	20.6	19.04	.34	90.2	2.5	11.08	16.93	
26	Mauritius ...	Bois Rouge ...	18-9-07	do.	21.5	20.22	.36	94.0	4.0	12.27	17.74	9 May (fully)
27	Do. ...	Settlers ...	18-9-07	do.	22.5	21.36	.21	94.9	3.5	11.56	18.89	
28	New Guinea ...	New Guinea 8A ...	18-9-07	do.	19.8	17.63	.77	89.0	3.5	9.44	15.96	22 June (slightly)
29	Do. ...	15 ...	18-9-07	do.	20.0	17.97	.71	89.8	3.5	10.77	16.03	
30	Do. ...	64 ...	18-9-07	do.	18.4	16.00	1.12	86.9	4.5	10.97	14.24	22 June

FINAL EXAMINATION OF IRRIGATED FIRST RATOON CANE: PLATS, NO MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—SEPTEMBER, 1907.

16A	New Guinea ...	New Guinea 24 ...	19-9-07	10 mo's	21.0	18.84	.28	89.7	4.5	11.61	16.65	23rd July (very slightly)
17A	Do. ...	do. 24A ...	18-9-07	do.	21.0	19.61	.49	93.3	3.0	12.06	17.24	
18A	Do. ...	do. 24B ...	18-9-07	do.	20.7	19.60	.21	94.6	3.0	11.75	17.29	
19A	Trinidad ...	Trinidad S. 60 ...	18-9-07	do.	18.7	16.96	.62	90.7	4.0	11.08	15.08	28th June
25A	New Guinea ...	New Guinea 4 ...	18-9-07	do.	20.8	19.85	.11	95.0	4.5	10.87	17.69	
26A	Mauritius ...	Bois Rouge ...	18-9-07	do.	20.4	18.80	.41	92.1	5.0	12.20	16.50	9th May (fully)
27A	Do. ...	Settlers ...	18-9-07	do.	21.1	19.87	.19	94.1	4.0	12.00	17.48		8th July (slightly)
28A	New Guinea ...	New Guinea 8A ...	18-9-07	do.	18.8	16.18	.89	86.0	3.5	9.54	14.63	21st June (slightly)
29A	Do. ...	do. 15 ...	18-9-07	do.	22.5	21.46	.21	95.3	4.0	12.05	18.87	
30A	Do. ...	do. 64 ...	18-9-07	do.	20.7	19.49	.47	94.1	3.0	11.98	17.15	20th June

FINAL EXAMINATION OF NON-IRRIGATED FIRST RATOON CANE: PLATS WITH MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—SEPTEMBER, 1907.

1	New Guinea ...	New Guinea 24 ...	18-9-07	10 mo's	20.5	19.10	.31	93.1	3.5	9.67	17.25	
2	Do. ...	24A ...	17-9-07	do.	19.7	17.79	.68	90.3	4.0	11.92	15.67	
3	Do. ...	24B ...	17-9-07	do.	19.1	16.87	1.09	88.3	2.5	11.17	14.98	
4	Trinidad ...	Trinidad S. 60 ...	17-9-07	do.	16.9	13.45	.93	79.5	4.0	11.44	11.91	
10	New Guinea ...	New Guinea 4 ...	17-9-07	do.	16.7	14.28	.97	85.5	5.0	11.08	12.69	
11	Mauritius ...	Bois Rouge ...	17-9-07	do.	21.2	19.93	.25	94.0	4.0	12.27	17.48	9th May (fully)
12	Do. ...	Settlers ...	17-9-07	do.	20.4	19.15	.42	93.8	4.5	11.53	16.93		5th Aug.
13	New Guinea ...	New Guinea 8A ...	17-9-07	do.	20.5	18.67	.65	91.0	6.0	9.44	16.90	22nd June (slightly)
14	Do. ...	15 ...	17-9-07	do.	22.5	21.54	.16	95.7	4.5	10.77	19.22	
15	Do. ...	64 ...	17-9-07	do.	17.7	15.51	1.06	87.6	2.5	10.97	13.81	15th July

FINAL EXAMINATION OF NON-IRRIGATED FIRST RATOON CANE: PLATS, NO MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—SEPTEMBER, 1907.

1A	New Guinea ...	New Guinea 24 ...	18-9-07	10 mo's	20.4	19.57	.16	95.9	3.0	11.61	17.29	1st Aug. (very slightly)
2A	Do. ...	24A ...	17-9-07	do.	21.0	19.74	.41	94.0	3.0	12.06	17.36	
3A	Do. ...	24B ...	17-9-07	do.	20.5	19.44	.32	94.8	3.0	11.75	17.15	
4A	Trinidad ...	Trinidad S. 60 ...	17-9-07	do.	19.4	18.00	.44	92.7	5.0	11.08	16.0	1st July
10A	New Guinea ...	New Guinea 4 ...	17-9-07	do.	20.0	18.63	.17	93.4	5.0	10.87	16.65	
11A	Mauritius ...	Bois Rouge ...	17-9-07	do.	21.0	19.85	.25	94.5	4.0	12.29	17.42	9th May (fully)
12A	Do. ...	Settlers ...	17-9-07	do.	20.8	19.82	.14	95.2	4.5	12.00	17.44	
13A	New Guinea ...	New Guinea 8A ...	17-9-07	do.	21.5	20.62	.14	95.9	5.5	9.54	18.65	21st June (slightly)
14A	Do. ...	15 ...	17-9-07	do.	22.8	21.43	.15	96.1	3.5	12.05	18.84	
15A	Do. ...	64 ...	17-9-07	do.	19.4	18.13	.71	93.4	3.5	11.98	25.96	20th June

The action of irrigation and manures, upon the density and purity of the sugar juices, is set out in the table following, where it is seen that the indications pointed out last year have been again repeated—namely, that irrigation and manures have a tendency, while increasing the yield, to lower the purity of the juices. As previously stated, however, this does not apply to cane from land thoroughly exhausted by long and continuous cropping:—

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

Conditions.	Average Density of Juice (Brix.)	Average Sucrose in Juice.	Average Quotient of Purity.
Irrigated plats : mixed manures	20.0	18.18	90.9
Irrigated plats : no manures	20.5	19.06	92.9
Non-irrigated plats : mixed manures	19.5	17.63	90.4
Non-irrigated plats : no manures	20.6	19.53	94.8

After the analyses of the varieties had been carried out, each plat was cut and sent to Meadowlands Mill, and weighed separately over the weighbridge. Check weighings were also made at intervals over the station weighbridge. From the figures thus obtained, with a count of the canes, the following tables of crop results under the four sets of conditions have been compiled:—

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

1.—IRRIGATED PLATS: MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—1907.

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.
16	New Guinea	New Guinea 24	10½ months	33,976	3.5	53.4	21,904	97
17	Do.	24A	do.	33,759	3.3	50.1	16,871	75
18	Do.	24B	do.	34,630	3.1	49.3	19,003	84
19	Trinidad	Trinidad S. 60	do.	32,670	2.3	34.7	8,885	39
25	New Guinea	New Guinea 4	do.	58,152	1.4	38.3	14,540	64
26	Mauritius	Bois Rouge	do.	33,759	2.3	35.7	14,186	63
27	Do.	Settlers	do.	43,342	1.9	37.0	15,677	69
28	New Guinea	New Guinea 8A	do.	40,946	2.2	40.5	14,509	64
29	Do.	15	do.	30,274	3.6	48.9	17,579	78
30	Do.	64	do.	21,562	3.2	31.7	10,121	45

2.—IRRIGATED PLATS: NO MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—1907.

16A	New Guinea	New Guinea 24	10½ months	26,136	3.7	43.8	16,365	73
17A	Do.	24A	do.	26,789	3.7	44.6	17,249	77
18A	Do.	24B	do.	20,908	3.5	28.5	11,048	49
19A	Trinidad	Trinidad S. 60	do.	31,798	2.8	40.2	13,604	60
25A	New Guinea	New Guinea 4	do.	42,688	1.3	25.3	10,035	44
26A	Mauritius	Bois Rouge	do.	18,730	3.6	30.7	11,364	50
27A	Do.	Settlers	do.	23,740	2.3	25.3	9,920	44
28A	New Guinea	New Guinea 8A	do.	36,372	2.0	32.8	10,780	48
29A	Do.	15	do.	27,007	2.7	33.0	13,978	62
30A	Do.	64	do.	23,958	2.6	22.0	8,485	37

3.—NON-IRRIGATED PLATS: MIXED MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—1907.

No. of Plat.	Country.	No. or Name of Variety.	Age of Cane.	No. of Canes per Acre.	Average Weight of Canes 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	New Guinea 24	10½ months...	36,590	3.1	52.1	20,152	8.0
2	Do.	24A	do.	32,670	3.1	46.1	16,216	7.2
3	Do.	24B	do.	30,492	3.9	53.7	18,020	8.0
4	Trinidad	Trinidad S. 60	do.	25,047	2.9	32.8	8,776	3.9
10	New Guinea	New Guinea 4	do.	41,382	2.4	46.0	13,097	5.8
11	Mauritius	Bois Rouge	do.	33,323	2.7	41.0	16,064	7.1
12	Do.	Settlers	do.	33,105	2.2	32.8	12,449	5.5
13	New Guinea	New Guinea 8A	do.	33,323	2.6	38.9	14,751	6.5
14	Do.	15	do.	23,522	4.4	46.2	19,925	8.8
15	Do.	64	do.	14,374	5.4	35.0	10,534	4.8

4.—NON-IRRIGATED PLATS: NO MANURES; ALL OTHER CONDITIONS OF CULTIVATION BEING EQUAL—1907.

1A	New Guinea	New Guinea 24	10½ months...	25,264	2.7	30.9	12,602	5.3
2A	Do.	24A	do.	31,363	2.8	39.9	15,522	6.9
3A	Do.	24B	do.	25,482	3.3	38.3	14,744	6.5
4A	Trinidad	Trinidad S. 60	do.	25,264	3.2	36.3	13,015	5.8
10A	New Guinea	New Guinea 4	do.	48,569	1.7	38.7	14,436	6.4
11A	Mauritius	Bois Rouge	do.	30,056	2.1	28.5	11,126	4.9
12A	Do.	Settlers	do.	27,007	1.6	20.3	7,967	3.5
13A	New Guinea	New Guinea 8A	do.	18,513	3.3	27.6	11,506	5.1
14A	Do.	15	do.	19,602	3.7	32.7	13,800	6.1
15A	Do.	64	do.	13,068	4.1	24.4	8,741	3.9

The summary table following presents the average results obtained from the plats under the four sets of conditions. It is shown that the irrigated plats with manures gave a slightly lower result than the corresponding non-irrigated plats with manures; while the irrigated plats with no manures gave a slightly higher result than the corresponding non-irrigated plats with no manures. The irrigated plats with manures show an increase of 9.3 tons of cane per acre, and 1.3 tons of sugar over the irrigated plats with no manures; and the non-irrigated plats with manures show an increase of 10.7 tons of cane and 1.2 tons of sugar per acre over the non-irrigated plats with no manures.

SUMMARY TABLE.

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

Conditions.	Weight of Cane per Acre in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
Irrigated plats: mixed manures; other conditions of cultivation being equal	45.9	15,327	6.8
Irrigated plats: no manures; other conditions of cultivation being equal	32.6	12,234	5.4
Non-irrigated plats: mixed manures; other conditions of cultivation being equal	42.4	15,028	6.7
Non-irrigated plats: no manures; other conditions of cultivation being equal	31.7	12,235	5.4

In considering the above tables it will be seen that the unmanured plats of Trinidad Seeding 60 have again given a higher yield than the manured plats. This is due to the facts explained last year—namely, that a large proportion of the plants on the manured plats failed to germinate. The low yield on the irrigated plat without manure of New Guinea 24B is accounted for by the fact that a large

number of stoles failed to throw out ratoons. No explanation was found for this circumstance, the treatment of this plot being the same as on the other plots, under the same conditions. It is, therefore seen that the manure experiment was upset by other conditions of the crop; or, in other words, by the failure of the stand of cane on the unmanured plot.

It was anticipated last year that in the ratoon crops the manures would give a larger account of themselves. This, as already pointed out, has been amply proved, the average of the irrigated and non-irrigated plots, with manures, showing an increase of 9.3 and 10.7 tons of cane per acre respectively, due to the fertilisers applied. The largest increase, due to manure, was (excluding the irrigated plots of New Guinea 24E already referred to) in the non-irrigated plots of New Guinea 24B with and without manures, where 15.4 tons of cane per acre increase is shown as due to manure; while the smallest difference is in the non-irrigated plots of Bois Rouge with and without manures, the increase being only 5 tons per acre.

As Assistant Director in charge of the details of the experimental work, these observations have been of the greatest interest to the writer. The Director has consistently, throughout the experiments, called attention to what might be looked for as to the outcome in connection with irrigation, deep cultivation, and especially manuring. He indicated what was to be expected at different periods of the experiments in connection with the application of manures, and when the manures would begin to tell upon the crop. These forecasts have been fully realised; and have furnished, not only a guide, but also much interest to the person in charge of the execution of the work.

In comparing the results from the first ratoon crop with those obtained from the plant crop last year, it must be remembered we are now dealing with a ten and a-half months' crop, the plant crop being seventeen months old at time of harvest.

As far as these experiments have now gone, the New Guinea canes of the 24 series, with New Guinea 15 (or Badila), are still maintaining the lead, both in cane and sugar production, over their rivals from Mauritius and Trinidad.

SUBSOILING AND CULTIVATION EXPERIMENT WITH CANE KNOWN AS NEW GUINEA 40: FIRST 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 9 to 9 inches of true soil, was divided into ten plots, and planted with the variety known as New Guinea 40. The first ratoons of this variety were separated into two portions of five plots each. One such portion was ploughed and deeply subsoiled between the rows, and subsequently cultivated with the Planet Junior cultivator until out of hand, while the other portion received no treatment whatever, beyond being kept free from weeds, although the land for the plant crop had originally been subsoiled. The analyses of these canes is shown in the following tables:—

FIRST PROGRESSIVE EXAMINATION OF FIRST RATOON CANE, NEW GUINEA 40—JUNE, 1907.

Conditions of Experiments.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH.
Subsoiled and cultivated	10-6-07	7 months	15.0	11.83	1.78	78.8	5.0
Not subsoiled and not cultivated	18-6-07	do.	16.1	13.09	1.52	81.3	5.0

SECOND PROGRESSIVE EXAMINATION OF FIRST RATOON CANE, NEW GUINEA 40—JULY, 1907.

Subsoil and cultivated	10-7-07	8 months	16.8	14.06	1.42	83.6	5.5
Not subsoiled and not cultivated	15-7-07	do.	18.2	16.55	.60	90.9	5.0

THIRD PROGRESSIVE EXAMINATION OF FIRST RATOON CANE, NEW GUINEA 40—AUGUST, 1907.

Subsoiled and cultivated	9-8-07	9 months	16.8	14.52	.94	86.4	3.0
Not subsoiled and not cultivated	15-8-07	do.	19.1	18.02	.28	94.3	6.5

FINAL EXAMINATION OF FIRST RATOON CANE, NEW GUINEA 40—SEPTEMBER, 1907.

Conditions of Experiment.	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.	Sucrose in Cane.	Sucrose in Cane.	Date of Harvesting.
Subsoiled and cultivated	17-9-07	10 mo's.	18.9	17.45	.39	92.3	5.5	12.11	15.33	...
Not subsoiled and not cultivated	18-9-07	do.	19.2	17.99	.15	93.7	4.0	12.08	15.81	...

These plats were harvested at the same time as the first ratoons of the ten leading varieties, and the results are given below:—

CROP RESULTS OF NEW GUINEA 40: FIRST RATOONS; 1907.

No. 1.—RATOONS SUBSOILED AND CULTIVATED.

Plat Numbers.	No. of Variety.	Age of Cane.	No. of Canes per Acre.	Average Weight of the Sticks in Pounds.	Weight of Cane per Acre in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
5 to 9	New Guinea 40	10½ months	32,016	27	38.9	13,386	5.9

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

20 to 24	New Guinea 40	10½ months	20,473	2.9	27.0	9,596	4.2
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The increased yield, due solely to subsoiling and cultivation of the ratoons, amounted to 11.9 tons of cane and 1.7 tons of sugar per acre. None of these plats were manured or irrigated.

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 first 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 feet; and under the heading of "Weight of seed used per acre," it is seen that, while one continuous stick in the row used 2½ tons of seed per acre, the other extreme of 36 inches 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 feet used 1 ton 18 cwt. of seed per acre, while the distance of 7 feet between the row used 1 ton 2 cwt. per acre. These data require to be kept in mind when the crop results are dealt with in a later place.

DISTANCE EXPERIMENTS.
CANE PLANTS USED PER ACRE.
FIRST SERIES.

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

SECOND SERIES.

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

The foregoing data were given in connection with the plant crop, the results of which were published last year. They will, however, be useful in considering the results of the first ratoon crop of these experiments, which are now to hand. The preliminary and final analyses of the crop will be found in the following tables:—

FIRST PRELIMINARY EXAMINATION OF FIRST RATOON CANE IN THE DISTANCE EXPERIMENTS—
JUNE, 1907.

FIRST SERIES.

Variety of Cane.	Distance between the Plants.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH.
New Guinea 40	Continuous stick in the row ...	21-6-07	7 months ...	11.1	5.39	3.57	48.5	4.0
40	Plants 6 inches apart	21-6-07	do. ...	13.2	8.85	2.84	67.0	4.5
40	Plants 12 inches apart	24-6-07	do. ...	13.8	9.90	2.50	71.7	4.0
40	Plants 18 inches apart	24-6-07	do. ...	14.4	10.26	2.15	71.2	5.0
40	Plants 24 inches apart	24-6-07	do. ...	13.9	9.85	2.50	70.8	4.0
40	Plants 36 inches apart	24-6-07	do. ...	13.3	8.88	2.66	66.7	4.0

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.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH.
New Guinea 24A	4 feet	21-6-07	7 months ...	15.9	12.19	2.12	76.6	4.0
24A	5 feet	21-6-07	do. ...	15.5	10.35	2.50	66.7	3.5
24A	6 feet	21-6-07	do. ...	15.1	11.08	2.36	73.3	4.0
24A	7 feet	21-6-07	do. ...	15.5	11.77	2.15	75.9	4.0

SECOND PROGRESSIVE EXAMINATION OF FIRST RATOON CANE IN THE DISTANCE EXPERIMENTS—
JULY, 1907.

FIRST SERIES.

Variety of Cane.	Distance between the Plants.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH.
New Guinea 40	Continuous stick in the row	18-7-07	8 months ...	14.2	10.23	2.31	72.0	5.5
40	Plants 6 inches apart	18-7-07	do. ...	15.1	11.02	2.19	72.9	4.5
40	Plants 12 inches apart	18-7-07	do. ...	15.8	12.16	2.05	76.9	4.0
40	Plants 18 inches apart	18-7-07	do. ...	15.6	11.94	1.62	76.5	4.0
40	Plants 24 inches apart	19-7-07	do. ...	14.4	10.75	2.19	74.6	3.0
40	Plants 36 inches apart	19-7-07	do. ...	15.4	12.02	1.69	78.0	3.5

SECOND SERIES.

Variety of Cane.	Distance between the Rows.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH.
New Guinea 24A	4 feet	17-7-07	8 months ...	15.4	12.62	2.05	76.9	3.0
24A	5 feet	17-7-07	do. ...	15.6	11.32	2.50	72.5	4.5
24A	6 feet	18-7-07	do. ...	17.4	14.22	1.73	81.7	3.0
24A	7 feet	18-7-07	do. ...	18.0	15.45	1.21	85.8	3.5

THIRD PROGRESSIVE EXAMINATION OF FIRST RATOON CANE IN THE DISTANCE EXPERIMENTS—
AUGUST, 1907.

FIRST SERIES.

Variety of Cane.	Distance between the Plants.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH.
New Guinea 40	Continuous stick in the row	20-8-07	9 months ...	17.6	15.45	.92	87.7	5.0
40	Plants 6 inches apart	20-8-07	do. ...	16.7	13.79	1.22	82.5	5.5
40	Plants 12 inches apart	20-8-07	do. ...	17.6	15.15	.91	86.0	5.5
40	Plants 18 inches apart	21-8-07	do. ...	15.7	12.99	1.19	82.7	4.0
40	Plants 24 inches apart	21-8-07	do. ...	17.0	14.57	.90	85.7	3.5
40	Plants 36 inches apart	21-8-07	do. ...	17.4	15.07	.86	86.6	4.0

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.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH.
New Guinea 24A	4 feet	19-8-07	9 months ...	17.4	14.01	1.78	80.5	3.0
24A	5 feet	20-8-07	do. ...	20.4	19.12	.46	93.7	3.0
24A	6 feet	20-8-07	do. ...	16.9	13.58	1.56	80.3	4.0
24A	7 feet	20-8-07	do. ...	18.8	15.92	1.30	84.6	4.0

FINAL EXAMINATION OF FIRST RATOON CANE IN THE DISTANCE EXPERIMENTS—SEPTEMBER, 1907.
FIRST SERIES.

Variety of Cane.	Distance between the Plants.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH	Fibre in Cane	Sucrose in Cane.	Date of Arrowing.
New Guinea 40	Continuous stick in the row ...	19-9-07	10 months	17.7	15.67	.96	88.5	4.5	10.15	14.08	...
40	Plants 6 inches apart ...	19-9-07	do. ...	18.1	16.17	.87	89.3	5.5	11.11	14.37	...
40	Plants 12 inches apart ...	19-9-07	do. ...	17.7	15.42	1.09	87.1	4.5	10.43	13.81	1st Aug. (very slight)
40	Plants 18 inches apart ...	19-9-07	do. ...	18.8	17.22	.54	91.6	3.5	9.83	15.52	...
40	Plants 24 inches apart ...	19-9-07	do. ...	18.7	17.09	.58	91.3	4.0	10.90	15.22	...
40	Plants 36 inches apart ...	19-9-07	do. ...	18.5	17.25	.41	93.2	4.5	10.69	15.40	...

SECOND SERIES.

Variety of Cane.	Distance between the Rows.	Date of Analysis.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Acidity per 100 Juice Expressed in c.c. N/10 NaOH.	Fibre in Cane.	Sucrose in Cane.	Date of Arrowing.
New Guinea 24A	4 feet ...	19-9-07	10 months	19.3	17.75	.78	89.6	3.5	9.00	16.15	...
24A	5 feet ...	19-9-07	do. ...	20.0	18.16	.72	90.8	2.5	9.71	16.39	...
24A	6 feet ...	19-9-07	do. ...	18.6	16.61	.87	89.3	3.5	9.72	14.99	...
24A	7 feet ...	19-9-07	do. ...	20.1	18.18	.65	90.4	3.5	10.41	16.28	...

It will be noticed that the density, sucrose, and purity of the juice increases, on the whole, in the canes comprised in the first series, which were planted the greater distance apart in the rows. This was the case also in the plant crop. The second series, where the distance varies between the rows, does not show a great deal of difference in the ratoon crop this year.

The crop results of the first ratoons of the distance experiments were arrived at in precisely the same manner as the other experiments, and are set out hereunder:—

CROP RESULTS OF THE DISTANCE EXPERIMENTS: FIRST RATOONS, 1907.

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 ...	10½ months	37,897	2.6	44.6	14,082	6.2
2. Plants 6 inches apart ...	40 ...	do. ...	39,857	2.5	45.0	14,485	6.4
3. Plants 12 inches apart ...	40 ...	do. ...	36,808	2.4	41.0	12,698	5.6
4. Plants 18 inches apart ...	40 ...	do. ...	29,880	2.9	39.6	13,869	6.1
5. Plants 24 inches apart ...	40 ...	do. ...	33,976	2.6	39.5	13,472	6.0
6. Plants 36 inches apart ...	40 ...	do. ...	32,670	2.5	37.6	12,870	5.7

SECOND SERIES.

Distance between the Rows.	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. 4 feet apart ...	New Guinea 24A ...	10½ months	35,486	3.7	56.5	20,451	9.2
2. 5 feet apart ...	24A ...	do. ...	37,926	2.9	49.1	19,041	8.0
3. 6 feet apart ...	24A ...	do. ...	32,125	3.4	48.9	16,451	7.3
4. 7 feet apart ...	24A ...	do. ...	32,668	3.1	46.2	16,872	7.5

It will be seen from the above table that the results from the first ratoon crop have closely followed those from the plant crop of last year, although the plot planted with the continuous stick in the row gave a slightly higher yield than where the plants were placed 6 inches apart in the row. In the first ratoon crop, however, the difference is in favour of planting in the row 6 inches apart.

In the first series, the plot having plants placed 6 inches apart in the row has given 7.7 tons of cane per acre more than the plot where the plants were placed 36 inches apart in the row. The gradation in the tonnage of cane produced is regular throughout the series, being highest in the plots planted 6 inches apart and with the continuous stick in the row, and tapering off through the plots where the plants were placed 12, 18, 24, and 36 inches apart in the rows respectively.

In the second series, the cane planted in rows 4 feet apart has given an increased yield of 10½ tons per acre over the cane planted in rows 7 feet apart, and a difference of 1½ tons of sugar per acre in favour of the narrower rows. Here, again, the gradation is regular and progressive as regards the weight of cane produced. The yield of sugar also diminishes regularly until the 7-foot rows are reached, where the amount of sugar produced by this plot is found to be slightly heavier than in the 6-foot rows, which difference could be due to some other factor affecting this year's crop.

We are now ready to make a comparison between the different plots, and to see what advantages we have gained by using more seed per acre on given plots. Taking the plant and first ratoon crop to date, we find the plots in which the plants were placed 6 inches apart in the row have given—

- 1st. An increase over plants placed 12 inches apart in the row, of 8.3 tons per acre, for an expenditure of 18 cwt. more seed per acre;
- 2nd. An increase over plants placed 18 inches apart in the row, of 11.4 tons per acre, for an expenditure of 24 cwt. more seed per acre;
- 3rd. An increase over plants placed 24 inches apart in the row, of 11.0 tons per acre, for an expenditure of 26 cwt. more seed per acre; and
- 4th. An increase over plants placed 36 inches apart in the row, of 18.5 tons per acre, for an expenditure of 30 cwt. more seed per acre.

The second series show even more remarkable results. The cane planted in rows 4 feet apart has, up to date, for the plant and first ratoon crop, given—

- 1st. An increase over the cane planted in rows 5 feet apart, of 19.2 tons per acre, for an expenditure of 8 cwt. more seed per acre;
- 2nd. An increase over cane planted in rows 6 feet apart, of 23.1 tons per acre, for an expenditure of 14 cwt. more seed per acre; and
- 3rd. An increase over cane planted in rows 7 feet apart, of 30.5 tons per acre, for an expenditure of 16 cwt. more seed.

It is thus indicated that the practice of planting wide distances apart in the row in Queensland does not give the results that follow from a more liberal use of seed, and a more regular distribution of the plants in the row at the time of planting. It must be remembered that much cane that is planted by many farmers is placed anywhere from 1 foot to 3 feet apart in the rows or in the holes. These tests clearly indicate that this is not the way to plant cane to obtain the biggest crop.

The remarks made in last year's report relative to the plant crop, that the variation in difference between the rows has a much more definite bearing upon the crop results than the variation in distance between the plants in the row, can be repeated regarding the first ratoon crop of this year. Meanwhile these indications, or the apparent conclusions drawn, must not yet be considered final. Results are still to be obtained from the second and third ratoon crops. However, so far as these experiments have gone already, they tend to decidedly confirm the statement already made, namely:—

- Firstly, one plant with three eyes, with 6 inches between the plants in the row, is indicated to be the best way of planting the seed in the row.
- Secondly, it is also indicated that any increase in the distance between the rows exceeding 5 feet, is likely to result in a lower weight of cane and yield of sugar per acre, while less than 5 feet between the rows can result in an increase of cane and sugar per acre.

Of course the different nature of soils and climatic has a decided bearing upon these questions, as was definitely pointed out when considering these experiments last year.

SURPLUS CANE SENT TO MEADOWLANDS MILL.

All cane not required for distribution, planting purposes, and analyses was sold to the Meadowlands Mill Company. All the cane sent to the mill was either first, second, or third ratoons, and the total amount sent from 4 acres was 155 tons 12 cwt., or an average yield of 28.8 tons per acre.

Area of cane sold	...	...	...	...	4 acres
Tonnage	...	...	...	...	155½ tons
Value (including bounty)	...	...	...	...	£143 18s. 7d.

The price paid by the Meadowlands Mill for the Experiment Station cane was 1s. per ton less than the ruling price of the district. The reason therefor is that the Director requested the mill to take delivery of the cane at the Experiment Station's convenience, and on the ground that the value of the experiments required such an arrangement. In consideration of the convenience agreed upon by the mill, the Experiment Station agreed to accept the 1s. a ton less.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS AT THE SUGAR EXPERIMENT STATION, MACKAY, FROM 1ST SEPTEMBER, 1906, TO 30TH SEPTEMBER, 1907, COVERING PERIOD OF GROWTH OF EXPERIMENT CROPS.

Month.	Rainfall.	AIR TEMPERATURE.							SOIL TEMPERATURES AT 6 INCHES DEEP AT SUNRISE.			Inches of Water Applied to Irrigated Plots, First Rainfalls.	Per Cent. Soil Moisture (Irrigated Plots), First Rainfalls.	Average Relative Humidity of the Air (Saturation = 100).	Average Daily Evaporation in Cubic Inches.	Lowest Grass Temperature.	
		Highest Maximum.	Lowest Maximum.	Average Maximum.	Highest Minimum.	Lowest Minimum.	Average Minimum.	Mean Temperature.	Highest.	Lowest.	Mean.						
1906.																	
September	5.130	86.2	71.8	79.1	72.7	49.4	64.5	71.8	73.0	68.0	71.5	...	18.4	73.1	0.214	42°, 1 Sept.	
October ...	3.385	85.4	72.2	81.2	70.5	50.5	63.1	72.1	74.0	66.0	71.5	...	22.0	63.9	0.238	42.5°, 6 Oct.	
November	2.845	91.0	79.0	84.3	75.0	54.8	66.0	75.1	78.0	71.8	74.8	...	20.0	62.7	0.236	49.0°, 11 Nov.	
December	17.181	89.8	76.0	84.1	76.0	64.2	70.3	77.2	77.6	75.0	76.2	...	23.5	72.2	0.246	57.0°, 12 Dec.	
1907.																	
January ...	2.453	95.6	84.0	87.3	76.3	64.5	71.8	79.8	81.0	73.2	79.0	1.0	18.0	77.3	0.251	50.5°, 2 Jan.	
February	7.178	90.6	75.4	86.4	75.3	62.9	71.2	73.8	79.0	75.6	77.2	2.0	21.0	84.3	0.237	55.4°, 23 Feb.	
March ...	8.941	93.0	81.4	86.4	75.3	55.0	67.9	77.1	77.0	71.6	75.1	...	21.9	74.1	0.217	47.3°, 23 Mar.	
April ...	1.002	88.5	80.2	83.5	68.5	57.3	64.2	73.8	72.0	70.5	71.6	1.0	19.8	73.4	0.216	52.0°, 22 Apl.	
May ...	6.919	81.0	72.1	77.1	66.0	45.0	60.9	69.0	69.0	63.9	67.2	...	22.0	77.7	0.214	47.5°, 29 May	
June ...	4.838	81.0	62.8	73.8	68.5	43.1	57.5	65.6	68.0	61.4	64.6	...	23.6	81.8	0.152	36.5°, 17 June	
July ...	0.244	78.3	67.7	73.3	62.5	37.6	49.5	61.4	61.6	58.0	60.2	...	19.8	77.3	0.201	27.0°, 8 July	
August ...	0.331	82.0	68.8	76.2	60.0	42.0	49.8	63.0	63.2	59.4	61.0	...	16.8	71.6	0.252	32.0°, 7 Aug.	
September	0.312	84.5	76.0	78.9	64.8	46.0	54.8	66.3	66.0	63.8	65.2	...	14.5	66.5	0.300	36.0°, 12 Sept.	
Total ...	60.759	4.0

NEW SERIES OF EXPERIMENTS:

- (a) With ten Hambleton seedlings.
 (b) With Barbados 208 and two unknown canes from South Africa.

(a) The ten leading seedlings raised at the Colonial Sugar Company's Hambleton Plantation, North Queensland, which were sent to the Mackay Station in August, 1906, by Dr. Reid, Manager of Hambleton, and planted out, had, by the end of July, 1907, produced sufficient seed for further experimentation.

These new experiments are being undertaken for the purpose of establishing the comparative value of the Hambleton seedlings supplied, as cane and sugar producers, from a commercial point of view, while, at the same time, their pest and disease-resisting qualities will be carefully observed.

For the purpose of greater accuracy the tests are being made in duplicate. Two separate portions of land were selected, limed to neutralise any sourness left over by previous crops, ploughed three times, subsoiled to a depth of from 19 to 21 inches, and then planted with a green crop of cow-pea in December of last year. By February, 1907, a fine crop of green manure was ready to be ploughed under.

After ploughing in the green crop the portions were kept clean (till the time of planting) with disc harrows.

The ten Hambleton seedlings were planted at the beginning of August in duplicate, and the results will be to hand next year. None of the plots will be irrigated, and conditions of fertilisation and subsequent cultivation will be identical.

In the meantime it has to be said that no seedling canes, at the present time growing at the Mackay Station, exhibit the strength and vitality of the best New Guinea varieties, which latter varieties are now being grown in the State upon a large cropping scale. The present young crop of seedlings, including all the Hambleton, and one other, not only do not indicate great vigour, but indications of great debility have appeared in certain of them. Expressed briefly, the result, at the Mackay Experiment Station, with

the seedling canes obtained, has not nearly approached the constant and large commercial results furnished by the best of the New Guinea canes, and by the old standard varieties of some other countries. These remarks apply more particularly to the seedling canes which were actually in competition with New Guinea canes in the experiments with canes from different countries. With reference to the Hambledon seedlings the tests will be very carefully continued, in the hope that the seedlings may develop a more constant and a higher level of commercial results.

(b) Three new varieties have been brought into experiment, namely—a seedling known as B 208 and two canes introduced from South Africa, of which the names or numbers could not be ascertained. The land upon which these three varieties have been planted was treated in exactly the same manner as the portions reserved for the Hambledon seedlings. B 208 is a cane with a strong record, both in its native land, and also on the Herbert River, North Queensland, as a sugar producer, and the results from this cane, at the Mackay Experiment Station, will be awaited with interest.

EXPERIMENTS ENDEAVOURING TO RAISE NEW VARIETIES.

In the report for last year it was stated that the Experiment Station was still endeavouring to raise mature seed, from leading varieties, by planting the same out upon soil of a poor nature, deficient in plant food, and by absence of cultivation. The canes thus treated were planted in September, 1905, but did not produce any arrows whatever in 1906. They were allowed to go round for another year, and are at this date (30th September, 1907) somewhat over two years old.

Out of the nine varieties planted only four have produced a few arrows. New Guinea 4, 15, 24, 24A, and 24B have not arrowed at all. The number of canes grown and the number of arrows produced are shown hereunder:—

Variety.	Number of Sticks grown on Special Plots.	Number of Sticks which arrowed.
New Guinea 4	223	None
„ „ 8A	127	3
„ „ 15	139	None
„ „ 24	151	„
„ „ 24A	170	„
„ „ 24B	153	„
„ „ 6A	120	2
Mauritius Bois Rouge	195	25
Trinidad Seedling 60	166	10

This deficiency in arrowing of the best varieties has seriously handicapped the attempts to raise seedlings at the Mackay Station, added to which it has to be stated that the few arrows that were produced emerged and matured at different periods, so that the factor of cross fertilisation, so vital in cane seedling work, was not obtainable. The arrows produced, however, were carefully broken up and sown in specially prepared boxes, in the propagating house, but no germination resulted. The chances of raising seedlings from the best New Guinea varieties at Mackay seem very remote, but it may be possible to raise seed from the new seedlings now growing at the station. This will form the subject for future experiments.

NEW VARIETIES INTRODUCED.

The following new varieties have been introduced during the past year—namely, Mauritius Mahagache, Barbades 147, and six of the best of the Queensland Acclimatisation Society's seedlings, numbered Q 6, Q 30, Q 102, Q 116, Q 121, and Q 176. When sufficient seed of these new varieties is ready, further experiments will be undertaken.

It is proposed that the Assistant Director, Mr. H. T. Easterby, shall visit New Guinea in May of the coming year in order to obtain new varieties of New Guinea canes that can have a special commercial value for the Queensland industry. Mr. Easterby knows intimately every variety that has already been introduced from New Guinea, and is thus prepared to distinguish varieties that have not yet been introduced.

He will be equipped with such apparatus as is necessary to make rough tests of the cane upon the spot relating to their sugar-producing value, and also to carefully observe and note that the varieties selected are free from disease and pests, and can be brought in with a clean bill of health.

REPORT ON VARIETIES DISTRIBUTED FROM THE MACKAY STATION.

Mackay, 10th October, 1907.

The Director, Bureau of Sugar Experiment Stations, Brisbane.

SIR,—I have the honour to submit the following report upon the varieties of sugar-cane distributed from the Mackay Sugar Experiment Station to farmers' associations and others during the year 1906.

I have, &c.,

HARRY T. EASTERBY, Assistant Director.

The history of the varieties grown at the Sugar Experiment Station, Mackay, has already been given in the report of the Bureau of Sugar Experiment Stations for 1903-4. Out of a total number of 105 varieties, which had been under close observation, and subjected to the most rigorous testing, both as croppers and sugar producers, for a period of six years, the following varieties were selected for distribution to sugar-growers as being of the highest promise under the soil and climatic conditions obtaining at the Mackay Station:—New Guinea 8A, New Guinea 15 (or Badila), New Guinea 24 (or Goru), New Guinea 24A, New Guinea 24B, New Guinea 64, Trinidad Seedling No. 60, Mauritius Bois Rouge, and Mauritius Settlers.

The first eight of these were grown on a special piece of ground and reserved for distribution purposes, and, during the year 1906, were carefully cut, selected, and packed in specially made crates, and distributed to farmers' associations and other parties applying for the same throughout the sugar-growing districts of Queensland, all freight and other charges being paid by the Sugar Bureau, so that the varieties should reach applicants free of charge. Mauritius Settlers was only distributed in certain districts. New Guinea 15 (Badila) and New Guinea 24 (Goru) were not sent to the far North, as they were already established there, but, as they were originally introduced by the Queensland Government at the same time as the other New Guinea canes, and actually belong to the collection, observations on their behaviour in the most Northern localities are included in the same manner as where these two varieties were sent out by the Sugar Bureau with the other canes.

The sugar districts from Mossman to Burdekin north of Mackay have been personally visited by me in compliance with your instructions requesting a report upon the results of given varieties under different climatic and soil conditions.

Concerning the varieties given out to centres south of Mackay, the parties receiving cane have been asked to furnish the Experiment Station with reports on their behaviour. In many cases this request has been complied with, and where this is so the reports have been appended.

Before detailing the particulars relating to the growth and appearance of the varieties, under different conditions, the following tables, representing the analytical data and the yield of cane and sugar per acre, in English tons, for the plant, first, second, and third ratoon crops, from 1903 to 1907, will be of interest. In the final columns of the tables are shown:—

- The mean sucrose and purity of the four years' analyses.
- The total yield of cane and sugar per acre for the four years.

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.				AVERAGE OF THE FOUR YEARS.	
	Density of Juice (Brix.)	Per Cent. Sucrose in Juice.	Per Cent. Glucose in Juice.	Purity of Juice.	Density of Juice (Brix.)	Per Cent. Sucrose in Juice.	Per Cent. Glucose in Juice.	Purity of Juice.	Density of Juice (Brix.)	Per Cent. Sucrose in Juice.	Per Cent. Glucose in Juice.	Purity of Juice.	Density of Juice (Brix.)	Per Cent. Sucrose in Juice.	Per Cent. Glucose in Juice.	Purity of Juice.	Sucrose.	Purity.
New Guinea 8A ...	19.8	17.74	1.20	80.6	19.7	17.93	.73	91.3	21.0	19.61	.29	93.3	20.7	19.15	.37	92.5	18.62	91.6
15 (Badila)	20.8	19.71	.55	91.7	22.0	20.86	.26	94.8	21.9	20.56	.27	93.9	22.2	20.76	.28	93.5	20.47	94.2
24 (Goru) ...	20.5	19.66	.27	95.6	19.8	18.50	.32	93.4	20.3	18.88	.23	93.0	20.0	18.47	.32	92.3	18.86	93.5
24A ...	19.8	17.86	1.43	90.2	21.2	19.76	.37	93.2	20.8	19.14	.48	92.0	20.5	19.10	.45	93.1	18.86	92.1
24B ...	18.6	18.29	1.42	87.6	20.6	19.03	.59	92.3	20.8	18.84	.78	90.5	20.7	19.04	.59	91.9	18.30	90.5
64 ...	19.0	18.95	1.31	89.9	18.9	18.95	.90	89.6	15.9	13.18	1.54	82.8	18.1	15.84	1.00	87.5	15.73	87.4
Trinidad S. 80 ...	18.3	16.96	.71	92.7	20.5	19.29	.27	94.9	19.1	17.81	.28	93.2		Not grown			*18.01	92.3
Mauritius Bois Rouge ...	22.7	20.40	.31	91.1	21.4	19.63	.15	91.7	20.5	19.10	.20	93.1		Not grown			*19.80	91.9
Do. Settlers ...	21.7	20.88	.34	96.2				Cut for seed and not ratooned.										

* Three years only.

CROP RESULTS, 1904-1907.

Name or Number of Variety.	PLANT CROP, 1904.		FIRST RATOON CROP, 1905.		SECOND RATOON CROP, 1906.		THIRD RATOON CROP, 1907.		TOTAL YIELD, FOUR 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.	
	New Guinea 8A	58.9	9.7	49.5	8.0	32.7	5.6	41.8	7.2	182.9	30.5
15 (Badila)	59.8	10.8	53.8	10.1	41.6	7.7	43.0	7.9	198.2	36.5	
24 (Goru)	63.5	11.1	51.8	8.5	33.0	5.5	54.0	8.9	202.3	34.0	
24A	58.9	9.6	51.3	8.9	36.7	6.3	41.0	6.9	187.9	31.7	
24B	60.4	8.9	49.0	8.4	34.7	5.8	40.0	6.7	184.1	29.8	
64	56.7	8.6	43.2	6.4	27.6	3.3	30.5	4.3	158.0	22.6	
Trinidad Seedling No. 60	55.7	8.4	55.4	9.4	34.8	5.5	Not ratted		†145.9	23.3	
Mauritius Bois Rouge	51.3	9.4	38.1	6.5	19.5	3.2	„	„	†108.9	19.1	
Mauritius Settlers	52.3	9.8	This variety being needed for seed was not ratooned.								

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

† Three crops only.

Six out of the above eight varieties are now going on for a further crop of fourth ratoons.

It is also desirable that a description of the canes should be given, not only as a matter of interest, but for the benefit of farmers who may have mislaid or lost the original labels. The tendency of many growers under these circumstances is to at once name the cane with a fancy title of their own. For example, New Guinea 24 (native name Goru) is known to many Queensland growers as "Farmers' Glory," simply because it was christened so, some years ago, by a farmer who did not know its correct name. It has a bad effect on classification to give local names to varieties that have already classified names, and often leads to the direst confusion. It is hoped that the following brief account of the varieties distributed will be of service:—

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 inches 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 inches long, but some times longer, especially in ratoon cane. Habit erect; foliage also somewhat erect and very green. Eyes generally full and prominent. Trashes easily. Has never arrowed at station. The foliage of very young cane has a slightly reddish tinge. Flesh white and highly saccharine. A remarkably heavy cane, often weighing 1 lb. per foot. Greatly appreciated by labourers, as it is so easily cut, trashed, and loaded.

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

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

New Guinea 24B (New Guinea name, Goru Bunu Bunana).—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 inches long. Eyes full and prominent. Foliage broad and plentiful. Trashes readily. Flesh yellow. A very sparse arrower at station. New Guinea 24B is more upright in growth than either 24 or 24A, and is somewhat thicker. It is a nice clean cane to handle, and should be a favourite with cutters.

New Guinea 64 (New Guinea name unknown).—A brownish to olive greenish cane with longitudinal claret coloured stripes and small linear skin cracks. Moderately stout. Internodes usually from 3 to 5 inches 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 $2\frac{1}{2}$ to 4 inches 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 inches 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 $3\frac{1}{2}$ to 5 inches 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.

The following general particulars, which, it must be borne in mind, are the result of observations at Mackay only, are appended:—

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

The observations on the behaviour of the above varieties under different conditions of soil and rainfall, now about to be set forth in table form, were made during the latter end of June and early part of July of this year in sugar-growing districts north of Mackay. It was somewhat unfortunate that the visit of inspection, from various causes, had to be postponed till this time, as the cane sent out and planted in 1906 had in most cases been cut, either for distribution (where the cane had been planted at one centre) or for replanting, where the local association had distributed the cane sent direct to farmers. However, under these circumstances it was possible to see both young plant and first ratoon cane in some districts, while in others, in anticipation of a visit from an officer of the Bureau, some stoles of the 1906 planting had been allowed to remain standing. Owing to time being limited, it was impossible to visit every farmer who had received cane; but the cane growing on as many different types of soil as possible was inspected, and the information gathered respecting each variety has been set out in a tabular form and in simple language, enabling the reader to see at a glance how each cane has germinated and grown, its appearance at the time of inspection, and how it has ratooned—where ratoons were seen. These are the most important particulars at this stage of the inquiry. Until the varieties are well established, analytical data, variation of canes under new conditions, and other details may be left for a later examination. In the following table it may be premised that Areas 1, 2, 3, &c., refer to different types of soil visited, and not always to individual farms.

MOSSMAN DISTRICT.

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

Rainfall: Average, 170 inches.

Rainfall for 1906, 201 inches.

Rainfall to 21st June, 1907, 66 inches.

In this district the Mossman Central Mill received the crate containing the varieties, and planted the canes out in a nursery near the mill, from which, when sufficiently developed, they were distributed to the farmers applying for same. The greatest care had been given to the canes; manures were supplied, and a large yield per acre at the rate of 60 tons was procured.

MOSSMAN DISTRICT.

Name or Number of Variety.	Data.	Area 1—Alluvial Sandy Subsoil.	Area 2—Alluvial Clay Subsoil.	Area 3—Alluvial Clay Subsoil.	Area 4—Alluvial Sandy Subsoil.
New Guinea 8A	Germination	Good	Poor	Poor	Not grown
	Growth	"	"	Fair	"
	Appearance at time of inspection	Partly eaten by grubs	Not healthy	Not healthy	"
	Ratoons	Fair	None	None	"
15 (Badila)	Germination	Very good	Very good	Very good	Very good
	Growth	"	"	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	Good	Good	Good
24 (Goru)	Germination	"	"	"	"
	Growth	"	"	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	Good	Good	Good
24A	Germination	Very good	"	"	"
	Growth	"	"	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	Not grown	None	None
24B	Germination	Excellent	Very good	Very good	Very good
	Growth	"	"	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	None	None	None
64	Germination	"	Good	Good	Very good
	Growth	"	"	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	None	None	None
Trinidad Seedling No. 60	Germination	Very slow	Very poor	Very poor	Slow
	Growth	Fair	"	"	Good
	Appearance at time of inspection	Foliage rusty	Not healthy	Not healthy	Healthy
	Ratoons	Fair	None	None	None
Mauritius Bois Rouge	Germination	Good	Good	Good	Good
	Growth	"	"	"	"
	Appearance at time of inspection	Foliage rusty	Healthy	Not healthy	Foliage rusty
	Ratoons	Fair	None	None	None

From the above observations it is indicated that New Guinea 8A, Trinidad Seedling 60, and Mauritius Bois Rouge may prove unsuited to the Mossman district. New Guinea 24B appeared to have done the best of the varieties forwarded, giving the highest weight at the mill nursery.

CAIRNS DISTRICT.

MULGRAVE AND HAMBLEDON.

Soils: Mulgrave—Deep, rich, alluvial, with sandy subsoils for the most part. There are true volcanic areas also, but very little cane is grown on these.

Soils: Hambleton—Volcanic and shaly.

Rainfall: Average recent years, 76 inches.

Rainfall for 1906, 79.55 inches.

Rainfall for 1907 to end of June, 58.44 inches.

The varieties sent to the Cairns district were distributed by the Cairns District United Farmers' Association direct to farmers. In a great number of cases very little care was given the cane, and in others stock were allowed access to the growing plants and destroyed them. The grub pest, particularly severe in the Cairns district, also interfered with certain growers' plans for giving a fair trial to the varieties. In spite of all these disadvantages, the greater number of the varieties were making excellent progress on the areas visited, which were chosen after consultation with the Secretary of the Association, Mr. Griffin.

CAIRNS—MULGRAVE AND HAMBLEDON DISTRICTS.

Name or Number of Variety.	Data.	Area 1—Alluvial Sandy Subsoil.	Area 2—Alluvial River Flats.	Area 3—Alluvial Sandy Subsoil.	Area 4—Volcanic.
New Guinea 8A	Germination	Not grown	Poor	Fair	Poor
	Growth	"	"	"	"
	Appearance at time of inspection	"	Not healthy	Not healthy	Rusty foliage
	Ratoons	"	Poor	Poor	Not grown
15 (Badila)	Germination	Very good	Very good	Very good	Very good
	Growth	"	"	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	Good	Good	Good
24 (Goru)	Germination	Very good	Very good	Very good	Very good
	Growth	"	"	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	Good	Good	Good
24A	Germination	"	"	"	"
	Growth	"	"	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	Good	Good	Good
24B	Germination	Very good	Very good	"	Very good
	Growth	"	"	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoon	Good	Very good	Good	Good
64	Germination	Very good	Slow	"	Slow
	Growth	Good	Good	"	Good
	Appearance at time of inspection	Healthy	Healthy	Healthy	"
	Ratoons	Good	Good	Good	Not grown
Trinidad Seedling No. 60	Germination	Very slow	Slow	Not grown	Fairly good
	Growth	Fair	Fair	"	"
	Appearance at time of inspection	Foliage rusty	Foliage rusty	"	Healthy
	Ratoons	Irregular	Irregular	"	Not grown
Mauritius (Bois Rouge)	Germination	Good	Good	Good	Fair
	Growth	"	"	Slow	Poor
	Appearance at time of inspection	Healthy	Foliage rusty	Not healthy	Not healthy
	Ratoons	Fair	Fair	Not grown	Not grown

New Guinea 8A, Trinidad Seedling 60, and Mauritius Bois Rouge also appear unsuited to the Mulgrave district, although, if planted in August for a ten months' crop, they might possibly do better. Bois Rouge, however, on account of the sticks being thin, is not favoured by growers, who are asking for heavy upright canes to suit labour conditions in the North.

GERALDTON DISTRICT.

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

Rainfall: Average for past ten years, 143.5 inches.

Rainfall for 1906, 179.0 inches.

Rainfall to end of June, 1907, 94.0 inches.

The cane sent to the Farmers' Association, Geraldton, was distributed direct to individual growers. Owing to the state of the roads at the time of inspection, getting around the district was rendered difficult, and only three areas were inspected. Rather more care had been given the varieties at Geraldton than at Cairns. On two of the areas visited the original plant cane was still standing, while on the third the ratoons were some considerable distance from the plant cane, and no time was available for inspection. The Secretary of the Association, however, states that most of the varieties were ratooning well.

GERALDTON DISTRICT.

Name or Number of Variety.	Data.	Area 1—Alluvial Gravelly Subsoil.	Area 2—Alluvial Sandy Subsoil.	Area 3—Volcanic.
New Guinea 8A	Germination ...	Good ...	Good ...	Very good
	Growth ...	" ...	" ...	"
	Appearance at time of inspection	Healthy ...	Healthy ...	Healthy
15 (Badila)	Germination ...	Good ...	Very good ...	Not grown
	Growth ...	" ...	Very heavy	"
	Appearance at time of inspection	Healthy ...	Healthy ...	"
24 (Goru)	Ratoons ...	Good ...	Good ...	"
	Germination ...	" ...	" ...	Good
	Growth ...	" ...	" ...	"
24A	Appearance at time of inspection	Healthy ...	Healthy ...	Healthy
	Ratoons ...	Good ...	Good ...	Good
	Germination ...	" ...	" ...	"
24B	Growth ...	" ...	" ...	"
	Appearance at time of inspection	Healthy ...	Healthy ...	Healthy
	Ratoons ...	Good ...	Good ...	Good
64	Germination ...	Not grown ...	Good ...	Good
	Growth ...	" ...	" ...	"
	Appearance at time of inspection	" ...	Healthy ...	Healthy
Trinidad Seedling No. 60	Germination ...	Very slow ...	Poor ...	Poor
	Growth ...	" ...	" ...	Slow
	Appearance at time of inspection	Healthy ...	Foliage waxy	Some plants fairly healthy
Mauritius Bois Rouge	Germination ...	Not grown ...	Good ...	Good
	Growth ...	" ...	Poor ...	"
	Appearance at time of inspection	" ...	Not healthy	Arrowed early and showed waxy foliage

New Guinea 8A made a better showing than at the Massman or Mulgrave. Trinidad Seedling 60 and Mauritius Bois Rouge were very much behind the other varieties. Mauritius Settlers was also distributed in this district in 1905, but was not spoken well of.

HERBERT RIVER DISTRICT.

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

Rainfall: Average for past ten years, 82.7 inches.

Rainfall for 1906, 126.7 inches.

Rainfall to 30th June, 1907, 65.0 inches.

On receipt of crates containing the varieties, the local residents at Ingham and Halifax distributed the canes to individual farmers. On the areas visited the varieties had been looked after with care. New Guinea 8A and Mauritius Bois Rouge appeared to be doing much better in this district than in the localities farther North. Trinidad Seedling No. 60, however, was backward in growth, and did not have a healthy appearance around Ingham.

HERBERT RIVER DISTRICT—FAIRFORD, VICTORIA, STONE RIVER, ETC

Name or Number of Variety.	Data.	Area 1—Deep Alluvial Sandy Subsoil.	Area 2—Sandy Loam, Sandy Subsoil.	Area 3—Forest Soil, Alluvial.	Area 4—Alluvial River Flats, sandy Subsoil.
New Guinea 8A	Germination	Good	Good	Fair	Good
	Growth	"	"	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	Good	Mod. rately good	Good
15 (Badila)	Germination	"	"	Good	"
	Growth	"	Very good	Very good	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	Good	Good	Good
24 (Goru)	Germination	Very good	"	"	Fair
	Growth	"	"	"	Not too good
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	Good	Good	Backward
24A	Germination	Slow	"	"	Good
	Growth	Backward	Very good	"	"
	Appearance at time of inspection	Fairly healthy	Healthy	Healthy	Healthy
	Ratoons	Fair	Good	Good	Good
24B	Germination	Good	Very good	"	"
	Growth	"	"	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	Good	Good	Good
64	Germination	"	"	Good, but slow	Slow
	Growth	Very good	"	Good	Fairly good
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	Good	Good	Fair
Trinidad Seedling No. 69	Germination	Not grown	Slow	Slow	Slow
	Growth	"	Good	Very poor	Poor
	Appearance at time of inspection	"	Healthy	Foliage rusty	Not healthy
	Ratoons	"	Fair	Backward	Poor
Mauritius Bois Rouge	Germination	Good	Good	Good	Good
	Growth	"	Fair	"	"
	Appearance at time of inspection	Healthy	Foliage rusty	Healthy	Healthy
	Ratoons	Good	Fairly good	Good	Good
Mauritius Settlers	Germination	Not grown	"	Fair	Fairly good
	Growth	"	"	Slow	"
	Appearance at time of inspection	"	Foliage rusty	Not healthy	Healthy
	Ratoons	"	Fair	Irregular	Fair

HERBERT RIVER DISTRICT—HALIFAX.

Name or Number of Variety.	Data.	Area 1—Alluvial Sandy Subsoil.	Area 2—Loam, Sandy Subsoil.	Area 3—Alluvial Sandy Subsoil.
New Guinea 8A	Germination	Poor	Good	Fairly good
	Growth	Slow	"	"
	Appearance at time of inspection	Backward	Healthy	Healthy
	Ratoons	Poor	Good	Rather poor
15 (Badila)	Germination	Good	Very good	Good
	Growth	"	Good	"
	Appearance at time of inspection	Healthy	Healthy	Healthy
	Ratoons	Good	Good	Good

HERBERT RIVER DISTRICT—HALIFAX—*continued.*

Name or Number of Variety.	Data.	Area 1—Alluvial Sandy Subsoil.	Area 2—Alluvial Sandy Loam, Sandy Subsoil.	Area 3—Alluvial Sandy Subsoil.
New Guinea 24 (Goru)	Germination ...	Good	Good	Good
	Growth ...	"	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy
	Ratoons ...	Good	Good	Good
24A	Germination ...	"	"	"
	Growth ...	"	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy
	Ratoons ...	Good	Good	Good
24B	Germination ...	"	"	"
	Growth ...	"	Very good	Very good
	Appearance at time of inspection	Healthy	Good	Healthy
	Ratoons ...	Good	"	Good
64	Germination ...	Not grown	"	Slow
	Growth ...	"	"	Good
	Appearance at time of inspection	"	Healthy	Healthy
	Ratoons ...	"	Good	Good
Trinidad Seedling No. 60	Germination ...	Good, but slow	Slew	Slow
	Growth ...	Good	Good	Fair
	Appearance at time of inspection	Healthy	Healthy	Healthy
	Ratoons ...	Fair	Fair	Fair
Mauritius Bois Rouge	Germination ...	Good	Good	Good
	Growth ...	Fair	"	"
	Appearance at time of inspection	Foliage rusty	Healthy	Healthy
	Ratoons ...	Fair	Fair	Fair

Macnade Plantation was also visited, some of the varieties having been sent there this year. As the officer in charge of the nursery was absent, no information could be gathered, except as to Settlers (Mauritius). This was inspected in the young-plant stage and appeared vigorous and healthy. Mr. Waring, Manager of Macnade, has since written to say that N.G. 8A, 24A, and 24B were doing well. The first two canes had made a strong vigorous growth, while 24B was clean and healthy, though backward. Trinidad Seedling 60 had made very poor headway, only 15 per cent. were alive.

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, 36.14 inches.

Rainfall for 1906, 49.36 inches.

Rainfall to 30th June, 1907, 18.26 inches.

At the Lower Burdekin district the varieties were taken charge of by Mr. G. S. Mackersey, Secretary to the Lower Burdekin Farmers' Association, and planted by him in a nursery specially prepared for the purpose. They received every care and attention, and the resulting crop, a large one, was distributed to growers applying for the same. As the plant crop from these will not be available till next year, no ratoons could be seen except in the nursery mentioned above.

LOWER BURDEKIN DISTRICT.

Name or Number of Variety.	Data.	Area 1—Sandy Loam with Sandy Subsoil.	Area 2—Sandy Loam with Sandy Subsoil.	Area 3—Black Loam Clay Subsoil.	Area 4—Black Loam Porous Subsoil.
New Guinea 8A	Germination	Fair	Slow	Good	Fair
	Growth	"	Fair	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Fair	Not grown	Not grown	Not grown
15 (Badila)	Germination	Good	Good	Good	Good
	Growth	Very fine	Very good	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	Not grown	Not grown	Not grown
24 (Goru)	Germination	"	Good	Good	Good
	Growth	"	Very good	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	Not grown	Not grown	Not grown
24A	Germination	"	Good	Fair	Good
	Growth	"	"	"	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	Not grown	Not grown	Not grown
24B	Germination	"	Good	Slow	Good
	Growth	Very good	"	Fair	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	Not grown	Not grown	Not grown
64	Germination	"	Slow	Fair	Good
	Growth	"	Fair	Good	"
	Appearance at time of inspection	Healthy	Healthy	Healthy	Healthy
	Ratoons	Good	Not grown	Not grown	Not grown
Trinidad Seedling No. 60	Germination	Slow	Slow	Slow	Poor
	Growth	Fair	Fair	Poor	Very poor
	Appearance at time of inspection	Healthy	Healthy	Not healthy	Not healthy
	Ratoons	Fair	Not grown	Not grown	Not grown
Mauritius Bois Rouge	Germination	Good	Fair	Fair	Fair
	Growth	Fair	"	"	"
	Appearance at time of inspection	Foliage rusty	Healthy	Healthy	Healthy
	Ratoons	Fair	Not grown	Not grown	Not grown

The cane grown by Mr. Mackersie received three irrigations during the growing season. Trinidad Seedling No 60 and Mauritius Bois Rouge were behind the other varieties both in appearance and growth.

From the above observations, made on the canes grown from the varieties sent out by the Mackay Sugar Experiment Station to districts north of Mackay, only general conclusions can at present be drawn.

It is indicated that New Guinea 8A, Trinidad Seedling No. 60, and Mauritius Bois Rouge may not thrive in the localities farthest North, while the two latter canes have not done particularly well in any district, although Bois Rouge has made a better growth than Trinidad 60. Further observations will be required to supplement and confirm these conclusions.

The canes of the Goru class, such as 24A and 24B, with Badila or New Guinea 15, have given excellent results all through the North, and appear to grow equally well under all the different soil and rainfall conditions met with.

It is quite possible that, if the three varieties mentioned above as of low promise in the North were planted in the spring, different results might be obtained, as it has uniformly been found that a much higher germination, and a more vigorous growth, is realised when the New Guinea 8A and Trinidad 60 are planted in the spring. Mauritius Bois Rouge in any case fully ripens in from ten to twelve months, as shown by its early arrowing, so that spring planting is indicated for this cane also.

BUNDABERG DISTRICT.

Soils: Rich, deep, volcanic with some alluvial areas.

Average rainfall for past ten years, 40.37 inches.

Rainfall for 1906, 49.73 inches.

Rainfall to 30th June, 1907, 27.95 inches.

WOONGARRA SUB-DISTRICT.

The varieties were sent to the Woongarra Farmers' Association in August, 1906. The Hon. Secretary of the Association has forwarded the two following reports, under date, 4th September, 1907:—

Report from Faulkner Brothers, Woodlands Plantation, Woongarra, Bundaberg—

“The sets were planted in black scrub soil. Fifty-seven inches of rain fell during the period of growth (twelve months).

“The ground was treated with lime manure, thoroughly cultivated, and kept free from weeds.

“New Guinea 24, 24A, 24B—These varieties are good croppers, stool well, and show no sign of disease. Estimated tonnage, 25 tons per acre.

“New Guinea 64.—Fair cropper, self trashing; not many canes to stool. Centre of cane streaked with red, apparently a disease. Yield estimated at the rate of about 18 tons per acre.

“Trinidad Seedling 60.—Fair cropper, healthy; stools out well. Estimated yield, 15 tons per acre.

“New Guinea 15 (Badila).—Very slow grower; when matured short and thick, but very heavy; stools freely; eyes prominent, and inclined to shoot. Estimated at rate of 15 tons per acre.

“Mauritius Bois Rouge.—Very slow grower; sticks thin, and very hard to trash. Yield, about 12 tons per acre.

“New Guinea 8A.—Very slow grower; stools freely, but sticks very thin and hard to trash. Yield, about 6 tons per acre.

“Rappoe, from local sets grown in same block under exactly similar conditions, gave a much heavier yield than any of the above varieties. With the exception of New Guinea 8A, all have been planted out for further trial.”

Report from Mr. Cameron A. Simpson on cane plants received from the Mackay Experiment Station on the 18th August, 1906:—

“The cane was soaked in water for forty-eight hours, and then cut into sets of from one to three eyes, and then planted in red volcanic forest land, the size of the plat being 15 by 48 feet.

New Guinea 8A.	17 plants;	cut 15th July, 1907, weighed	118 lb.
Mauritius, Bois Rouge	11 plants;	“ “ “	134 “
New Guinea 64	22 plants;	“ “ “	135 “
“ 15	20 plants;	“ “ “	137 “
“ 24	27 plants;	“ “ “	261 “
“ 24B	16 plants;	“ “ “	140 “
“ 24A	21 plants;	“ “ “	176 “
Trinidad S. 60	6 plants;	“ “ “	25 “

“The rainfall for the period of growth was 41 inches, of which nearly 11 inches fell in September.”

Remarks.—N.G. 24 (Goru or Farmer's Glory), N.G. 24A, and 24B, all had a red tinge in the centre of the cane for about 2 feet from the bottom, none of the other varieties showed any sign of it. Messrs. Parquhar and others of the Hummock Plantation, Bundaberg, who received the varieties early in August, 1906, state—

“The eight varieties from your station were planted out on 15th August, 1906, in rows 5 feet 6 inches apart, and 3 feet apart in the rows, one plant to each hole. The land (black scrub) had not grown cane before, and was free from grubs and pests. Immediately after planting, the plants received a good soaking, and again on the 22nd August; these were the only occasions water was applied artificially. Good rain fell during the last three days in August, 190 points being registered. The rainfall was particularly favourable for plants as the following shows.—September, 5.52 inches; October, 6.51 inches; November, 1.56 inches; December, 5.38 inches; January, 1907, 4.40 inches; February, 3.52 inches; March, 14.15 inches; April, 1.11 inches; May, 2.42 inches; and the first three days in June, 3.43 inches. The plants of all varieties, except Mauritius Bois Rouge and N.G. 24, came up with hardly a miss. Of

The Mauritius Bois Rouge only eight plants came up out of twenty-nine, and of N.G. 24 75 per cent. came up. The plants continued to grow, without any serious check, until 3rd June this year, when five of the varieties were cut and planted out. The three remaining varieties had not attained sufficient growth to warrant cutting. We intend planting these out next autumn, and hope for better results in the field blocks. Of the varieties planted out—

“New Guinea 24B is undoubtedly the pick, stoling out well, and showing strong and vigorous growth. The canes attained good height and great thickness. Estimated weight per acre, 30 tons.

“New Guinea 24A is somewhat behind 24B, though stoling out and growing well; and did not show the thickness of cane. Estimated weight, 28 tons per acre.

“Trinidad Seedling No. 60 is a great stoler; the canes are long and thin. Estimated weight, 25 tons per acre.

“New Guinea 64 is a poor stoling cane; the canes, however, grow to great length and fair thickness. Estimated weight, 25 tons per acre.

“New Guinea 8A, though stoling out well, is a slow grower. Estimated weight, 12 tons per acre.

“As all the varieties were planted out in land which had previously been used as a vegetable garden, and frequently been heavily dressed with stable manure, the experiment, so far, cannot be taken as a proper field trial, but, considering the short time the plants were growing and the results attained, we have great hopes that three or four of the canes will prove a valuable addition to our varieties.”

Mr. P. L. Elliott, of Spring Hill, Bundaberg, was sent seven of the varieties early in August, 1906. His report is as follows, dated 20th June, 1907:—

“I may mention that all the cane in this district is very backward, and, although we have had plenty of rain, the cane has not grown as well as might be expected. Your varieties have not grown as well as the Rappoe planted at the same time, but an allowance must be made for fresh plants as against yours. Only one variety—namely, New Guinea 8A—shows signs of sickness, and, in fact, it has not grown at all; two or three miserable shoots to a stole, and no cane made on them yet.

Variety.	Appearance.	Growth.	Pest Resisting.	Soil.
N.G. 8A	Sickly	Bad	Bad	Red Volcanic.
N.G. 15 (Badila)	Strong and healthy	Backward; thick stumpy sticks, long tops	Good	
N.G. 24 (Goru)	Strong and healthy	Fair	Good	
N.G. 24A	Very strong and healthy	Very good	Good	
N.G. 24B	Very good	Good	Good	
N.G. 64	Healthy; long heavy sticks, but small stoles	Good	Good	
Mauritius Bois Rouge	Healthy	Backward	Good	

N.G. 24A and 24B have done the best.

GOOBURRUM SUB-DISTRICT.

The Gooburrum Farmers' Association received the varieties in August, 1906. The Secretary of the Association reports under date, 19th September, 1907, as follows:—

“The plants were received here in a very dry time, and have not done so well as I hope they will do in future. Many of the farmers have not kept the plants marked, and now cannot distinguish them. Owing to the dry weather, many plants did not grow.

“New Guinea 8A.—Made fair growth. Buds very large. Seems to have changed colour, now streaked with red.

“New Guinea 15.—Grows very stoutly, with short joints.

“New Guinea 24.—Bushy—does not seem to suit this climate or soil.

“New Guinea 24A.—Very good growth, good stoler, stout sticks, but somewhat rusty.

“New Guinea 24B.—Very good growth. Seems to be the best variety of the lot. Stout sticks.

“New Guinea 64.—Does not stool well. Red leaves. Grows very straggly. Not liked.

“Trinidad Seedling 60.—Stout, good looking cane; made very good growth.

“Mauritius Bois Rouge.—Fair growth, too many sticks and too bushy.”

GOODWOOD SUB-DISTRICT.

Messrs. Blissett and Hart, of Goodwood Plantation, received New Guinea 8A, New Guinea 15 (Badila), and New Guinea 24 (Goru). Their report on these varieties, which they planted in August, 1906, is as follows:—

“ 14th August, 1907.

“ We may say that the soils in which these canes were planted were prepared for their reception by having, as a preliminary condition, cowpeas grown upon the land and ploughed in. When planted, the drills were supplied with farmyard manure in order to give the plants every chance. The soil is volcanic, red and loamy, and the rainfall from the date of planting till now has been normal for this district.

“ The present condition of the canes is as follows:—

N.G. 15 (Badila) : Very stunted in growth.

N.G. 8A : Splendid vigorous growth, healthy looking.

N.G. 24 (Goru) : Splendid variety, vigorous growth.

“ The two last are particularly strong and healthy in appearance, and give promise of good returns.”

CHILDERS SUB-DISTRICT.

Mr. H. Epps, of Sellings, Childers, to whom Mauritius Settlers was sent in 1905, reports concerning that variety as follows, under date 17th August, 1907:—

“ Mauritius Settlers did fairly well, analysing 15·3 per cent. obtainable sugar in July, 1906, and I have now about quarter of an acre, planted 18th October, 1906. It is now about a 16-ton crop, but I have not yet ascertained its quality. This yield is not up to Rappoe, still this variety will produce a crop in land that will not grow other canes.

“ Drawbacks are—Trash hard to remove, hair very bad, and, owing to the bushy stole, it requires a greater width between rows (6 feet) than other varieties. On the other hand, its sweetness is maintained throughout the season, and it stands over either as plant or ratoon particularly well.”

Mr. H. L. Poulsen, of Childers, was sent the following varieties in May, 1906:—New Guinea 15 (Badila), 24 (Goru), 24A, 24B, 64, Trinidad Seedling 60, and Mauritius Bois Rouge. Mr. Poulsen sends the following statement, dated 21st August, 1907:—

“ The land selected for the experiment was on the top of a ridge, average quality of red soil. It had produced three cuttings of green Tanna cane, after which it was stumped, ploughed, and green manured with Tonga beans. In addition, it received a dressing of molasses ash at the rate of 10 cwt. to the acre. The plants arrived in good condition, and I obtained a fair strike. With regard to growth, the varieties stand in the following order of merit:—

New Guinea	64	} Equal
“	24B	
“	24	
“	24A	
Bois Rouge		
Trinidad Seedling	60	
New Guinea	15.	

“ Bois Rouge has produced very big stools, but the sticks are too thin, and the leaves adhere too firmly for white labour conditions. No. 15 (Badila) is of too stunted a growth, and I am not continuing these two varieties in experiment. New Guinea 64 shows signs of disease, but I have planted it all out on account of the good growth it has made.

“ I have had none of the varieties analysed, as I had too few of the best kinds to be able to spare the number required for a test. I had grown Goru and Badila for two years prior to getting them from your department, but did not know that they were identical with N.G. 24 and N.G. 15 until receiving your plants, and, in 1906, the analyses of these two varieties were not equal to that of Rappoe.

“ I have planted out all available cane of N.G. 64, N.G. 24A, N.G. 24B, and Trinidad Seedling 60, and, in addition, I have planted about 4 acres with N.G. 24. Next year I shall, if desired, send you samples for analyses or let you know the result of tests at the Colonial Sugar Company's Childers Mill.”

BEENLEIGH DISTRICT.

Soils: Alluvial river banks.

Average rainfall for past ten years, 42·23 inches.

Rainfall for 1906, 49·73 inches.

Rainfall to 30th June, 1907, 23·00 inches.

The varieties were forwarded to the Sugar Growers' Association, Beenleigh, at the end of August, 1906. Mr. W. Kleinschmidt, on 28th June, 1907, reported:—

“ Previous to the planting of the cane the weather had been wet and rather cold, consequently it was some time before the cane showed above ground. After the cane was fairly well above ground, a dry spell set in, and the growth for a considerable time was very tardy. With the new year, however, the weather conditions became more favourable, and since then the cane has made fairly good progress. In all cases where the varieties sent by you were planted alongside of Rappoe, and Striped Singapore

(the standard canes in this district), the latter were always much larger and stronger than your varieties. On account of the continued wet weather I have been unable to get out to Pimpama Island, where several lots have been distributed. The soil there is of a sandy nature (black sand), and it is quite possible that the results will be totally different.

"I will now give you the condition of each of the varieties—

"New Guinea 8A.—Poor growth, slight sign of rust on leaves. Although canes look well, their size puts the variety out of the question.

"New Guinea 15 (Badila).—Very strong healthy cane, good stoler, heavy canes, although rather short. This cane impresses one as being very suitable for a standover cane.

"New Guinea 24 (Goru).—Good stoler, good growth, but very much affected by rust on leaves.

"New Guinea 24A.—Fairly strong stoler, vigorous growth, very badly affected by rust. Although the canes look really well, this would put it out of the question.

"New Guinea 24B.—Fairly strong cane, rather poor stoler. Badly affected by rust.

"New Guinea 64.—Good growth. The canes are very cracked, otherwise it seems very healthy but, unlike Bois Rouge, does not appear such a likely sugar producer.

"Trinidad Seedling No. 60.—Very strong stoler, thick canes rather stunted, slight sign of rust on leaves. Apparently well adapted for two years old.

"Mauritius Bois Rouge.—Good stoler, very healthy. Almost as good in growth as Rappoe. Sticks inclined to be thin.

"I consider that Badila is the cane that is best adapted to our requirements, as we need a cane that will not fall over when the wet weather comes. That has been our principal trouble, as when there is a heavy crop frost has destroyed half of it.

At a later date Mr. Kleinschmidt states "the canes are looking fairly well. The varieties which I reported to you as being affected with what we call rust do not appear to be vitally affected, for, in all cases, the tops commenced to shoot out afresh, and the cane appeared no worse for it. In the disease that we know as rust the top gradually dies, the cane later on doing likewise. This has led me to believe that the dying top is a habit peculiar to the varieties, and possibly is only an indication that the cane is matured. Further, on questioning some of the farmers I find that when they planted the cane they planted somewhat heavily (on account of the plants being old) to ensure their growing. This would account for much of the cane being rather stunted, and stalks too numerous."

Messrs. R. and H. Witty, of Beenleigh, who applied for and received the same varieties as the association, at the same time, report:—

"22nd June, 1907.

"Re the new varieties of cane supplied, we regret to state the labels were entirely obliterated through delay in transit (viz., parcel lying some considerable time on wharf at Brisbane).

"We planted the varieties in forest land, and they germinated well. The spot, however, was not a fair test for their growth, &c., being an elevated piece of chocolate soil, and perhaps too highly drained (though virgin land). The appearance of them is good and healthy, about 2 feet to 3 feet cane developed. One variety of red foliage (No. 64 N.G.) calls for particular notice, having developed more cane than the others, though a rather sparse stoler. The climatic conditions were not too favourable; there were several dry spells affecting growth. We did not notice any pests affecting the cane. We regret that the spot chosen was not a fair test."

SUMMARY.

It has already been explained that the purpose in distributing these varieties of cane in the different districts reaching from farthest South to farthest North of Queensland was to determine the soil and climatic conditions to which the varieties are respectively the best adapted. The purpose of the work has been fully justified, which is shown by the reports sent in to the Sugar Experiment Station from the respective districts. The reports show that certain varieties are giving the best results in the climatic conditions of the North, in the Northern soils, while other varieties are, apparently, less suited to the Northern conditions, but are doing well and promising good commercial results in the more temperate climatic conditions of the South and in Southern soils. It is clearly of high importance that this testing of the fitness of varieties, upon a broad scale, throughout the sugar districts of the North and South, shall be continued in order that selection shall be made by the soils and climatics themselves of those varieties which are best adapted to the conditions. Therefore, the co-operation of the farmers in each district is most urgently invited, so that the tests may lead everywhere to the best paying results.

FURTHER DISTRIBUTION OF CANE VARIETIES.

The work of distributing Cane Varieties of high commercial promise has been continued during the year. Specially built crates, containing select canes, have been sent, at the cost of the Sugar Bureau, to Nerang, Gir. Gin, Bundaberg, Lower Burdekin, Cairns, and Mossman. Smaller packages were also forwarded to growers at Childers, Bundaberg, Proserpine, and Brisbane.

The usual distributions direct to farmers at Mackay have also been carried out.

The total number of growers supplied with cane was 160, as well as a number of canegrowers' associations. As these latter will ultimately distribute the canes among their own farmers, the final number receiving such canes will be very large, and the varieties will become generally spread throughout the State.

VARIETIES IN HOSPITAL.

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

Mavoe, Chenoma, Oiva, 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 S. 202, New Guinea 3 and New Guinea 7.

Concerning these varieties, the following remarks were made by the Director in last year's report:—

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

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

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

During their period of growth for the past year as a plant crop, these varieties have been inspected at regular intervals. At the end of the first three months after planting the canes were counted, and the percentage of dead or diseased sticks is shown in the table hereunder:—

19TH NOVEMBER, 1906.

Number or Name of Variety.	Percentage of Dead or Diseased Stalks.
Mavoe	17.7
Chenoma	47.0
Oiva	22.5
Batoe	3.1
Kikarea	7.9
Mabuan	5.2
Moo Moo	...
Oraya	3.3
Meerah	23.0
Iduari	25.0
Akewa	...
Oiboku	...
White Bamboo	50.0
Striped Singapore	50.0

19TH NOVEMBER, 1906—continued.

Number or Name of Variety.	Percentage of Dead or Diseased Stalks.
Rose Bamboo	9.6
Louisiana Striped	21.4
Louisiana Tiboo Merd	16.0
D. 74 ... ..	...
D. 95	40.0
T. 202	17.3
N.G. 3	76.7
N.G. 7	51.7

As the canes progressed towards maturity, examinations of diseased stalks, and also of apparently healthy ones, were made, for the purpose of ascertaining if gum or other disease was indicated. Sections of these stalks were also cut and examined microscopically. No symptoms of root or fungoid disease were discovered, but the gumming disease was apparent in several varieties, and those affected will be indicated in the table showing the number of apparently healthy and diseased sticks per acre counted at the time of harvesting the hospital varieties.

The whole of these varieties were cut and counted in September, when they were just over twelve months old, and were passed through the experimental mill at the station for the purpose of ascertaining the quality of the resulting juice. The analyses are given below:—

ANALYSES 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. N/10 NaOH.
1	New Guinea	Mavoe	5-9-07	12 months	17.6	14.41	1.25	81.8	10.5
2	Do.	Chenoma	5-9-07	do.	18.9	16.98	.47	89.8	6.5
3	Do.	Oiva	5-9-07	do.	16.4	13.37	1.13	81.5	8.5
4	Do.	Batoe	5-9-07	do.	17.7	15.61	.66	88.2	7.5
5	Do.	Kikarea	5-9-07	do.	12.3	8.44	1.11	68.6	6.0
6	Do.	Mabuan	5-9-07	do.	17.9	15.53	1.13	86.7	6.5
7	Do.	Moo Moo	5-9-07	do.	14.5	11.34	1.60	78.2	8.0
8	Do.	Oraya	5-9-07	do.	17.5	14.97	1.08	85.5	7.0
9	Queensland	Meerah	5-9-07	do.	17.7	15.91	.48	89.8	10.0
10	New Guinea	Iduari	5-9-07	do.	17.1	14.00	1.42	82.4	8.0
11	Do.	Akewa	5-9-07	do.	17.2	14.17	1.73	82.3	6.0
12	Do.	Oiboku	5-9-07	do.	16.2	13.42	1.15	82.8	7.0
13	Queensland	White Bamboo	5-9-07	do.	18.7	16.64	.59	88.9	6.5
14	Do.	Striped Singapore	5-9-07	do.	17.8	15.98	.43	89.7	5.5
15	Do.	Rose Bamboo	5-9-07	do.	18.0	16.60	.34	92.2	6.0
16	Louisiana	Louisiana Striped	5-9-07	do.	17.2	15.51	.55	90.1	8.5
17	Do.	Louisiana Tiboo Merd	5-9-07	do.	15.5	13.61	.72	87.8	6.0
18	Demerara	Demerara 74	5-9-07	do.	16.2	13.99	.52	86.3	6.5
19	Do.	Do. 95	5-9-07	do.	17.2	15.35	.34	89.2	6.0
20	Trinidad	Trinidad S. 202	5-9-07	do.	17.9	16.09	.57	89.8	6.5
21	New Guinea	New Guinea 3	5-9-07	do.	18.4	16.08	.79	87.3	6.0
22	Do.	Do. 7	5-9-07	do.	19.1	17.51	.39	91.6	6.0

Acidity determinations were made on all the samples, but these do not tend to confirm Dr. Erwin Smith's opinion (quoted in last year's report) that the immunity of certain canes from the gumming disease is probably due to their high acidity, for although the average of acidity is slightly higher in the canes apparently unaffected, yet some individual varieties in which the disease was seen have given a higher acidity test than those in which it was not observed. The acidity in canes growing upon other portions of the station cannot be compared with the acidity in the hospital canes, for the reason that the former are ratoons growing upon old limed land, while the latter are plant, growing upon virgin soil.

The following table embodies the general observations made upon the foliage and appearance of the cane, the examination of the sticks for gumming or other diseases, and the number of apparently sound and diseased sticks at the time of cutting:—

No. or Name of Variety.	General Appearance of Foliage and Cane.	Result of Examination of Individual Canes by Cutting Sections.	Number of Apparently Healthy Canes per Acre.	Number of Apparently Diseased Canes per Acre.
Mavoe	Apparently healthy...	Apparently healthy...	18,530	1,635
Chenoma	Foliage rusty...	Gumming disease indicated	24,252	2,180
Oiva	"	Gumming disease not seen	16,895	4,632
Bate	"	Gumming disease not seen	27,522	1,907
Kikarea	Tops dying and crinkled	Gumming disease indicated	5,995	16,077
Mabuan	Tops dying and crinkled	Gumming disease indicated	24,252	4,087
Moo Moo	Foliage rusty ...	Apparent disease not gum	11,990	14,715
Oraya	"	Apparent disease not gum	33,517	1,090
Meerah	"	Apparent disease not gum	17,167	2,725
Iduari	Tops dying, many sticks dead; appearance poor	Gumming disease indicated	40,900	8,175
Akewa	Tops dying, many sticks dead; appearance poor	Gumming disease indicated	27,250	11,445
Oiboku	Tops dying, many sticks dead; appearance poor	Gumming disease indicated	17,440	13,080
White Bamboo	Short stunted cane, very few living plants	Gumming disease indicated	Nil	5,450
Striped Singapore	Very poor	Gumming disease indicated	6,812	1,090
Rose Bamboo	Foliage rusty ...	No gum visible	21,800	2,452
Louisiana Striped	"	Gumming disease indicated	15,532	2,997
" Tiboo Merd	"	Pithy centres; no gum seen	19,075	5,450
D. 74	Tops all dead; every cane arrowed; early maturity	Pithy centres; no gum seen	32,700	Nil
D. 95	Poor; tops dying ...	Gumming disease indicated	13,625	1,635
Trinidad S. 202	Tops all dead ...	Pithy centres; no gum seen	24,525	Nil
New Guinea 3	Poor; foliage rusty ...	Gumming disease indicated	10,900	817
" 7	Fair; "	Gumming disease indicated	27,000	250

Although the varieties, as a whole, appeared to have recovered somewhat, and fewer sticks seemed affected by the gumming disease, yet, before any definite conclusions can be drawn, the results of the ratoon crops must be awaited, when it is hoped some of the varieties will be found to have recovered totally from tendencies to given diseases.

SUBSIDIARY CROPS.

SORGHUMS.

Fresh areas have been planted with the useful sorts of sorghum varieties to meet the demand of farmers for seed. Of the seed distributed from the station in 1906, favourable reports have been received, except in the far North, where it did not appear to have done particularly well. Seed was also distributed during 1907 to farmers applying for same. The variety known as Giant Honduras produced an immense crop, from 13 to 16 feet high, in some nine months; but the smaller varieties, such as Planter's Friend, Early Orange, and Mixed American, had produced two crops in the same period. On cutting, the Giant Honduras has given a very poor ratoon crop, while the other three varieties have again yielded a third ratoon crop of fair dimensions, considering they were grown in the winter and during a very dry spell. Moreover, the experience at the station is, that stock decidedly prefer the smaller sorts to the coarse hard canes formed by the Giant Honduras variety.

SISAL HEMP.

The area under sisal hemp amounts to some 2 acres. The area first planted is now covered with large strong and hardy plants, which, in another year or two, should be ready for cutting. The smaller area, planted more recently, is also coming on nicely. The suckers produced from certain of the plants, reserved for that purpose, are distributed to farmers requiring same; but only a few applications have so far been received.

COTTON.

In last year's report it was stated that a larger piece of land had been planted with Caravonica cotton. This area, amounting to one-third of an acre, was planted in March, 1906. By August of the same year, the trees had made a very fine growth, and some of them had already commenced to flower. It was not, however, till April, 1907, that any cotton was formed, and picking was not commenced till May, 1907. As in the smaller experiment area, reported on last year, the trees have been flowering and producing some cotton nearly every month. A record has been kept of the weight of unginned cotton picked each month from May till October, 1907, the details of which appear in the following table:—

YIELD PER ACRE OF CARAVONICA COTTON (INCLUDING SEED) DURING THE SIX MONTHS FROM 1ST MAY TO 30TH OCTOBER, 1907.

Month.		Lb. per Acre.
1907—May	...	198.75
„ June	...	145.86
„ July	...	87.00
„ August	...	25.11
„ September	...	11.25
„ October	...	6.00
Total yield (six months)		473.97

As far as observations have been made at the station, the Caravonica variety has the decided disadvantage of producing the maximum amount of staple during the times of heaviest rainfalls. A more extended table, covering a period of twelve months' observation and picking, will be presented next year, when more decided conclusions can be drawn. The seed of this variety is available for distribution on application.

FRUIT TREES, Etc.

Reference was made last year to seeds of a special pawpaw-tree brought by the Director from Hawaii. These were planted in the nursery, germinated, and were planted out in the fruit garden in November, 1906. By March, 1907, these plantlets had grown into full size trees, had commenced to form fruit, and were presenting a very fine appearance. They then, all at once, developed disease of some kind, in common with most of the pawpaw-trees in the district. In the absence of a plant pathologist, the specific disease is unknown. It commences by the tops dying off, and then the rest of the foliage gradually. Some of the trees were completely dug out, and the roots carefully washed and examined, when a number of the lateral roots were seen to be affected, generally about the middle and towards the end. Many were quite rotten and hung in shreds. The taproot was more or less sound, and did not appear to be nearly so much affected at the lateral roots. No insect life was found near or upon the roots, and no traces of the same were discovered anywhere about the trees. One small tree, not planted out with the others, remains, and it is hoped that this tree will continue to exist. It is repeated that the ordinary variety of pawpaw-trees, both about Mackay and farther north, have, in many cases, succumbed to the diseased conditions specified, and the varieties imported from Hawaii have not escaped the same fate.

The young mango-trees planted in 1903 continue to do well. Many of them are flowering, and it is hoped will produce fruit this season. So far these seedlings, from the imported Indian stocks, have not developed scale to anything like the same extent as the parent trees. The latter have been sprayed as usual with the resin wash, and are at date fairly clean. The mango-trees of the Mackay district are at present laden with bloom, and the crop should be a very heavy one.

GRASSES.

The area under *Paspalum dilatatum* has again been added to, and numerous requests for plants for setting out have been complied with. A small quantity of seed of the new Rhodes grass has been introduced. This has germinated, and will be later on planted out, and, as soon as sufficient stoles are obtained, farmers will be supplied.

GRAPE VINES.

The usual distribution of vine cuttings was made during the pruning season, a number of applicants being supplied. The vines have been painted with a lime-sulphur mixture, and are now in good order. A number of cuttings of the best kinds were planted in the bush-house, and many have germinated. These will take the place of kinds that have been proved not so good.

PINEAPPLE SUCKERS.

A distribution of pineapple suckers of approved varieties has also been made.

MISCELLANEOUS.

The following analyses were made to determine the nutritive value of certain feedstuffs growing at the Experiment Station. Both the grasses analysed—namely, *Paspalum dilatatum* and Guinea Grass—are largely used in the Mackay district for feeding stock. Two analyses of paspalum are given, one of the young grass, and the other of a much older crop. In places where the grass is grazed, however, the shoots are generally always more or less young, and it will be seen that at this stage it contains the largest amount of protein, the most necessary and expensive ingredient of feeding stuffs. The *Paspalum dilatatum* is shown to be superior to the Guinea grass in proteids and carbohydrates.

An analyses of Cassava Root is also given. These roots are still used by some farmers for pig feeding, but not nearly to the extent they should be. Dangerous proportions of Hydrocyanic (prussic) Acid were found in the roots, but this is easily got rid of by taking the precautions outlined in a previous report, *i.e.*, chopping up the roots, boiling them, running the water off, rinsing in cold water, and again running this water away. The roots are then ready for use.

ANALYSES OF PASPALUM DILATATUM GROWN AT THE EXPERIMENT STATION, MACKAY.

	YOUNG CROP.		OLD CROP.	
	Green Substance.	Dry Substance.	Green Substance.	Dry Substance.
Moisture	74.400	00.000	66.731	00.000
Dry Substance	25.600	100.000	33.269	100.000
Crude Fibre	7.680	30.000	10.167	30.560
Total Nitrogen ... ..	.372	1.456	.169	.509
x 6.25 = to Proteids	2.329	9.100	1.056	3.181
Albuminoid Nitrogen ... ..	.307	1.200	.141	.424
x 6.25 = to Proteids	1.920	7.500	.881	2.650
Amide Nitrogen (diff.) ... ..	.065	.256	.028	.085
Asparagine ... ..	.350	1.371	.150	.455
Ether Extract ... ..	.788	3.080	1.550	4.660
Carbohydrates (less fibre)	12.790	49.961	17.814	53.547
Total Ash	2.070	8.088	2.704	8.128
Soluble Ash	1.927	7.528	2.568	7.720

ANALYSIS OF GUINEA GRASS GROWN AT THE EXPERIMENT STATION, MACKAY.

	Green Substance.	Dry Substance.
Moisture	78.450	00.000
Dry Substance	21.550	100.000
Crude Fibre	8.132	37.736
Total Nitrogen ... ..	.238	1.108
x 6.25 = to Proteids	1.487	6.925
Albuminoid Nitrogen ... ..	.161	.747
x 6.25 = to Proteids	1.006	4.668
Amide Nitrogen (diff.) ... ..	.058	.271
Asparagine ... ..	.310	1.451
Ether Extract ... ..	.707	3.280
Carbohydrates (less fibre)	8.918	41.385
Total ash	2.474	11.480
Soluble Ash	2.391	11.096

ANALYSIS OF CASSAVA ROOT GROWN AT THE EXPERIMENT STATION, MACKAY.

	Fresh Substance.	Dry Substance.
Moisture	60.650	00.000
Dry Substance	39.350	100.000
Crude Fibre	1.196	3.040
Total Nitrogen ... ..	.178	.452
× 6.25 = to Proteids	1.112	2.825
Albuminoid Nitrogen ... ..	.087	.222
× 6.25 = to Proteids ... ..	.545	1.387
Amide Nitrogen (diff.) ... ..	.090	.230
Asparagine ... ..	.484	1.232
Ether Extract ... ..	.354	.904
Carbohydrates (less fibre)	35.949	91.357
Total Ash ... ..	.818	2.080
Soluble Ash ... ..	.739	1.880

SISAL HEMP ANALYSES.

The analyses of the dry substance of the sisal hemp shows that that crop takes up from the soil a relatively high proportion of mineral matter. It is further shown, however, that the great bulk of the mineral matter is composed of soil elements of the commonest and most abundant character, such as lime and magnesia, and that the elements usually purchased, in the form of manures, are drawn upon by the crop in a relatively small measure. The high content of lime and magnesia, in the ash of the sisal, at once explains why the plant flourishes so well upon soils having a coal or limestone subsoil; such, for example, as the sea-level soils of the Hawaiian Islands, where the sisal hemp is considerably developing. There is no doubt, in the opinion of growers, that a good supply of lime and related constituents has a good effect upon the nature of the fibre, as well as upon the rate of growth of the plant.

ANALYSIS OF SISAL HEMP GROWN AT THE EXPERIMENT STATION, MACKAY.

	Green Substance.	Dry Substance.
Moisture	86.70	00.000
Dry Substance	13.30	100.000
Crude Fibre	2.825	21.240
Total Ash	1.574	11.840
Insol. Ash ... ..	.037	.290

ASH CONSTITUENTS.

Sand ... ..	.560
Carbon Dioxide	26.430
Soluble Silica ... ..	.808
Phosphoric Acid	4.604
Lime	31.860
Magnesia	21.310
Ferric Oxide ... ..	.800
Manganese Oxide ... ..	.000
Sulphur Trioxide	1.448
Chlorine	1.040
Potash	7.997
Soda	2.674
	<hr/> 99.531

ANALYSIS OF WATER FROM EXPERIMENT STATION BORE USED FOR IRRIGATION PURPOSES.

	Per 100 Water.	Grains per Gallon.	Parts per 100,000.
Total Solids	·0200	14·0000	20·000
Mineral Solids	·0160	11·2000	16·400
Organic Solids	·0040	2·8000	4·000
Chlorine	·0025	1·7500	2·500
Equivalent to Salt	·0041	2·8875	4·100

MINERAL CONSTITUENTS.

	Per 100 Total Solids.	Grains per Gallon.	Parts per 100,000.
Silica (Total)	32·000	4·4800	6·400
Lime	8·833	1·2362	1·766
Magnesia	8·955	1·2537	1·791
Phosphoric Acid	4·262	·5964	·852
Ferrous Oxide	·900	·1260	·180
Carbon Dioxide	14·754	2·0550	2·950
Chlorine	12·500	1·7500	2·500
Potash	3·671	·5110	·730
Soda	14·046	1·9670	2·810

REMARKS.

Water slightly turbid owing to minute particles of Silica in suspension. No Sulphates present.

ANALYSES MADE AT MACKAY SUGAR EXPERIMENT STATION LABORATORY FROM 1ST JULY, 1906,
TO 30TH JUNE, 1907.

Materials.	No. of Samples Analysed.	No. of Analyses.
Sugar-canes for Experiment Station	463	926
Sugar-cane fibres for Experiment Station	115	236
Sugar-canes for outside growers	14	28
Sugars	1	2
Hillside deposit	1	2
Soils, Experiment Station—Agricultural method	2	4
Soils, Experiment Station, by Maxwell's Aspartic Acid method	2	2
Fertilisers	2	4
Grasses, for nutrient value	3	6
Cassava root	1	2
Sisal hemp (mineral matter)	1	2
Water (full analysis)	1	2
	609	1,216

HARRY T. EASTERBY, Assistant Director.

SUB-STATIONS EXPERIMENTAL WORK.

Only two sub-stations continued their experiments into the year 1907, and these did so in accordance with their own urgent request to be allowed to continue the work through the third ratoon crop. The results of the Mundoo Sub-station are given in the form of a letter addressed to the Director.

MUNDOO SUB-STATION.

" Mundoo, 18th July, 1907.

" Dr. W. Maxwell, Director of Sugar Experiment Stations.

" DEAR SIR,—I have much pleasure in herewith forwarding you details of the harvesting of 3rd ratoons (fourth crop) of the experimental plats here, cut and loaded 2nd to 4th July, at age of ten months. You will note by last year's report that the plats were cut 3rd September, 1906, and by the report of the preceding year 8th September, 1905, so that the results this year, at ten months old, come out splendidly without a doubt. The weights and sugar contents of each plat, as supplied by the courtesy of the C.S.R. officials at Goondi Mill, are as under specified :—

			Weights of Cane.	P.O.C.S.
Trashed—Plat No. 1 ($\frac{1}{2}$ -acre), lime and manure	...	...	9.212	10.95
" " 2 " manure	...	...	9.064	11.75
Not trashed—Plat No. 3 ($\frac{1}{2}$ -acre), manure	...	...	9.531	10.20
" " 4 " lime and manure	...	...	10.439	10.50
" " 5 " check ordinary cultivation...	...	...	2.075	11.75

" You will observe how consistently plats Nos. 3 and 4 have continued right through from the start. These two plats had no drawbacks whatever, but Nos. 1 and 2 in first ratoon stage suffered to a certain extent from grub patches, supplemented later on by a visitation of grasshoppers (in the hopper stage), Nos. 1 and 2 being in their line of march, and the young ratoons were completely stripped of the leaves by the pest. Nos. 3 and 4 escaped altogether both grubs and grasshoppers, as also did the check plat, otherwise they would have suffered the same check. The whole of the four plats had the same equal ploughing, subsoiling, cultivation, and manuring, and Nos. 1 and 2 should have been as good as 3 and 4, had they escaped grubs and grasshoppers. I might mention that the first piece of cane I cut this season was 8 acres of first ratoons, violet cane, which yielded 69½ tons, or an average of a little over 8½ tons per acre. This 8-acre piece was cut last year as plant cane, 16th to 20th August, and averaged between 13 and 14 tons to the acre. I mention this as a comparison. After cutting the above 8 acres I put the gang into the experimental plats, which, after cutting, they went into another farmer's paddock, so that the 8 acres and experiment plats comprise all the cane that I have harvested as yet this season. The balance of my crop I cut later on. I am cutting with white labour this year for the first time since I have been canegrowing, and, so far, I have had no fault whatever to find with the gang the C.S.R. Company provided me with. They cut cleanly, and loaded well the 109 tons that I have sent in, and I will be very well satisfied if the balance of my crop comes off as well. I only trashed two of the plats this season, Nos. 1 and 2, and Nos. 3, 4, and 5 were not trashed. I intended to trash the five plats, but heavy rain and wind set in after I finished Nos. 1 and 2, and the cane went down to such an extent that I considered it advisable to knock off trashing, so as to avoid the trashers walking on and breaking the cane stalks. I was very pleased that Mr. Easterby visited me at a most opportune time; half the experiment plats area were cut, and the remaining half standing when he arrived on the scene, so that the cane was under his observation as it was lying on the ground cut, and the balance standing untouched. He was very pleased, indeed, with the appearance of the plats. I will send you the cost of production of this third ratoon crop later on. I am very glad to note by your wire that you intend visiting us in October, and will be pleased to meet you again.

" Yours, &c.,

" RALPH REID."

RESULTS OF THE EXPERIMENT PLATS AS COMPARED WITH THE CHECK PLATS AT MUNDOO SUB-STATION,
COVERING FOUR CROPS.

Total yield per acre of experiment plats =	83.66 tons.
Total yield per acre of check plats =	25.02 tons.

These figures speak for themselves, and require no comment further than the Director's statement that Mr. Ralph Reid has conducted these experiments from beginning to end with the greatest enthusiasm and care, and has, in every respect, carried out the instructions of the Director of the Sugar Bureau. No better illustration is available of the value of deep ploughing and subsoiling, and of the judicious application of manures to exhausted soils.

ECONOMICS.

ESTIMATED VALUE OF THE SUGAR CROP OF 1906.

Volume of Crop, 184,377 tons.		£
Value of the total sugar, upon the basis of the value of 94 per cent. N.T.	...	1,978,980
Molasses	...	11,840
Value of uncrushed cane	...	290,000
Feed value of molasses, cane, &c., consumed	...	150,000
		<u>£2,430,820</u>

EXPORT VALUE OF THE SUGAR CROP IN RELATION TO THE NET EXPORTS OF MEATS, EXTRACTS, CATTLE, SHEEP, PIGS, CROPS, AND ALL EDIBLE PRODUCE.

	£
Meat and extracts	569,548
Cattle, sheep, pigs	285,371
Crop and other edible produce	855,777
Sugar and molasses	1,626,608
	<u>£3,337,304</u>

PROPORTIONAL VALUE OF SUGAR EXPORTS TO THE TOTAL NET EXPORTS OF LIVE STOCK, CROPS, AND ALL OTHER EDIBLE PRODUCTS.

Year 1901-2	...	32.0 per cent.
„ 1902-3	...	35.5 „
„ 1903-4	...	34.7 „
„ 1904-5	...	37.0 „
„ 1905-6	...	41.1 „
„ 1906-7	...	48.7 „

Concerning information upon the relative proportions of the crop produced by white labour and by coloured labour, copious statements have already been published in not less than three official reports. For this reason the Director considers it unnecessary to republish such data in this report, and thus incur further costs of publication. Moreover, it appears advisable, as a general rule, that overlapping and repetition by Government reports should be avoided, and the general costs of publication as far as possible reduced.

STATEMENT OF EXPENDITURES FOR THE YEAR ENDING 30th JUNE, 1907.

	£	s.	d.
Salaries	1,100	0	0
Wages	597	18	3
Chemicals and apparatus	172	16	0
Freights, passages, railway travel, &c.	102	17	8
Stamps, telegrams, and petty cash, &c.	106	7	10
Travelling expenses, all officers	175	14	8
Transport	64	11	0
Printing and advertising	86	10	6
Gas	48	5	0
Manures	30	2	9
Repairs (blacksmith, carpenter, plumber, &c.)	37	18	5
Rents and rates	29	9	7
Furniture	35	5	5
Sundries	25	9	5
Tools, implements, &c.	25	11	4
Insurance, &c.	30	19	8
Timber	25	0	2
Stationery	45	16	7
Telephones, &c.	12	12	0
Library and subscriptions to newspapers	41	11	6
Fuel	4	17	0
Entertaining allowance	16	0	0
Horse feed	8	17	10
	<u>£2,813</u>	<u>14</u>	<u>3</u>

RECEIPTS AND EXPENDITURES, YEAR 1906-7.

RECEIPTS.

	DR.			CR.		
	£	s.	d.	£	s.	d.
Balance on hand 30th June, 1906 (as per last annual report)	5,149	13	11			
Sale of cane, Mackay... ..	146	17	6			
Bonus on white-grown cane	45	13	11			
Other collections	11	11	6			

EXPENDITURE.

Expenditure as per page 45				2,813	14	3
Balance to credit at 30th June, 1907				2,540	2	7
				<hr/>	<hr/>	<hr/>
	£5,353	16	10	£5,353	16	10

Price 1s. 8d.]

By Authority: GEORGE ARTHUR VAUGHAN, Government Printer, William street, Brisbane.