1904.

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, November, 1904.

SIR,—I have the honour to submit the Fourth Annual Report upon the Sugar Experiment Stations, the Administration of the Sugar Fund, and upon the state of the Sugar Industry in Queensland, as required by "*The Sugar Experiment Stations Act of* 1900."

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

The Report will deal with the "Technical and Experimental," the "Agricultural," and the "Economic" factors of the sugar industry, and in an order similar to that followed in preceding reports.

TECHNICAL AND EXPERIMENTAL.

(A) WORK OF THE LABORATORIES.

The laboratories have been engaged with the further examination of soils, irrigation waters, manures, sugar-canes and their products, and with other sundry materials.

In presenting the analytical results of the soil analyses, the tables of data contained in last year's report are reproduced, with all new data and results included. By this means the general statement of the work is brought up to the present date, and in a form most convenient for rapid reference and oversight.

DISTRICTS FROM WHICH SAMPLES OF SOIL HAVE BEEN TAKEN FOR ANALYSIS.

District.	Sub-district.	No. of Samples.	No. of Sub-samples.
Cairns	Mossman River	32	128
	Cairns	44	176
	Johnstone River	60	240
	Herbert River	52	208
Mackay	Burdekin Delta	54	216
	Proserpine	41	164
	Mackay	147	588
Bundaberg	Bundaberg	101	404
	Isis	74	296
	Maryborough	94	376
	Logan	50	200
	Moreton	75	300
		824	3,296

It is seen that soil samples have been taken from 3,296 places, and that 824 samples have been dealt with in the laboratories.

The results of analysis of the soils of the respective districts are set forth in the following brief tables :—

CAIRNS OR NORTHERN DISTRICT.

CAIRNS.	TOTAL AMOUNTS OF ELEMENTS IN SOIL.				AMOUNTS OF ELEMENTS AVAILABLE.		
Sub-districts.	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Mossman	·237	·516	·112	·128	·0659	·0137	·0009
Kamerunga	·150	·272	·141	·092	·0430	·0082	·0014
Hambledon	·250	·465	·148	·122	·0678	·0108	·0013
Mulgrave	·288	·407	·184	·120	·0096	·0148	·0011
Geraldton	·128	·249	·237	·167	·0365	·0149	·0005
Mourilyan	·174	·218	·089	·166	·0311	·0137	·0006
Halifax	·494	·244	·125	·117	·1035	·0138	·0012
Ingham	·301	·195	·126	·095	·0508	·0121	·0010
Ripple Creek	·407	·226	·113	·104	·0908	·0171	·0009
Means	·292	·310	·141	·122	·0654	·0132	·0010

This table of analyses represents soils taken from 752 places.

ELEMENTS PER ACRE TO THE DEPTH OF ONE FOOT.

CAIRNS.	TOTAL POUNDS PER ACRE.				POUNDS AVAILABLE PER ACRE.		
Sub-districts.	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
Mossman River	7,110	15,480	3,360	3,600	1,977	411	27
Kamerunga	4,500	8,160	4,230	2,760	1,290	246	42
Hambledon	7,500	13,950	4,440	3,660	2,034	324	39
Mulgrave	6,640	12,210	5,520	3,600	2,988	444	33
Geraldton	3,840	7,470	7,110	5,010	1,095	447	15
Mourilyan	5,220	6,540	2,670	4,980	933	411	18
Halifax	14,820	7,320	3,750	3,510	3,105	414	36
Ingham	9,030	5,850	3,780	2,850	1,524	363	30
Ripple Creek	12,210	6,780	3,390	3,120	2,728	513	27
Means	8,760	9,300	4,230	2,660	1,962	396	30

SOILS OF THE MACKAY OR CENTRAL DISTRICT.

MACKAY.	TOTAL ELEMENTS IN SOIL.				AVAILABLE ELEMENTS IN SOIL.		
Localities and Sub-districts.	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Homebush	0·480	0·185	0·193	0·082	0·0591	0·0182	0·0013
River Banks	0·501	0·171	0·149	0·096	0·0748	0·0136	0·0014
North Eton	0·606	0·212	0·121	0·090	0·0760	0·0200	0·0009
Plane Creek	1·290	0·133	0·106	0·136	0·1170	0·0079	0·0015
North of River	1·300	0·375	0·290	0·204	0·1876	0·0207	0·0017
Farleigh Estate	0·910	0·176	0·181	0·132	0·1037	0·0276	0·0009
Sunnyside	0·676	0·246	0·172	0·119	0·0969	0·0246	0·0011
Proserpine	0·784	0·166	0·185	0·139	0·1277	0·0330	0·0011
Burdekin	0·916	0·344	0·188	0·103	0·1650	0·0344	0·0078
Means	0·829	0·223	0·165	0·122	0·1119	0·0222	0·0020

The table represents soils taken from 968 places.

Elements per Acre to the Depth of One Foot.

Mackay. Localities and Sub-districts.	Total Pounds per Acre.				Available Pounds per Acre.		
	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
Homebush	14,400	4,550	5,790	2,460	1,773	546	38
River Banks	15,030	5,130	5,470	2,880	2,244	408	42
North Eton	18,180	6,360	3,630	2,700	2,280	600	27
Plane Creek	38,770	3,990	3,180	4,080	3,510	237	45
North of River	39,000	11,190	8,700	6,120	5,628	621	51
Farleigh Estate	27,300	5,280	5,430	3,960	3,111	828	27
Sunnyside	20,280	7,380	5,160	3,570	2,907	738	33
Proserpine	23,520	4,980	5,550	4,170	3,831	990	33
Burdekin	27,480	10,320	5,640	3,090	4,350	1,032	234
Means	24,880	6,575	5,394	3,670	3,359	666	59

Soils of the Bundaberg or Southern District.

Bundaberg. Localities and Sub-districts.	Total Elements in Soil.				Available Elements in Soil.		
	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
(1) Isis (Level lands)	0·456	0·189	0·242	0·202	0·1841	0·0197	0·0011
Isis (Hill sides)	0·294	0·173	0·259	0·164	0·0842	0·0161	0·0013
Woongarra	0·636	0·144	0·404	0·220	0·2554	0·0234	0·0012
(2) Bingera	0·310	0·197	0·138	0·104	0·1461	0·0245	0·0016
Watawa	0·475	0·167	0·183	0·136	0·1279	0·0207	0·0010
Birthamba	0·245	0·082	0·207	0·140	0·1280	0·0290	0·0005
Gin Gin	0·873	0·258	0·212	0·128	0·1574	0·0211	0·0057
Sharon	0·880	0·328	0·195	0·159	0·1582	0·0409	0·0033
Kalbar	0·623	0·233	0·121	0·120	0·1320	0·0243	0·0024
Oakwood	0·287	0·128	0·086	0·108	0·1092	0·0328	0·0012
(3) Fairymead	0·510	0·467	0·478	0·133	0·1086	0·0235	0·0015
Waterview	1·106	0·453	0·141	0·158	0·2391	0·0441	0·0106
Avondale	0·675	0·320	0·176	0·146	0·1395	0·0327	0·0021
Invicta	0·373	0·257	0·211	0·198	0·1028	0·0321	0·0031
(4) Gooburrum	0·168	0·113	0·136	0·116	0·0680	0·0292	0·0006
Mount Bauple	0·275	0·159	0·178	0·145	0·0728	0·0223	0·0006
Fialba	0·195	0·142	0·155	0·180	0·0506	0·0187	0·0008
Beenleigh	0·841	0·268	0·288	0·161	0·1179	0·0280	0·0019
Nerang	0·692	0·311	0·286	0·185	0·1356	0·0404	0·0016
Moreton	...	...	...	...	0·0846	0·0099	0·0012

ELEMENTS PER ACRE TO THE DEPTH OF ONE FOOT.

BUNDABERG.	TOTAL POUNDS PER ACRE.				AVAILABLE POUNDS PER ACRE.		
Localities and Sub-districts.	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
(1)							
Isis (Level lands)	15,960	6,615	8,470	7,070	6,443	689	39
Isis (Hill sides)	10,290	6,055	9,065	5,740	2,947	563	45
Woongarra	22,260	5,040	14,140	7,700	8,939	819	42
(2)							
Bingera	9,300	5,934	5,940	3,120	4,483	735	48
Watawa	14,250	5,010	5,490	4,080	3,837	621	30
Birthamba	7,350	2,460	6,210	4,470	3,840	870	15
Gin Gin	26,211	7,740	6,360	3,840	4,722	633	171
Sharon	26,400	9,840	5,850	4,770	4,746	1,227	99
Kalbar	18,690	6,990	3,630	3,600	3,960	729	102
Oakwood	8,610	3,840	2,580	3,240	3,276	984	36
(3)							
Fairymead	15,300	14,010	14,340	3,990	3,258	705	45
Waterview	33,180	13,590	4,230	4,690	7,173	1,323	318
Avondale	20,250	9,600	5,280	4,380	4,185	981	63
Invicta	11,190	7,710	6,330	5,790	3,084	963	93
(4)							
Gooburrum	5,040	3,390	4,080	3,480	2,040	876	18
Mount Bauple	8,250	4,590	5,340	4,350	2,184	669	18
Pialba	5,850	4,260	4,650	5,670	1,518	561	24
Beenleigh	21,025	6,700	7,200	4,025	2,947	700	47
Nerang	17,312	7,777	7,152	4,640	3,390	1,010	40
Moreton	...	...	...	...	2,116	248	30

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.	Localities.	Number of Samples.	Number of Sub. Samples.
Cambooya	9	36	Nundah	11	44
Drayton	12	48	Nudgee	20	80
Toowoomba	12	48	Geebung	1	4
Westbrook State Farm	13	52	Zillmere	12	48
Hermitage State Farm	6	24	Sunnybank	10	40
Biggenden State Farm	6	24	Barcaldine	8	32
Albion	1	4			
Clayfield	1	4	TOTALS	122	488

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	·0434	·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	·186	·0458	·0096	·0124
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	·0044
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	·0006
Cambooya (black soils)	3·689	·274	·321	·136	·2369	·0227	·0014
Drayton (red soils)	·638	·194	·224	·149	·1264	·0207	·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	·1032	·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
Biggenden State Farm	1·787	·097	·185	·119	·1476	·0432	·0027
Hermitage State Farm (black soils)	1·393	·261	·184	·097	·1387	·0332	·0017

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 soil)	5,850	2,496	6,126	2,946	1,626	570	60
Nundah (grey soil)	4,200	2,975	6,750	1,920	1,572	660	310
Nudgee (red soil)	8,040	2,580	5,370	3,270	2,817	912	42
Nudgee (grey soil)	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
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	1,965	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	877	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	5,470	4,792	891	45
Drayton (black soils)	27,270	6,752	4,012	3,637	3,467	824	60
Toowoomba (red soils)	15,315	4,878	6,606	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	45
Westbrook State Farm (black soils)	47,625	7,100	5,850	3,125	6,380	615	28
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	4,600	2,425	3,467	830	42

Tables are now in course of preparation giving the soil analyses of each locality, including all the sugar-growing localities and also non-sugar-growing districts. When these are completed they will be sent out to the respective farmers' associations. This work has been some weeks in abeyance, due to the illness of the Bureau Secretary, who has been laid up in the hospital. At a later time the Soil Bulletin is intended to be published, when each cane farmer will be entitled to receive a copy.

It is proposed that the examination of the soils of other non-sugar districts shall be undertaken in due course, and so fast as the prior claims of the sugar districts upon the labours of the laboratories will allow.

Analyses of Brick and Other Clays.—Several samples of clays were submitted to the laboratories for examination, in order to estimate their respective suitabilities for brickmaking and also for the manufacture of fine pottery. These clays were received respectively from the Ipswich and Mackay districts, and the analyses are set forth as follow:—

Analyses of Ipswich Clays.

—	1.	2.	3.	4.	5.
Moisture	3·960	6·450	4·320	6·120	1·780
Vol. matter and combined water	8·420	8·950	9·340	8·170	6·460
Silica	58·860	53·210	54·400	54·610	67·940
Phosphoric acid	·179	·185	·236	·191	·191
Chlorine	·004	·003	·006	·003	·020
Ferric oxide	1·790	1·751	1·783	1·871	·478
Alumina	25·051	27·553	28·351	27·118	21·931
Lime	·170	·140	·140	·160	·140
Magnesia	·696	·584	·584	·955	·923
Potash and soda	·590	·974	·730	·591	·340
Total	99·720	99·800	99·980	99·789	100·203

Particulars—

No. 1. "Saunderson," Ipswich road—Fire clay.
No. 2. Ditto ditto Pottery clay.
No. 3. Ditto ditto Prepared from No. 2.
No. 4. "Clayton" pottery clay, middle of seam.
No. 5. "Clayton" pottery clay, surface and top of seam.

Analyses of Mackay Clays.

—	No. 6.	No. 7.	No. 8.	No. 9.	No. 10.	No. 11.	No. 12.
Moisture	1·790	2·100	1·150	3·280	3·430	2·250	2·060
Combined water	8·130	10·570	13·260	7·380	9·640	10·970	11·100
Silica	49·300	53·220	47·840	59·600	47·200	50·840	49·800
Phosphoric acid	·300	·422	·268	·268	·383	·268	·281
Chlorine	·020	·023	·050	·050	·013	·014	·011
Ferric oxide	15·124	2·388	2·189	6·368	5·174	1·990	1·990
Alumina	19·876	28·390	26·543	21·064	26·593	31·242	32·560
Lime	1·200	·750	·700	·750	·900	·500	·500
Magnesia	1·010	1·262	·721	·920	1·082	1·500	·883
Potash	·136	·214	·278	·110	·208	·231	·180
Soda	·788	·546	1·560	·350	1·170	·261	·244
Sulphuric acid	2·425	trace	5·575	trace	3·810	trace	·487
Total	100·199	100·385	100·134	100·140	99·603	100·066	100·096

Particulars—

No. 6. Ferruginous sample, containing white veins of kaolin.
No. 7. Very white kaolin.
No. 8. Soft kaolin, with small amount of ferric oxide.
No. 9. Ferruginous sample, with veins of kaolin.
No. 10. Ferruginous sample.
No. 11. White kaolin.
No. 12. White kaolin.

The analyses of these clays are given for the guidance of landowners and others who may also have in their control similar quarry materials for which they are seeking a commercial outlet and use.

Irrigation Waters.—It is not proposed to devote a section to the subject of irrigation in this Report. That subject has been copiously dealt with in previous reports. Moreover, extremely little expansion of the areas where irrigation is being applied has occurred during the past year. One good rain and apprehensions of recurring drought very largely pass out of the minds of men until disaster comes round again to impress its results upon us.

The laboratories, however, have had under examination a great number of waters proposed for irrigation purposes, concerning which guidance and advice to farmers and others have been constantly given. A series of such waters, with the analyses, are now given, in order to convey to the public the extreme variation in quality and in suitability for irrigation uses of the waters that are submitted for the laboratory's determinations. The results of the analyses will make it very clear that waters should not be used indiscriminately for plant nutrition, and without the guidance that chemical analysis furnishes at a very small cost. The results, as set forth in the following tables, have already been sent to the senders of the waters, and it is not necessary to furnish the names or localities.

The minerals which render waters unfit for irrigation, when these bodies are contained in excess, are common salt and chlorides of magnesium, potassium, &c., and also the carbonates of soda and related salts. It has been stated repeatedly by the writer that there is not any economic means of rendering highly-mineralised waters suitable for irrigation, and that the only practicable means of lessening the severe action of the chlorides of sodium and magnesium upon plant life is the free use of lime. Experiments with saline waters, in great detail, carried out by Director C. F. Eckart, Honolulu Sugar Experiment Station, have fully confirmed all that has been said thereon. The only means of protection is the use of waters whose saline contents do not exceed a given amount, or which does not exceed a certain "danger point."

There is, however, no such thing as an absolute danger point. The point of danger is governed by the saline contents of the soil as well as those of the water. Soils with a minimum content of soluble, pernicious salts can bear a water with a higher content of salts than soils that are already more or less charged with chlorides or carbonates of soda or magnesium. A standard for general guidance has to be adopted, however; and, while Director of the Hawaiian Experiment Station, and engaged with irrigation questions in that country, the writer was led to adopt 100 grains of common salt per gallon as the "danger point," and repeated tests carried out by Mr. Eckart in the same conditions have very generally tended to confirm the advisability of that standard, which is now adopted in the present considerations.

Analyses of Irrigation Waters.

Laboratory Number.	Total Solids per Imperial Gallon (grains).	Organic Solids per Gallon (grains).	Mineral Solids per Gallon (grains).	Common Salt per Gallon (grains).	Remarks.
1	...	...	...	1240·200	Bad.
2	73·640	17·780	55·860	23·100	Good.
3	59·950	20·900	39·050	27·950	Good.
4	15·750	4·760	10·990	1·730	Good.
5	433·650	291·970	141·680	...	Bad.
6	2005·500	...	...	1637·900	Bad.
7	30·800	...	...	14·760	Good.
8	392·800	98·700	294·100	282·957	Bad.
9	399·000	106·400	292·600	...	Bad.
10	21·700	6·190	15·510	...	Good.
11	17·670	10·810	6·860	6·006	Good.
12	14·800	2·900	11·900	3·234	Good.
13	990 100	...	...	704·550	Bad.
14	29·960	...	...	11·660	Good.
15	28·630	...	...	11·780	Good.
16	22·190	...	...	6·460	Good.
17	75·000	...	...	47·350	Good.
18	89·740	...	...	40·194	Good.
19	84·840	...	...	59·598	Safe.
20	97·510	...	...	69·762	Safe.
21	287·840	...	...	206·480	Bad.
22	101·500	...	...	71·997	Safe.
23	80·500	...	...	51·975	Safe.

ANALYSES OF IRRIGATION WATERS—*continued.*

Laboratory Number.	Total Solids per Imperial Gallon (grains).	Organic Solids per Gallon (grains).	Mineral Solids per Gallon (grains).	Common Salt per Gallon (grains).	Remarks.
24	52·010	4·130	47·880	10·600	Good.
25	21·300	...	...	...	Good.
26	19·200	...	...	...	Good.
27	61·200	21·400	39·800	...	Good.
28	41·800	12·100	29·700	...	Good.
29	428·700	144·200	284·500	278·355	Bad.
30	106·100	...	...	80·800	Safe.
31	91·140	...	...	51·860	Safe.
32	134·050	59·190	74·860	56·020	Safe.
33	1098·440	...	...	358·050	Bad.
34	93·400	...	...	55·400	Good.
35	32·200	7·000	25·200	...	Good.
36	36·050	9·310	26·740	...	Good.
37	59·74	16·130	43·610	42·730	Good.
38	40·530	21·630	18·900	...	Good.
39	65·800	15·080	50·720	...	Good.
40	63·630	14·420	49·210	...	Good.
41	58·04	14·210	44·730	...	Good.
42	113·400	35·000	78·400	18·600	Safe.
43	27·860	8·680	19·180	...	Good.
44	198·80	...	...	115·040	Dangerous.
45	269·920	39·060	230·860	177·290	Bad.
46	434·98	38·570	396·410	135·130	Dangerous.
47	261·100	39·480	221·620	95·860	Safe.
48	635·320	90·580	544·740	160·540	Dangerous.
49	59·500	9·520	49·950	...	Good.
50	57·820	18·360	39·460	...	Good.
51	208·200	85·910	122·290	124·160	Dangerous.
52	63·350	6·510	56·840	21·350	Good.
53	69·020	15·050	53·970	49·660	Good.
54	40·880	12·180	28·700	27·720	Good.
55	24·360	7·630	16·730	11·550	Good.
56	17·465	2·400	15·050	4·620	Good.
57	24·360	7·280	17·080	1·820	Good.
58	288·420	84 000	153·900	174·300	Bad.
59	136·570	23·780	112·800	113·190	Dangerous.
60	86·520	45·640	40·880	40·390	Good.
61	343·000	77·840	265·160	252·945	Bad.
62	35·560	12·740	22·820	19·040	Good.
63	9·940	4·060	5·880	5·775	Good.
64	48·650	6·090	42·560	19·040	Good.
65	80·220	20·300	59·920	40·390	Good.
66	145·04	56·700	88·340	78·400	Safe.
67	19·530	3·430	16·190	10·390	Good.

ANALYSES OF IRRIGATION WATERS—*continued.*

Laboratory Number.	Total Solids per Imperial Gallon (grains).	Organic Solids per Gallon (grains).	Mineral Solids per Gallon (grains).	Common Salt per Gallon (grains).	Remarks.
68	437·080	211·960	225·120	272·002	Bad.
69	194·000	98·560	95·480	128·205	Dangerous.
70	63·665	...	...	46·877	Good.
71	87·780	...	...	64·102	Safe.
72	225·120	20·230	204·890	153·600	Dangerous.
73	137·060	12·460	124·600	80·850	Safe.
74	183·120	16·590	166·530	121·300	Dangerous.
75	321·720	70·280	251·440	246·010	Bad.
76	7·280	3·270	3·900	4·620	Good.
77	10·150	5·250	4·900	4·620	Good.
78	204·960	...	...	130·975	Dangerous.
79	115·920	13·020	102·900	58·905	Safe.
80	144·900	17·430	127·470	80·850	Safe.
81	45·57	8·540	37·03	26·565	Good.
82	42·000	7·000	35·000	27·720	Good.
83	17·500	4·900	12·600	1·155	Good.
84	112·210	...	...	67·567	Safe.
85	82·320	14·630	67·690	60·060	Safe.
86	40·460	9·690	30·870	26·740	Good.
87	129·500	...	...	83·300	Safe.
88	215·320	...	...	130·480	Dangerous.
89	112·770	10·780	101·990	61·180	Safe.
90	103·670	11·270	92·400	71·610	Safe.
91	84·980	13·580	71·400	40·420	Good.
92	330·260	53·340	276·920	226·380	Bad.
93	351·120	73·640	277·480	226·380	Bad.
94	224·140	35·840	188·300	128·200	Dangerous.
95	610·680	112·980	497·700	61·790	Safe.
96	111·230	...	...	65·835	Safe.
97	106·330	47·180	59·150	50·820	Safe.
98	74·900	12·180	62·720	49·087	Safe.
99	14·630	7·070	7·056	4·900	Good.
100	562·240	58·100	504·140	184·420	Dangerous.
101	55·300	13·020	42·280	40·420	Good.
102	24·220	5·040	19·180	8·085	Good.
103	135·800	59·500	76·720	92·400	Safe.
104	59·080	19·600	39·480	45·045	Good.
105	271·040	...	...	184·800	Dangerous.
106	9·100	...	...	5·190	Good.
107	58·940	23·940	35·000	36·960	Good.
108	175·000	63·000	112·000	105·100	Dangerous.
109	146·300	49·420	96·880	88·935	Safe.
110	14·560	5·250	9·310	5·775	Good
111	68·250	25·620	42·630	30·270	Good
112	85·680	9·380	76·300	40·380	Good.

ANALYSES OF IRRIGATION WATERS—*continued.*

Laboratory Number.	Total Solids per Imperial Gallon (grains).	Organic Solids per Gallon (grains).	Mineral Solids per Gallon (grains).	Common Salt per Gallon (grains).	Remarks.
113	336·980	...	...	242·200	Bad.
114	56·840	...	...	50·820	Good.
115	54·530	11·130	43·400	47·350	Good.
116	102·060	14·560	87·500	64·680	Safe.
117	30·100	10·990	19·100	9·240	Good.
118	21·700	8·400	13·300	2·310	Good.
119	36·400	13·300	23·100	16·170	Good.
120	31·50	8·400	23·100	10·080	Good.
121	27·020	10·855	16·170	8·956	Good.
122	30·100	10·640	19·460	5·775	Good.
123	463·120	...	...	351·120	Bad.
124	71·96	30·380	41·58	25·410	Good.
125	57·260	34·440	22·820	15·260	Good.
126	60·860	37·100	32·760	24·500	Good.
127	34·580	22·260	12·320	15·015	Good.
128	123·900	63·280	60·620	48·510	Good.
129	68·600	45·360	23·240	17 990	Good.
130	71·050	21·700	49·350	86·960	Good.
131	16·800	4·900	11·900	9·240	Good.
132	47·600	15·400	32·200	21·000	Good.
133	9·800	5·600	4·200	2·310	Good.
134	69·160	7·350	61·810	17·320	Good.
135	58·450	14·980	43·470	38·115	Good.
136	23·800	7·420	16·380	6·930	Good.
137	46·550	13·440	33·110	24·780	Good.
138	36·120	7·490	28·630	4·620	Good.
139	64·260	10·080	54·180	35·210	Good.
140	28·210	7·630	20·580	8·050	Good.
141	44·800	8·120	36·680	19·600	Good.
142	19·600	4·620	14·980	5·740	Good.
143	20·230	4·760	15·470	5·740	Good.
144	45·150	7·210	37·940	19·040	Good.
145	49·840	13·370	36·470	13·230	Good.
146	28·140	11·060	17·080	6·930	Good.
147	47·390	32·480	14·910	11·090	Good.
148	66·500	10·150	56·350	35·805	Good.
149	85·400	8·750	76·650	58·900	Good.
150	260·260	33·460	226·800	184·800	Dangerous.
151	117·320	11·900	105·420	40·425	Good.
152	141·400	14·210	127·190	47·355	Good.
153	117·740	12·250	105·490	40·425	Good.
154	11·620	...	...	5·775	Good.
155	19·600	...	...	11·550	Good.
156	121·800	31·080	90·720	41·580	Good.
157	21·140	6·300	14·840	11·550	Good.

ANALYSES OF IRRIGATION WATERS—*continued.*

Laboratory Number.	Total Solids per Imperial Gallon (grains).	Organic Solids per Gallon (grains).	Mineral Solids per Gallon (grains).	Common Salt per Gallon (grains).	Remarks.
158	146·720	15·120	131·600	102·480	Dangerous.
159	136·250	13·090	123·160	92·400	Safe.
160	105·350	84·980	20·370	9·240	Good.
161	102·060	86·800	15·260	9·240	Good.
162	169·400	17·220	152·180	120·120	Dangerous.
163	44·310	7·770	36·540	4·620	Good.
164	44·520	7·280	37·24	6·030	Good.
165	191·870	27·300	164·570	124·740	Dangerous.
166	192·430	28·840	163·590	124·110	Dangerous.
167	44·660	7·420	37·240	8·050	Good.
168	178·430	26·320	152·110	127·050	Dangerous.
169	45·360	6·580	38·780	8·050	Good.
170	45·360	6·580	38·780	8·050	Good.
171	166·810	16·520	150·290	122·430	Dangerous.
172	46·480	6·650	39·830	10·395	Good.
173	156·29	16·520	139·770	127·576	Dangerous.
174	52·780	8·050	44·730	18·200	Good.
175	24·640	5·600	19·040	3·465	Good.
176	28·280	6·580	21·700	5·775	Good.
177	47·810	9·800	38·010	6·930	Good.
178	29·680	5·180	24·500	6·930	Good.
179	27·650	7·840	19·810	3·430	Good.
180	27·160	7·070	20·090	4·620	Good.
181	50·890	8·050	42·840	12·705	Good.
182	131·670	18·200	113·470	90·090	Safe.
183	144·760	23·59	121·170	99·330	Safe.
184	162·61	22·120	140·490	109·725	Dangerous.
185	...	...	...	14·080	Good.
186	...	...	...	58·870	Safe.
187	...	...	...	49·630	Good.
188	...	...	...	68·110	Safe.
189	137·480	42·000	95·480	109·725	Dangerous.
190	...	...	...	56·000	Safe.
191	...	...	...	47·320	Good.
192	29·050	6·650	22·400	8·085	Good.
193	35·140	7·910	27·230	12·705	Good.
194	29·295	12·950	16·345	16·800	Good.
195	36·295	17·430	18·865	21·070	Good.
196	36·400	16·030	20·370	20·160	Good.
197	20·020	4·760	15·260	10·395	Good.
198	13·930	3·150	10·780	3·990	Good.
199	199·850	...	...	125·895	Dangerous.

NOTE.—All the chlorine is calculated to common salt, but there are also present magnesium, potassium, and calcium chlorides in some of the samples of water analysed.

EXPERIMENTS TO DETERMINE THE PRESERVING ACTION OF DIFFERENT CHEMICALS UPON CANE JUICE.

Original Analysis.	Lead Acetate.			Mercuric Chloride.			Formalin.		
	After 16 hours.	After 40 hours.	After 72 hours	After 16 hours.	After 40 hours.	After 72 hours.	After 16 hours.	After 40 hours.	After 72 hours.
Brix, 19·410 per cent.	...	...	...	19·380	19·330	19·320	19·380	19·360	19·320
Sucrose, 18·157 ,, ...	18·321	18·239	18·232	18·163	18·183	18·135	17·960	17·892	17·829
Glucose, ·249 ,, ...	·253	·250	·250	·253	·265	·277	·285	·322	·323
Purity, 93·590 ,, ...	...	...	...	93·820	94·060	93·960	92·670	92·410	92·280

NOTE.—The above figures show the preserving action of lead acetate, mercuric chloride, and formalin. The results individually, and in average, indicate conclusively that mercuric chloride is the most effective. These results relate exclusively to preservation, and not to the clarification of juice for analysis. Lead acetate was applied as a preservative at the rate of 4 c.c. to 100 c.c. of juice; mercuric chloride at the rate of ·01 gramme to 100 c.c. of juice; and formalin at the rate of 1 c.c. to 100 c.c. of juice.

The actual analytical work carried out in the laboratories is set forth in the following table:—

ACTING FIRST ASSISTANT CHEMIST'S REPORT.

Materials.	Method of Analysis.	No. of Samples Analysed.	No. of Analyses.
Soils	Agricultural Method	982	1,964
Ditto	Maxwell's Aspartic Acid Method	819	1,638
Ditto	Soluble Silica—Special	20	40
Ditto	Humus—Special	778	1,556
Ditto	Nitrogen—Special	865	1,730
Ditto	Mechanical Analyses	934	934
Waters	Irrigation Waters	199	398
Manures	For Fertilisation Uses	80	160
Limes	ditto	33	66
Cane...	Polarisation Tests	115	230
Sugars	ditto	5	10
Miscellaneous Analyses	...	39	78
	Totals	4,869	8,804

The analyses by the agricultural method comprise 11 constituents. By the aspartic acid method 3 constituents are determined.

Credit is due to Messrs. Anderssen, Littlemore, and McCready, who have done good work.

GEORGE R. PATTEN, Acting First Assistant Chemist.

(B) WORK OF THE EXPERIMENT STATION.

The experimental work of the station has been continued, and upon the lines established and set forth in preceding reports. This work embraces cultivation, manuring, irrigating experiments, and competitive tests with all varieties of cane that may turn out to have a commercial value for the industry.

Last year the report was largely taken up with the statement of results following "ordinary" and "deep subsoil" cultivation. These experiments were continued with the ratoons of the Rose Bamboo variety, from which variety heavy crops of plant cane were taken last year. As will be shown in the following paragraphs, the cane rot disease has seriously interfered with the results yielded by the ratoon crop.

RATOONS OF THE ROSE BAMBOO VARIETY.—The experiments of last year in cultivation and fertilising were continued with the first ratoon crop of the Rose Bamboo variety. Unfortunately, in December of last year the disease known as cane rot began to appear in this cane, and continued to cause damage right up to the harvesting of the crop. As a consequence, the competitive and experimental value of the different plats was destroyed, and it is now only attempted to give the general results, and not to draw any conclusions from the experiments of a special nature.

The total yield of cane from the 42 plats, covering 3.1 acres, was 59.21 tons, or an average of 19.1 tons per acre. After delivery of the sound cane to the mill, the rotten cane found upon the ground amounted to 28 loads, representing not less than some 35 tons of cane, had it remained sound. The cost of production was £13 17s. an acre, and is stated as a close approximation only, the actual cost, on account of the diseased cane that had to be removed, being very difficult to decide. The value of the Rose Bamboo ratoon cane delivered at Meadowlands Mill amounted to £52 6s., including the federal rebates, being equal to £16 17s. 5d. per acre, thus leaving a balance over cost of production of £3 0s. 5d. per acre.

These figures state the results of the crop consequent upon the disease which attacked it. Had the crop remained sound and healthy it is shown, by the amount of dead cane found, that the yield of cane would not have been less than 32 tons per acre, and the profit would then have been some £10 per acre. The plant crop gave 49 tons per acre.

Owing to the disease which overtook this variety, all the Rose Bamboo ratoons have been ploughed out, and the ground thoroughly exposed to the air, the roots, leaves, &c., being burnt off or totally removed.

It is to be remarked that the Rose Bamboo variety throughout the Experiment Station was subject to the same disease of rot-cankers already described. Plant cane only ten months old showed the disease in strong force, and a very large proportion of the cane was dead before the time of cutting.

The behaviour of the Rose Bamboo raises the question of cane diseases in a most acute form, and especial effort will be made to unfold the nature of these diseases by exhaustive pathological, entomological, and chemical examinations, which it is proposed to have carried out at the Mackay Station.

The Director proposes to reintroduce the Rose Bamboo variety from the Sandwich Islands. At the time that the leading variety of cane of those islands was giving out, the Rose Bamboo was imported from Queensland, when it actually saved the situation for Hawaii upon large areas of land. The reintroduction will show what the effect of the change of climate has been. It is clear that a variety which has rendered such great service to the industry in Queensland should not be given up without every effort being made to enable it to regain its original qualities and productiveness.

In the report of last year it is said:—"Experiments are being conducted to test the cane and sugar-producing powers of different varieties of cane. There are 68 varieties growing at the Mackay Station, and these are now in competition under uniform conditions of treatment. The results, which will indicate the commercial value of each variety as a sugar-producer, will come to hand next season." . . . "The 68 varieties include standard representative canes from Demarara, Trinidad, South America, Mauritius, Louisiana, New Guinea, and Queensland."

Preceding the final results arrived at, a brief description is given of the history of treatment and selection, and of the steps by which some varieties have been abandoned and other varieties promoted to the first positions as commercial sugar-producers.

EXPERIMENTS WITH VARIETIES OF CANE.

History of the Varieties.

1900.—On the arrival of the Director at Mackay towards the end of 1900, 72 varieties of cane were found growing at the Sugar Experiment Station. Of these, 70 had been introduced from New Guinea, while 2—Meerah and White Bamboo—had been grown for many years in Queensland. The condition of the varieties, when the Director first visited the station, was exceedingly unpromising, due in a large measure to the drought that had prevailed. The cane of some of the varieties was dying, and others had made very little growth. The cultivation, however, was changed, and fertilisers composed of the most vital elements, in a state immediately available for the use of the cane, were applied. Good rains set in also at this juncture, and continued in abundance through the growing season.

1901.—Between January and June of 1901 a growth was made which was simply astounding, and cane which in December, 1900, did not show one joint, and was actually dying out, developed into a crop of a very notable character. In August the whole of the varieties were analysed, with the results shown in the following table:—

Analyses of Varieties in 1901—Plant Crop.

Country.	No. or Name of Variety.	Age of Cane.	Date of Analyses.	Density of Juice (Brix).	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	% Fibre in Cane.	Sucrose in Cane.	State of Maturity.
New Guinea	No. 1	11 months	Aug., 1901	17·1	14·11	2·17	82·5	10·20	12·07	
Ditto ...	2	ditto ...	ditto ...	19·1	17·92	0·78	94·2	8·03	16·43	Partly arrowed.
Ditto ...	3	ditto ...	ditto ...	17·2	14·62	1·86	85·0	10·09	13·05	
Ditto ...	4	ditto ...	ditto ...	18·8	17·20	0·76	91·5	10·07	15·46	
Ditto ...	4A ...	ditto ...	ditto ...	13·9	9·97	2·75	69·6	8·03	8·83	Arrowed.
Ditto ...	6A ...	ditto ...	ditto ...	19·3	17·25	1·06	89·4	9·05	15·58	
Ditto ...	6B ...	ditto ...	ditto ...	17·7	14·81	1·73	83·7	10·57	13·21	
Ditto ...	8A ...	ditto ...	ditto ...	20·2	17·03	1·66	84·3	6·03	15·90	
Ditto ...	8B ...	ditto ...	ditto ...	15·2	10·51	2·17	69·1	6·29	9·84	Arrowed.
Ditto ...	9	ditto ...	ditto ...	18·0	14·85	2·03	82·5	10·03	13·28	Arrowed.
Ditto ...	10	ditto ...	ditto ...	16·6	12·62	2·23	76·0	10·35	11·31	Partly arrowed.
Ditto ...	11	ditto ...	ditto ...	15·3	11·06	4·32	45·3	13·02	10·23	Arrowed.
Ditto ...	12	ditto ...	ditto ...	14·5	10·53	2·06	72·6	8·77	9·60	
Ditto ...	13	ditto ...	ditto ...	16·9	13·83	1·04	81·8	8·32	12·68	
Ditto ...	14	ditto ...	ditto ...	14·1	10·80	2·67	76·6	6·01	10·15	
Ditto ...	14A ...	ditto ...	ditto ...	16·5	13·77	2·13	83·4	7·40	12·75	
Ditto ...	15	ditto ...	ditto ...	19·9	17·64	1·22	88·6	7·06	16·39	
Ditto ...	16	ditto ...	ditto ...	14·7	10·42	2·84	70·9	9·70	9·47	Partly arrowed.
Ditto ...	17	ditto ...	ditto ...	18·2	15·30	2·06	84·1	9·35	13·86	

ANALYSES OF VARITIES IN 1901—PLANT CROP—*continued.*

Country.	No. or Name of Variety.	Age of Cane.	Date of Analyses.	Density of Juice (Brix.).	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	% Fibre in Cane.	Sucrose in Cane.	State of Maturity.
New Guinea	No. 18	11 months	Aug., 1901	19·1	16·05	1·98	84·0	8·95	14·61	
Ditto ...	19 ...	ditto ...	ditto ...	18·8	14·99	2·45	79·7	8·49	13·71	
Ditto ...	20	ditto ...	ditto ...	11·4	6·02	4·65	52·8	6·27	5·64	
Ditto ...	21	ditto ...	ditto ...	15·9	13·43	2·00	84·5	10·81	11·97	Slightly arrowed.
Ditto ...	22	ditto ...	ditto ...	19·4	17·86	0·84	92·0	9·72	16·12	
Ditto ..	24	ditto ...	ditto ...	19·3	17·35	1·09	89·9	11·30	15·38	
Ditto ...	24A ...	ditto ...	ditto ...	19·6	18·20	0·59	92·8	10·12	16·36	
Ditto ...	24B ...	ditto ...	ditto ...	18·2	16·29	1·43	89·5	7·91	15·00	
Ditto ...	25	ditto ...	ditto ...	12·2	6·27	5·19	51·4	6·60	5·85	Partly arrowed.
Ditto ..	26	ditto ...	ditto ...	16·1	13·35	1·82	82·2	9·96	12·02	
Ditto ...	28	ditto ...	ditto ...	16·2	12·40	2·57	76·5	7·61	11·45	
Ditto ...	31	ditto ...	ditto ...	12·0	7·48	3·74	62·3	5·72	7·05	
Ditto ...	32	ditto ...	ditto ...	19·3	17·14	1·56	88·8	10·09	15·41	
Ditto ...	34	ditto ...	ditto ...	14·7	10·90	3·10	74·5	7·45	10·08	
Ditto ...	35	ditto ...	ditto ...	18·6	15·73	1·46	84·5	9·10	14·29	
Ditto ...	37	ditto ...	ditto ...	17·4	14·45	2·13	83·0	9·41	13·09	Partly arrowed.
Ditto ...	39	ditto ...	ditto ...	20·1	17·91	1·43	89·5	9·53	16·20	
Ditto ...	40	ditto ...	ditto ...	15·9	12·05	2·48	75·7	7·80	11·11	Partly arrowed.
Ditto ...	41	ditto ...	ditto ...	17·2	14·74	1·63	85·7	9·88	13·40	
Ditto ...	42	ditto ...	ditto ...	17·6	12·94	3·75	73·5	10·92	11·64	Partly arrowed.
Ditto ...	43	ditto ...	ditto ...	13·4	7·99	4·65	59·6	10·23	7·17	Arrowed.
Ditto ...	44	ditto ...	ditto ...	18·7	11·67	4·52	62·4	13·59	10·08	Arrowed.
Ditto ...	45	ditto ...	ditto ...	14·5	10·32	3·29	71·2	8·02	9·49	
Ditto ...	46	ditto ...	ditto ...	14·7	10·84	3·17	73·7	7·46	10·02	
Ditto ...	47	ditto ...	ditto ...	20·0	17·04	1·86	85·2	11·50	15·08	
Ditto ...	48	ditto ...	ditto ...	17·5	14·57	2·46	83·2	10·35	13·06	
Ditto ...	49 (striped)	ditto ...	ditto ...	16·1	10·81	3·60	67·1	7·15	10·03	Slightly arrowed.
Ditto ...	49 (green) ...	ditto ...	ditto ...	17·6	14·56	2·31	82·7	7·33	13·49	
Ditto ...	50	ditto ...	ditto ...	18·8	17·25	0·82	91·7	7·93	15·88	
Ditto ...	51	ditto ...	ditto ...	18·1	15·15	1·58	83·7	6·92	14·19	
Ditto ...	52	ditto ...	ditto ...	16·5	13·52	2·13	82·0	11·77	11·92	
Ditto ...	53	ditto ...	ditto ...	15·0	9·35	4·15	62·3	8·73	8·57	Arrowed.
Ditto ...	54	ditto ...	ditto ...	19·5	17·37	1·90	89·1	9·45	15·72	
Ditto ...	55	ditto ...	ditto ...	18·0	14·78	2·21	82·1	11·58	13·07	
Ditto ...	56	ditto ...	ditto ...	19·0	15·74	2·52	82·8	11·00	14·00	
Ditto ...	57	ditto ...	ditto ...	17·9	15·34	1·68	85·7	11·55	13·56	
Ditto ...	58	ditto ...	ditto ...	17·0	14·71	1·58	86·4	6·02	13·74	
Ditto ...	59	ditto ...	ditto ...	15·1	11·29	3·09	74·1	6·82	10·52	
Ditto ...	60	ditto ...	ditto ...	17·0	14·63	2·04	86·1	7·70	13·49	
Ditto ...	62	ditto ...	ditto ...	14·7	12·72	3·25	76·1	9·25	11·54	
Ditto ...	65	ditto ...	ditto ...	19·8	16·81	2·25	84·9	9·90	15·14	
Ditto ...	66	ditto ...	ditto ...	18·3	14·70	2·36	79·4	8·50	13·45	Totally arrowed.
Ditto ...	Mavoe ...	ditto ...	ditto ...	16·6	13·85	2·07	83·4	9·85	12·48	
Ditto ...	Chewoma ...	ditto ...	ditto ...	19·2	17·87	0·99	93·0	11·55	15·80	
Ditto ...	Oiva	ditto ...	ditto ...	18·6	15·37	1·84	82·4	11·80	13·56	
Ditto ...	Batoe	ditto ...	ditto ...	14·8	11·97	2·07	80·8	5·05	10·91	
Ditto ...	Kikarea ...	ditto ...	ditto ...	16·8	13·83	2·00	83·5	7·62	12·77	
Ditto ...	Mabuem ...	ditto ...	ditto ...	17·9	14·38	2·21	84·5	11·06	12·78	
Ditto ...	Mave	ditto ...	ditto ...	21·3	19·13	1·22	89·8	10·82	17·15	
Ditto ...	Moo Moo ...	ditto ...	ditto ...	17·4	13·86	2·59	79·7	7·92	12·79	
Ditto ...	Oraya	ditto ...	ditto ...	17·8	14·33	2·25	80·5	11·83	12·63	
Queensland ...	White Bamboo	ditto ...	ditto ...	19·5	17·21	1·30	88·2	10·00	15·48	
Ditto ...	Meerah ...	ditto ...	ditto ...	19·7	18·52	0·33	94·0	10·50	16·15	

In the following month (September) the whole of the cane was cut, weighed, and sent to the mill, the yield of cane and sugar per acre of each variety being as set forth under:—

CROP RESULTS OF VARIETIES IN 1901—PLANT CROP.

Country.	No. or Name of Variety.	Age of Cane.	Date of Cutting.	Weight per Acre of Cane in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
New Guinea	1	12½ months ...	September, 1901	47·36	13,440	6·00
Ditto	2	ditto ...	ditto ...	34·87	12,812	5·72
Ditto	3	ditto ...	ditto ...	53·43	15,612	6·97
Ditto	4	ditto ...	ditto ...	66·76	23,116	10·32
Ditto	4A	ditto ...	ditto ...	49·52	9,788	4·37
Ditto	6A	ditto ...	ditto ...	39·41	13,753	6·14
Ditto	6B	ditto ...	ditto ...	40·05	11,872	5·30
Ditto	8A	ditto ...	ditto ...	28·59	8,400	3·75
Ditto	8B	ditto ...	ditto ...	22·81	5,017	2·24
Ditto	9	ditto ...	ditto ...	36·26	10,774	4·81
Ditto	10	ditto ...	ditto ...	21·52	5,443	2·43
Ditto	11	ditto ...	ditto ..	59·35	13,731	6·13
Ditto	12	ditto ...	ditto ...	28·39	6,092	2·72
Ditto	13	ditto ...	ditto ...	16·24	4,592	2·05
Ditto	14	ditto ...	ditto ...	27·07	6,137	2·74
Ditto	14A	ditto ...	ditto ...	38·98	9,699	4·33
Ditto	15	ditto ...	ditto ...	29·75	10,908	4·87
Ditto	16	ditto ...	ditto ...	40·15	8,512	3·80
Ditto	17	ditto ...	ditto ...	46·63	14,470	6·46
Ditto	18	ditto ...	ditto ...	59·50	19,465	8·69
Ditto	19	ditto ...	ditto ...	45·20	13,888	6·20
Ditto	20	ditto ...	ditto ...	55·48	6,988	3·12
Ditto	21	ditto ...	ditto ...	44·53	11,939	5·33
Ditto	22	ditto ...	ditto ...	30·48	10,976	4·90
Ditto	24	ditto ...	ditto ...	31·89	10,976	4·90
Ditto	24A	ditto ...	ditto ...	45·40	16,620	7·42
Ditto	24B	ditto ...	ditto ...	50·36	16,912	7·55
Ditto	25	ditto ...	ditto ...	21·00	2,755	1·23
Ditto	26	ditto ...	ditto ...	40·13	10,796	4·82
Ditto	28	ditto ...	ditto ...	32·02	8,198	3·66
Ditto	31	ditto ...	ditto ...	44·26	6,988	3·12
Ditto	32	ditto ...	ditto ...	43·81	15,120	6·75
Ditto	34	ditto ...	ditto ...	32·67	7,369	3·29
Ditto	35	ditto ...	ditto ...	56·97	18,233	8·14
Ditto	37	ditto ...	ditto ...	55·48	16,262	7·26
Ditto	39	ditto ...	ditto ...	39·76	14,425	6·44
Ditto	40	ditto ..	ditto ...	34·22	8,512	3·80
Ditto	41	ditto ...	ditto ...	39·08	11,715	5·23
Ditto	42	ditto ...	ditto ...	33·25	8,668	3·87
Ditto	43	ditto ...	ditto ...	30·72	4,928	2·20
Ditto	44	ditto ...	ditto ...	45·89	10,348	4·62

CROP RESULTS OF VARIETIES IN 1901—PLANT CROP—*continued.*

Country.	No. or Name of Variety.	Age of Cane.	Date of Cutting.	Weight per Acre of Cane in English Tons.	Yield of Sugar per Acre in Pounds.	Yield of Sugar per Acre in English Tons.
New Guinea	45	12½ months ...	September, 1901	39·28	8,332	3·72
Ditto	46	ditto ...	ditto ...	28·00	6,272	2·80
Ditto	47	ditto ...	ditto ...	37·46	12,633	5·64
Ditto	48	ditto ...	ditto ...	37·14	10,864	4·85
Ditto	49 (striped)	ditto ...	ditto ...	40·25	9,027	4·03
Ditto	49 (green) ...	ditto ...	ditto ...	44·92	13,552	6·05
Ditto	50	ditto ...	ditto ...	11·86	4,211	1·88
Ditto	51	ditto ...	ditto ...	27·03	8,579	3·83
Ditto	52	ditto ...	ditto ...	36·85	9,833	4·39
Ditto	53	ditto ...	ditto ...	59·11	11,334	5·06
Ditto	54	ditto ...	ditto ...	53·93	18,972	8·47
Ditto	55	ditto ...	ditto ...	32·02	9,363	4·18
Ditto	56	ditto ...	ditto ...	35·39	11,088	4·95
Ditto	57	ditto ...	ditto ...	18·47	5,600	2·50
Ditto	58	ditto ...	ditto ...	13·74	4,233	1·89
Ditto	59	ditto ...	ditto ...	17·79	4,188	1·87
Ditto	60	ditto ...	ditto ...	25·18	7,793	3·39
Ditto	61	ditto ...	ditto ...	30·92	7,974	3·56
Ditto	65	ditto ...	ditto ...	32·67	11,065	4·94
Ditto	66	ditto ...	ditto ...	41·42	12,476	5·57
Ditto	Mavoe	ditto ...	ditto ...	74·87	20,921	9·34
Ditto	Oiva	ditto ...	ditto ...	57·17	17,337	7·74
Ditto	Chenoma ...	ditto ...	ditto ...	38·62	13,664	6·10
Ditto	Batoe	ditto ...	ditto ...	58·14	14,067	6·28
Ditto	Kikarea ...	ditto ...	ditto ...	50·56	14,448	6·45
Ditto	Mabuan ...	ditto ...	ditto ...	40·44	11,558	5·16
Ditto	Mave	ditto ...	ditto ...	40·44	15,523	6·93
Ditto	Moo Moo ...	ditto ...	ditto ...	56·39	16,150	7·21
Ditto	Oraya	ditto ...	ditto ...	47·64	13,462	6·01
Queensland	Meerah ...	ditto ...	ditto ...	33·05	11,939	5·33
Ditto	White Bamboo	ditto ...	ditto ...	47·83	16,576	7·40

1901.—The varieties were next ratooned, and a careful watch kept over their behaviour. Owing to disease largely affecting the New Guinea varieties—Nos. 2, 21, and 57—these were cut out and destroyed.

In October of 1901, 10 more New Guinea varieties were reintroduced to the Mackay Station from Kamerunga, Cairns, these varieties having previously died out at Mackay. The numbers and names of these varieties were as follow:—5, 7, 29, 36, 38, 63, 64; Iduari, Akewa, and Oiboku.

1902.—In January, 1902, the following varieties were cut out of the ratoon crop owing to disease:—6A, 53, and White Bamboo. While, in order to provide necessary land for other experiments, Nos. 6B, 17, 52, and 60 were cut and replanted on another piece of ground, but were not in a sufficiently forward condition to be analysed in 1902.

In August and September the whole of the remaining ratoon New Guinea varieties, as well as the 10 plant varieties from Kamerunga, and a variety known as Yuban, from South Africa (not sufficiently

forward for the 1901 analyses), were cut, weighed, and analysed, the results being set forth in the two following tables:—

ANALYSES OF VARIETIES IN 1902.

Country.	No. or Name of Variety.	Age of Cane.	Date of Analyses.	Plant or Ratoon.	Density of Juice (Brix).	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
New Guinea	1	11 months	August, 1902	Ratoon	20·70	17·98	1·60	86·8
Ditto	3	ditto	ditto	ditto	22·00	19·43	0·90	88·3
Ditto	4	ditto	ditto	ditto	21·6	20·12	0·26	93·1
Ditto	4A	ditto	ditto	ditto	21·3	19·10	0·83	89·6
Ditto	5	10 months	ditto	Plant	22·7	20·97	0·06	92·3
Ditto	7	ditto	ditto	ditto	22·0	20·00	0·11	90·9
Ditto	8A	11 months	ditto	Ratoon	22·8	20·68	0·31	90·7
Ditto	8B	ditto	ditto	ditto	20·7	19·22	0·53	92·8
Ditto	9	ditto	ditto	ditto	21·3	19·19	0·89	90·0
Ditto	10	ditto	ditto	ditto	19·5	17·18	1·11	88·1
Ditto	11	ditto	ditto	ditto	22·6	17·91	2·45	79·2
Ditto	12	ditto	ditto	ditto	21·1	18·40	1·54	87·2
Ditto	13	ditto	ditto	ditto	22·2	20·17	1·03	90·8
Ditto	14	ditto	ditto	ditto	19·2	16·10	1·85	83·8
Ditto	14A	ditto	ditto	ditto	20·7	18·11	0·72	87·4
Ditto	15	ditto	ditto	ditto	22·8	21·46	0·38	94·1
Ditto	16	ditto	ditto	ditto	22·3	19·82	1·20	88·8
Ditto	18	ditto	ditto	ditto	21·3	18·08	1·91	84·8
Ditto	19	ditto	ditto	ditto	20·7	17·63	2·07	85·1
Ditto	20	ditto	ditto	ditto	21·2	17·70	2·21	83·4
Ditto	22	ditto	ditto	ditto	23·4	22·23	0·34	95·0
Ditto	24	ditto	ditto	ditto	21·4	19·23	1·08	89·8
Ditto	24A	ditto	ditto	ditto	22·3	20·46	0·91	91·7
Ditto	24B	ditto	ditto	ditto	22·5	20·56	1·04	91·3
Ditto	25	ditto	ditto	ditto	19·3	14·78	3·19	76·5
Ditto	26	ditto	ditto	ditto	20·6	18·69	0·98	90·7
Ditto	28	ditto	ditto	ditto	20·4	17·18	1·91	84·2
Ditto	29	10 months	ditto	ditto	20·4	17·15	0·90	84·0
Ditto	31	11 months	ditto	ditto	19·0	15·84	1·93	83·3
Ditto	32	ditto	ditto	ditto	21·6	17·98	1·93	83·2
Ditto	34	ditto	ditto	ditto	19·8	16·55	2·05	83·5
Ditto	35	ditto	ditto	ditto	22·2	19·12	1·24	86·1
Ditto	36	10 months	ditto	Plant	18·9	14·06	2·29	74·3
Ditto	37	11 months	ditto	Ratoon	21·6	18·85	1·24	87·2
Ditto	38	10 months	ditto	Plant	21·8	19·22	0·72	88·1
Ditto	39	11 months	ditto	Ratoon	22·0	19·06	1·57	86·6
Ditto	40	ditto	ditto	ditto	20·2	18·41	0·80	91·1
Ditto	41	ditto	ditto	ditto	21·2	18·91	0·94	89·2
Ditto	42	ditto	ditto	ditto	20·4	14·85	4·45	72·8
Ditto	43	ditto	ditto	ditto	19·0	14·45	3·32	76·0
Ditto	44	ditto	ditto	ditto	21·1	13·53	5·29	64·1
Ditto	45	ditto	ditto	ditto	19·1	15·77	2·50	82·5
Ditto	46	ditto	ditto	ditto	19·8	17·64	1·16	89·1
Ditto	47	ditto	ditto	ditto	20·9	18·30	1·36	87·5
Ditto	48	ditto	ditto	ditto	20·4	17·89	1·38	87·7
Ditto	49 (striped)	ditto	ditto	ditto	18·2	13·70	2·92	75·2
Ditto	49 (green)	ditto	ditto	ditto	21·5	19·01	0·91	88·5
Ditto	50	ditto	ditto	ditto	21·1	19·15	0·69	90·7
Ditto	51	ditto	ditto	ditto	22·2	19·31	1·27	87·0

ANALYSES OF VARIETIES IN 1902—*continued.*

Country.	No. or Name of Variety.	Age of Cane.	Date of Analyses.	Plant or Ratoon.	Density of Juice (Brix).	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
New Guinea	54	11 months ..	August, 1902	Ratoon ...	21·7	18·61	1·83	85·7
Ditto	55	ditto ...	ditto ...	ditto ...	20·6	17·71	1·56	86·0
Ditto	56	ditto ...	ditto ...	ditto ...	20·5	18·59	0·97	90·7
Ditto	58	ditto ...	ditto ...	ditto ...	20·5	18·46	0·88	90·0
Ditto	59	ditto ..	ditto ...	ditto ..	20·2	16·58	2·64	82·0
Ditto	61	ditto ...	ditto ...	ditto ...	21·7	19·11	1·28	88·0
Ditto	63	10 months ...	ditto ...	Plant ...	21·3	17·60	1·96	82·6
Ditto	64	ditto ...	ditto ...	ditto ...	20·8	18·22	0·30	87·6
Ditto	65	11 months ...	ditto ...	Ratoon ...	22·0	19·74	0·64	89·7
Ditto	66	ditto ...	ditto ...	ditto ...	23·0	20·67	0·70	89·8
Ditto	Mavoe	ditto ...	ditto ...	ditto ...	19·5	16·97	1·30	87·0
Ditto	Chenoma ...	ditto ..	ditto ...	ditto ...	22·4	21·50	0·14	96·0
Ditto	Oiva	ditto ...	ditto ...	ditto ...	22·1	20·04	0·86	90·6
Ditto	Batoe	ditto ...	ditto ..	ditto ..	21·4	19·97	0·14	93·3
Ditto	Kikarea ...	ditto ...	ditto ...	ditto ...	20·0	18·18	0·60	90·9
Ditto	Mabnan ...	ditto ...	ditto ...	ditto ...	22·5	20·93	0·51	93·0
Ditto	Mavo	ditto ...	ditto ...	ditto ...	21·9	20·32	0·27	92·7
Ditto	Moo Moo ...	ditto ...	ditto ...	ditto ...	20·1	18·60	0·44	92·5
Ditto	Oraya	ditto ...	ditto . .	ditto ...	21·0	19·14	0·31	91·1
Queensland	Meerah ...	ditto ...	ditto ...	ditto ...	21·0	20·35	0·11	96·9
New Guinea	Iduari	10 months ...	ditto ...	Plant ..	21·5	17·70	1·61	82·3
Ditto	Akewa ...	ditto ...	ditto ...	ditto ...	21·0	18·42	0·86	87·7
Ditto	Oiboku ...	ditto ...	ditto ...	ditto ..	19·9	15·97	1·96	80·2
South Africa	Yuban	16 months ...	ditto ...	ditto ...	20·67	18·75	0·45	90·7

CROP RESULTS OF VARIETIES IN 1902—RATOONS AND PLANT.

Country.	No. or Name of Variety.	Age of Cane.	Plant or Ratoon.	Date of Cutting.	Weight of Cane per Acre in English Tons.
New Guinea	1	12 months ...	Ratoon ...	September, 1902	11·28
Ditto	3	ditto	ditto ...	ditto	28·48
Ditto	4	ditto	ditto ...	ditto	43·17
Ditto	4A ...	ditto	ditto ...	ditto	25·17
Ditto	5	11 months ...	Plant ...	ditto	26·64
Ditto	7	ditto	ditto ...	ditto	26·70
Ditto	8A ...	12 months ...	Ratoon ...	ditto	28·00
Ditto	8B ...	ditto	ditto ..	ditto	4·18
Ditto	9	ditto	ditto ..	ditto	19·44
Ditto	10	ditto	ditto ...	ditto	23·91
Ditto	11	ditto	ditto ...	ditto	41·53
Ditto	12	ditto	ditto ...	ditto	20·80
Ditto	13	ditto	ditto ...	ditto	14·00
Ditto	14	ditto	ditto ...	ditto	7·87
Ditto	14A ...	ditto	ditto ...	ditto	32·47
Ditto	15	ditto	ditto ...	ditto	46·57
Ditto	16	ditto	ditto ...	ditto	23·23
Ditto	18	ditto	ditto ...	ditto	17·40
Ditto	19	ditto	ditto ..	ditto	13·80
Ditto	20	ditto	ditto ...	ditto	17·89
Ditto	22	ditto	ditto ...	ditto	23·23
Ditto	24	ditto . .	ditto ..	ditto . .	20·22
Ditto	24A ...	ditto	ditto ..	ditto	18·08

CROP RESULTS OF VARIETIES IN 1902—RATOONS AND PLANT—*continued.*

Country.	No. or Name of Variety.	Age of Cane.	Plant or Ratoon.	Date of Cutting.	Weight of Cane per Acre in English Tons.
New Guinea	24B	12 months	Ratoon	September, 1902	22·36
Ditto	25	ditto	ditto	ditto	21·58
Ditto	26	ditto	ditto	ditto	23·33
Ditto	28	ditto	ditto	ditto	24·21
Ditto	29	11 months	Plant	ditto	10·70
Ditto	31	12 months	Ratoon	ditto	25·47
Ditto	32	ditto	ditto	ditto	13·80
Ditto	34	ditto	ditto	ditto	18·08
Ditto	35	ditto	ditto	ditto	16·91
Ditto	36	11 months	Plant	ditto	21·19
Ditto	37	12 months	Ratoon	ditto	28·58
Ditto	38	11 months	Plant	ditto	29·36
Ditto	39	12 months	Ratoon	ditto	14·68
Ditto	40	ditto	ditto	ditto	29·36
Ditto	41	ditto	ditto	ditto	20·12
Ditto	42	ditto	ditto	ditto	22·94
Ditto	43	ditto	ditto	ditto	19·34
Ditto	44	ditto	ditto	ditto	34·71
Ditto	45	ditto	ditto	ditto	28·00
Ditto	46	ditto	ditto	ditto	16·91
Ditto	47	ditto	ditto	ditto	21·87
Ditto	48	ditto	ditto	ditto	20·90
Ditto	49 (striped)	ditto	ditto	ditto	9·52
Ditto	49 (green)	ditto	ditto	ditto	16·72
Ditto	50	ditto	ditto	ditto	14·09
Ditto	51	ditto	ditto	ditto	12·05
Ditto	54	ditto	ditto	ditto	24·30
Ditto	55	ditto	ditto	ditto	35·58
Ditto	56	ditto	ditto	ditto	16·72
Ditto	58	ditto	ditto	ditto	8·75
Ditto	59	ditto	ditto	ditto	16·35
Ditto	61	ditto	ditto	ditto	10·89
Ditto	63	11 months	Plant	ditto	17·30
Ditto	64	ditto	ditto	ditto	37·33
Ditto	65	12 months	Ratoon	ditto	17·30
Ditto	66	ditto	ditto	ditto	33·25
Ditto	Mavoe	ditto	ditto	ditto	29·36
Ditto	Chenoma	ditto	ditto	ditto	33·44
Ditto	Oiva	ditto	ditto	ditto	20·22
Ditto	Batoe	ditto	ditto	ditto	30·72
Ditto	Kikarea	ditto	ditto	ditto	35·19
Ditto	Mabuan	ditto	ditto	ditto	19·83
Ditto	Mave	ditto	ditto	ditto	32·75
Ditto	Moo Moo	ditto	ditto	ditto	31·70
Ditto	Oraya	ditto	ditto	ditto	29·36
Queensland	Meerah	ditto	ditto	ditto	35·39
New Guinea	Iduari	11 months	Plant	ditto	26·25
Ditto	Akewa	ditto	ditto	ditto	45·89
Ditto	Oibok 1	ditto	ditto	ditto	39·86
South Africa	Yuban	17 months	ditto	ditto	62·03

As no fibre analyses were made in 1902, the yield of sugar per acre is not given, and, due to the drought of 1902, the yield of cane was small. In 1901, 17 of the varieties arrowed, but in the ratoon crop only 1 variety—viz., No. 11—arrowed.

Before sending the ratoon crop to the mill, the varieties were carefully gone over by the Director, and certain given varieties selected for further testing. The basis of this selection was:—(*a*) Quality of juice, (*b*) weight per acre, or (*c*) freedom from disease or liability of attack from borers. The varieties thrown out were mainly of low promise or subject to disease and borer. Of the total New Guinea varieties, 47 were thus further selected for experimentation, these being—Mavoe, Chenoma, Oiva, Batoe, Kikarea, Mabuan, Mave, Moo Moo, Oraya, Iduari, Akewa, Oiboku, Nos. 3, 4, 5, 6B, 7, 8A, 11, 14A, 15, 17, 18, 19, 22, 24, 24A, 24B, 26, 32, 35, 37, 38, 39, 40, 41, 47, 48, 49 (Green), 52, 54, 55, 56, 60, 64, 65, and 66. The discarded varieties, numbering 28, included New Guinea, Nos. 1, 4A, 8B, 9, 10, 12, 13, 14, 16, 20, 25, 28, 29, 31, 34, 36, 42, 43, 44, 45, 46, 49 (Striped), 50, 51, 58, 59, 61, and 63.

To the 17 New Guinea varieties reserved for continued testing were added Meerah and Yuban, and the 49 selected were planted to provide seed for further tests in 1903-4.

Other Varieties.

West Indian Canes.

1901.—In November of 1901 the station received from the Botanic Gardens, Brisbane, the following canes and seedlings, viz.:—Bourbon, Trinidad S. 60, Trinidad S. 83, Trinidad S. 202, and Trinidad S. 205. These were all planted out to produce seed to enter into competition with the New Guinea and other varieties in 1903-4, to be harvested in 1904.

Mauritius Canes.

1902.—In May the Botanic Gardens, Brisbane, forwarded the following Mauritius canes, viz.:—Borneo, Galogo C., Bois Rouge, Bambou Rouge, Louzier Rouge, Tamarin, and Settlers. These were directly planted to provide seed for the competition of varieties above referred to.

Queensland Canes.

In September, 1902, sets of White Bamboo and Striped Singapore were received from Mr. C. E. Godrell, The Palms, Geraldton, and planted out for above purposes.

Louisiana Canes.

1902.—In September were also received from Bundaberg sets of Louisiana Striped and Louisiana Tiboo Merd.

Demerara Canes.

Also Demerara 74 and Demerara 95. These two varieties, also including the Louisiana canes, were introduced by the Director from Honolulu, and were all planted out to provide seed for the 1903-4 variety competition.

Further Competition of Varieties.

1903.—The piece of land chosen for the further competition of the varieties having been deeply ploughed four times, and subsoiled, a seed bed containing some 20 inches of fine loose soil was provided; and all the above selected varieties, together with Rose Bamboo, of which there was then abundance of seed on the station, were planted under absolutely uniform conditions at the beginning of August, 1903, the total number of varieties being 68. In October a mixed fertiliser, containing nitrogen, potash, and phosphoric acid, was applied equally to all varieties; the soil, cultivation, manures, and all other treatment being the same, covering all the varieties.

1904.—In the course of their growth, and during the months of June and July, two preliminary analyses of the varieties were made by Mr. Anderssen, Assistant Chemist, at Mackay, in order to ascertain the progress of the canes towards maturity. The tables following set forth the results of these preliminary examinations:—

First Preliminary Examination of Varieties—Plant Crop, June, 1904.

Serial No.	Country.	No. or Name of Variety.	Date of Analyses.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
1	New Guinea	Mavoe	3-6-04	10 months	13·1	9·23	3·59	70·4
2	Ditto	Chenoma	3-6-04	ditto	14·7	11·15	2·74	75·8
3	Ditto	Oiva	3-6-04	ditto	10·4	5·71	4·24	54·9
4	Ditto	Batoe	3-6-04	ditto	13·5	9·95	3·04	73·7
5	Ditto	Kikarea	3-6-04	ditto	11·9	7·91	3·78	66·5
6	Ditto	Mabuan	6-6-04	ditto	14·0	10·06	3·25	71·8
7	Ditto	Mave	6-6-04	ditto	13·9	9·87	3·18	71·0
8	Ditto	Moo Moo	6-6-04	ditto	11·1	7·18	3·33	64·7
9	Ditto	Oraya	6-6-04	ditto	12·6	8·08	4·12	64·1
10	Queensland	Meerah	6-6-04	ditto	13·3	10·27	2·41	77·2
11	New Guinea	Iduari	6-6-04	ditto	13·1	8·58	3·41	65·5
12	Ditto	Akewa	8-6-04	ditto	13·1	8·47	3·89	64·6
13	Ditto	Oiboku	8-6-04	ditto	11·0	6·63	3·68	60·3
14	Queensland	White Bamboo	8-6-04	ditto	15·5	12·67	2·06	81·7
15	Ditto	Striped Singapore	8-6-04	ditto	13·2	10·40	2·15	78·8

FIRST PRELIMINARY EXAMINATION OF VARIETIES—PLANT CROP, JUNE, 1904—*continued.*

Serial No.	Country.	No. or Name of Variety.	Date of Analyses.	Age of Cane.	Density of Juice (Brix).	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
16	Queensland	Rose Bamboo	8-6-04	10 months	13·2	10·59	2·09	80·2
17	West Indies	Bourbon	9-6-04	ditto ...	11·7	7·60	2·80	64·9
18	Louisiana	Louisiana Striped	9-6-04	ditto ...	12·9	10·29	2·22	79·8
19	Ditto	Louisiana Tiboo Mord	9-6-04	ditto ...	11·4	8·37	2·59	73·4
20	Demerara	Demerara 74	9-6-04	ditto ...	14·8	12·37	1·44	83·6
21	Ditto	Demerara 95	9-6 04	ditto ...	13·3	10·00	2·69	75·2
22	Trinidad	Trinidad S. 60	9-6-04	ditto ...	14·9	12·34	2·33	82·8
23	Ditto	Trinidad S. 83	10-6-04	ditto ..	13·9	12·69	1·00	91·3
24	Ditto	Trinidad S. 202	10-6-04	ditto ...	14·1	11·77	2·03	83·5
25	Ditto	Trinidad S. 205	10-6-04	ditto ...	15·4	13·04	0·89	84·7
26	South Africa	Yuban	10-6-04	ditto ...	10·9	6·74	3·33	61·8
27	New Guinea	No. 3	10-6-04	ditto ...	14·2	11·03	2·59	77·7
28	Ditto	4	10-6-04	ditto ...	11·8	8·08	3·25	68·5
29	Ditto	5	14-6-04	ditto ...	14·7	11·77	1·70	80·0
30	Ditto	6B	15-6-04	ditto ...	13·7	9·35	3·33	68·2
31	Ditto	7	10-6-04	ditto ...	14·0	10 33	2 98	73 8
32	Ditto	8A	13-6-04	ditto ...	15·6	12·23	2·29	78·4
33	Ditto	11	15-6-04	ditto ...	13·0	5·81	6·36	44·7
34	Ditto	14A	15-6-04	ditto ...	13 0	8 82	3·90	67·8
35	Ditto	15	13 6-04	ditto ...	15·6	12·88	2·09	82·5
36	Ditto	17	15 6-04	ditto ...	16·1	13·42	2·22	83·3
37	Ditto	18	15-6-04	ditto ...	14·7	11·58	2 97	78·7
38	Ditto	19	15-6-04	ditto ...	15·5	11·99	3·18	77·3
39	Ditto	22	13-6-04	ditto ...	16·3	14·14	1·81	86·7
40	Ditto	24	18-6 04	ditto ..	16·7	14·66	0 85	87·8
41	Ditto	24A	13-6-04	ditto ...	17·5	15·37	1·62	87·8
42	Ditto	24B	13-6-04	dit4o ...	15·0	12·13	2·50	81·1
43	Ditto	26	13-6-04	ditto ...	13·5	10·49	2·54	77·7
44	Ditto	32	16-6-04	ditto ...	16·5	13·56	2·25	82·1
45	Ditto	35	16-6-04	ditto ...	16·3	13·13	2·45	80·5
46	Ditto	37	14-6-04	ditto ...	12·4	7·54	3·50	60·8
47	Ditto	38	14-6-04	ditto ...	14·5	11·10	2·85	76·5
48	Ditto	39	16-6-04	ditto ...	14·7	11·53	2·87	78·4
49	Ditto	40	14-6-04	ditto ...	13·1	10·26	2·37	78·3
50	Ditto	41	16-6-04	ditto ...	15·9	13·69	1·52	86·1
51	Ditto	47	16-6-04	ditto ...	15·9	12·91	2·69	81·2
52	Ditto	48	16-6-04	litto ...	15·5	12·58	2·61	81·1
53	Ditto	49	16-6-04	ditto ...	15·4	11·91	3·18	77 3
54	Ditto	52	17-6-04	ditto ...	12·2	7·82	3·68	64·1
55	Ditto	54	17-6-04	ditto ...	15·8	13·02	2·54	82·4
56	Ditto	55	14-6-04	ditto ...	10·3	6·03	4·24	58·5
57	Ditto	56	17-6-04	ditto ...	16·0	12·99	2·86	81·2
58	Ditto	60	17-6-04	ditto ...	15·5	11·61	3·59	74·9
59	Ditto	64	14-6-04	ditto ...	14·5	11·96	2·69	82·5
60	Ditto	65	17-6-04	ditto ...	16·8	13·76	1·90	83·1
61	Ditto	66	14-6-04	ditto ...	13·1	8·77	3·89	66·9
62	Mauritius	Borneo	17-6-04	ditto ..	11·7	8·19	1·46	70·0
63	Ditto	Galogo C.	17-6-04	ditto ...	14·6	11·04	1·16	75·6
64	Ditto	Bois Rouge	18-6-04	ditto ...	17·2	14·86	0·49	86·4
65	Ditto	Bambou Rouge	18-6-04	ditto ...	13·5	10·62	0·60	78·6
66	Ditto	Louzier Rouge	18-6 04	ditto ...	14·0	10·69	1·21	75·7
67	Ditto	Tamarin	18-6-04	ditto ...	15·1	12·56	1·03	83·2
68	Ditto	Settlers	18-6-04	ditto	16·3	14·28	0·72	87·6

SECOND PRELIMINARY EXAMINATION OF VARIETIES, JULY, 1904.

Serial No.	Country.	No. or Name of Variety.	Date of Analyses.	Age of Cane.	Density of Juice (Brix).	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
1	New Guinea	Mavoe	16-7-04	11 months	14·7	11·59	2·59	78·8
2	Ditto	Chenoma	16-7-04	ditto	17·0	14·47	1·43	85·1
3	Ditto	Oiva	16-7-04	ditto	11·0	7·18	2·87	65·3
4	Ditto	Batoe	16-7-04	ditto	13·3	10·54	1·79	79·2
5	Ditto	Kikarea	18-7-04	ditto	13·0	9·45	3·00	72·7
6	Ditto	Mabuan	18-7-04	ditto	14·6	11·64	2·21	79·7
7	Ditto	Mave	18-7-04	ditto	16·2	14·09	1·67	86·9
8	Ditto	Moo Moo	18-7-04	ditto	13·9	10·42	2·65	74·9
9	Ditto	Oraya	18-7-04	ditto	14·1	10·69	2·81	75·8
10	Queensland	Meerah	18-7-04	ditto	13·8	11·57	1·71	83·8
11	New Guinea	Iduari	19-7-04	ditto	13·9	10·20	2·55	73·4
12	Ditto	Akewa	19-7-04	ditto	12·7	9·01	3·46	70·9
13	Ditto	Oiboku	19-7-04	ditto	11·1	7·15	3·21	64·4
14	Queensland	White Bamboo	19-7-04	ditto	16·6	15·05	1·02	90·7
15	Ditto	Striped Singapore	19-7-04	ditto	11·0	7·61	2·87	69·2
16	Ditto	Rose Bamboo	19-7-04	ditto	15·0	13·51	1·14	90·1
17	West Indies	Bourbon	20-7-04	ditto	16·4	14·14	1·15	86·2
18	Louisiana	Louisiana Striped	20-7-04	ditto	13·9	11·75	1·65	84·5
19	Ditto	Lá Tiboo Merd	20-7-04	ditto	11·5	8·82	2·01	76·7
20	Demarara	Demerara 74	20-7-04	ditto	15·1	13·05	0·72	86·4
21	Ditto	Demerara 95	20-7-04	ditto	15·6	13·85	1·20	88·8
22	Trinidad	Trinidad S. 60	20-7-04	ditto	15·1	12·56	1·93	83·2
23	Ditto	Trinidad S. 83	21-7-04	ditto	12·3	9·85	1·32	80·1
24	Ditto	Trinidad S. 202	21-7-04	ditto	13·2	10·86	1·55	82·3
25	Ditto	Trinidad 205	29-7-04	ditto	15·7	13·18	1·79	83·9
26	South Africa	Yuban	21-7-04	ditto	15·3	12·64	1·47	82·6
27	New Guinea	No. 3	21-7-04	ditto	16·1	14·12	1·34	87·7
28	Ditto	4	21-7-04	ditto	14·7	11·99	1·98	81·6
29	Ditto	5	25-7-04	ditto	14·3	11·61	1·50	81·2
30	Ditto	6B	25-7-04	ditto	16·2	13·15	2·33	81·2
31	Ditto	7	21-7-04	ditto	16·7	14·06	1·69	84·2
32	Ditto	8A	21-7-04	ditto	16·7	14·66	1·73	87·8
33	Ditto	11	25-7-04	ditto	14·6	5·21	6·75	35·7
34	Ditto	14A	23-7-04	ditto	16·2	13·31	2·21	82·2
35	Ditto	15	22-7-04	ditto	17·7	16·09	1·01	90·9
36	Ditto	17	26-7-04	ditto	19·1	17·40	0·71	91·1
37	Ditto	18	26-7-04	ditto	17·5	15·26	1·67	87·2
38	Ditto	19	26-7-04	ditto	18·2	15·92	1·75	87·5
39	Ditto	22	22-7-04	ditto	18·9	17·72	0·62	93·7
40	Ditto	24	29-7-04	ditto	18·9	17·83	0·62	94·3
41	Ditto	24A	22-7-04	ditto	19·2	18·20	0·60	94·8
42	Ditto	24B	22-7-04	ditto	17·4	15·64	1·22	89·8
43	Ditto	26	22-7-04	ditto	11·5	7·90	2·93	68·7
44	Ditto	32	26-7-04	ditto	19·5	17·45	1·35	89·5
45	Ditto	35	26-7-04	ditto	19·0	16·13	2·01	84·9
46	Ditto	37	22-7-04	ditto	14·0	10·34	2·65	73·9
47	Ditto	38	23-7-04	ditto	17·7	15·42	1·53	87·1
48	Ditto	39	26-7-04	ditto	19·0	16·39	1·75	86·3
49	Ditto	40	23-7-04	ditto	14·1	11·96	1·65	84·8
50	Ditto	41	26-7-04	ditto	17·0	15·21	1·19	89·5
51	Ditto	47	26-7-04	ditto	18·3	15·95	1·78	87·2

SECOND PRELIMINARY EXAMINATION OF VARIETIES, JULY, 1904—*continued.*

Serial No.	Country.	No. or Name of Variety.	Date of Analyses.	Age of Cane.	Density of Juice (Brix.)	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.
52	New Guinea	No. 48	27-7-04	11 months	18·0	15·48	1·93	86·0
53	Ditto	49	27-7-04	ditto ...	18·5	15·31	2·41	82·8
54	Ditto	52	27-7-04	ditto ...	16·2	12·64	2·81	78·0
55	Ditto	54	27-7-04	ditto ...	17·4	14·57	2·70	83·7
56	Ditto	55	25-7-04	ditto ...	16·3	13·18	2·37	80·8
57	Ditto	56	27-7-04	ditto ...	18·8	16·23	2·33	86·3
58	Ditto	60	27-7-04	ditto ...	16·7	13·98	2·37	83·7
59	Ditto	64	25-7-04	ditto ...	15·6	13·61	1·59	87·2
60	Ditto	65	27-7-04	ditto ...	19·0	16·08	2·21	84·6
61	Ditto	66	25-7-04	ditto ...	12·6	9·01	2·41	71·5
62	Mauritius	Borneo	28-7-04	ditto ...	14·1	11·77	1·47	83·5
63	Ditto	Galoge C.	28-7-04	ditto ...	15·8	12·38	2·06	78·4
64	Ditto	Bois Rouge	28-7-04	ditto ...	19·5	17·47	0·56	89·6
65	Ditto	Bamboo Rouge	28-7-04	ditto ...	10·0	6·32	1·87	63·2
66	Ditto	Louzier Rouge	28-7-04	ditto ...	14·9	11·64	2·12	78·1
67	Ditto	Tamarin	28-7-04	ditto ...	18·6	17·28	0·70	92·9
68	Ditto	Settlers	29-7-04	ditto ...	18·2	17·26	0·61	94·8

During the month of September the final analyses were made just before the removal of the crop. These final analyses included the determination of the fibre in each variety. In the case of Trinidad Seedling 83 it will be seen that it is an early-maturing cane, and was at its best in the month of June, when the first preliminary analyses were made. It had arrowed completely at that time, and had also commenced to die away at the top. Demerara 74 proved another early-maturing cane, and contained more sugar in July than in September. The following are the analytical data covering *all* the varieties:—

FINAL ANALYSES OF VARIETIES PLANT CROP, 1904.

Serial No.	Country.	No. or Name of Variety.	Date of Analyses.	Age of Cane.	Density of Juice (Brix.).	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Fibre in Cane.	Sugar in Cane.	Date of Arrowing.
1	New Guinea ...	Mavoe	13-9-04	13 months	15·4	12·50	1·58	81·2	10·50	11·18	5th June
2	Ditto ...	Chenoma	13-9-04	ditto ...	20·1	18·54	·39	92·2	12·37	16·24	
3	Ditto ...	Oiva	13-9-04	ditto ...	14·1	11·43	1·71	81·1	9·52	10·31	
4	Ditto ...	Batoe	13-9-04	ditto ...	15·1	12·88	1·31	85·3	10·63	11·51	
5	Ditto ...	Kikarea	13-9-04	ditto ...	14·1	11·22	1·95	79·9	7·69	10·37	
6	Ditto ...	Maluma	13-9-04	ditto ...	16·8	13·50	2·08	80·4	10·35	12·02	
7	Ditto ...	Mave	13-9-04	ditto ...	20·2	18·10	1·06	89·6	8·07	16·04	
8	Ditto ...	Moo Moo	13-9-04	ditto ...	14·7	11·66	2·03	79·3	7·80	10·75	15th May
9	Ditto ...	Oraya	13-9-04	ditto ...	15·9	13·31	1·86	83·7	11·09	11·84	
10	Queensland ...	Meerah	13-9-04	ditto ...	17·3	16·17	0·65	93·5	10·21	14·52	
11	New Guinea ...	Idnari	13-9-04	ditto ...	16·3	13·47	1·74	82·6	10·02	12·12	
12	Ditto ...	Akawa	14-9-04	ditto ...	15·4	12·50	2·08	81·2	10·07	11·25	
13	Ditto ...	Ofboku	14-9-04	ditto ...	14·0	11·03	2·00	78·8	9·11	10·03	6th June
14	Queensland ...	White Bamboo ...	14-9-04	ditto ...	19·5	17·90	0·66	91·8	12·86	15·66	
15	Ditto ...	Striped Singapore ...	14-9-04	ditto ...	16·5	15·18	0·63	92·0	10·82	13·53	
16	Ditto ...	Rose Bamboo ...	14-9-04	ditto ...	15·8	14·19	0·85	89·8	10·43	12·71	
17	West Indies ...	Bourbon	14-9-04	ditto ...	16·8	15·09	0·66	89·8	10·86	13·45	
18	Louisiana ...	Louisiana Striped ...	14-9-04	ditto ...	18·0	16·56	0·72	92·0	9·80	14·94	14th June
19	Ditto ...	Louisiana Tibeo Mard	14-9-04	ditto ...	16·2	14·83	0·71	91·5	9·41	13·43	16th May
20	Demerara ...	D 74	14-9-04	ditto ...	14·7	12·77	0·65	86·9	8·75	11·72	16th May

FINAL ANALYSES OF VARIETIES PLANT CROP, 1904.—*continued.*

Serial No.	Country.	No. or Name of Variety.	Date of Analyses.	Age of Cane.	Density of Juice (Brix).	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Fibre in Cane.	Sugar in Cane.	Date of Arrowing.
21	Demerara ...	D 95	14-9-04	13 months	15·2	13·29	1·61	87·4	9·93	11·96	16th May
22	Trinidad ...	Trinidad S. 60 ...	14-9-04	ditto ...	18·3	16·96	0·71	92·7	10·63	15·15	21st August
23	Ditto ...	Trinidad S. 83 ...	15-9-04	ditto ...	11·6	9·50	1·24	81·9	7·44	8·79	16th May
24	Ditto ...	Trinidad S. 202 ...	15-9-04	ditto ...	14·9	13·51	1·13	90·6	9·54	12·22	16th May
25	Ditto ...	Trinidad S. 205 ...	19-9-04	ditto ...	19·9	16·91	2·00	85·0	12·12	14·86	
26	South Africa ...	Yuban ...	15-9-04	ditto ...	19·3	15·91	1·35	82·4	12·26	13·96	1st August
27	New Guinea ...	No. 3	15-9-04	ditto ...	17·3	15·45	0·98	89·3	11·25	13·71	
28	Ditto ...	4	15-9-04	ditto ...	18·8	16·47	1·07	87·5	10·44	14·75	
29	Ditto ...	5	16-9-04	ditto ...	21·1	18·95	0·65	89·8	9·78	17·10	17th May
30	Ditto ...	6B	17-9-04	ditto ...	19·0	16·48	1·45	86·7	10·65	14·72	
31	Ditto ...	7	15-9-04	ditto ...	18·3	16·36	0·71	89·4	11·93	14·41	
32	Ditto ...	8A	15-9-04	ditto ...	19·8	17·74	1·20	89·6	7·29	16·45	
33	Ditto ...	11	17-9-04	ditto ...	18·5	7·75	8·33	41·9	12·08	6·81	16th May. Full.
34	Ditto ...	11A	17-9-04	ditto ...	16·7	14·20	1·64	85·0	7·00	13·20	
35	Ditto ...	15	15-9-04	ditto ...	20·8	19·71	0·55	94·7	8·49	18·03	
36	Ditto ...	17	17-9-04	ditto ...	19·7	18·16	0·63	92·2	11·00	16·16	26th May
37	Ditto ...	18	17-9-04	ditto ...	19·5	17·31	1·36	88·9	8·43	15·88	1st June
38	Ditto ...	19	17-9-04	ditto ...	19·8	17·10	1·62	86·4	9·10	15·54	14th June
39	Ditto ...	22	15-9-04	ditto ...	20·7	19·40	0·68	93·7	8·88	17·68	2nd August
40	Ditto ...	21	19-9-04	ditto ...	20·5	19·60	0·27	95·6	10·72	17·50	
41	Ditto ...	21A	16-9-04	ditto ...	19·8	17·86	1·43	90·2	8·75	16·30	
42	Ditto ...	24B	16-9-04	ditto ...	18·6	16·29	1·42	87·6	9·49	14·74	
43	Ditto ...	26	16-9-04	ditto ...	16·1	12·92	1·90	80·2	8·07	11·88	
44	Ditto ...	32	17-9-04	ditto ...	21·7	19·70	1·04	90·8	7·82	18·16	26th May
45	Ditto ...	35	17-9-04	ditto ...	20·6	18·51	1·56	89·9	8·60	16·92	
46	Ditto ...	37	16-9-04	ditto ...	18·7	15·16	2·05	81·0	9·40	13·73	25th May
47	Ditto ...	38	16-9-04	ditto ...	19·0	16·94	1·29	89·1	8·30	15·53	16th May
48	Ditto ...	39	17-9-04	ditto ...	20·3	17·56	1·42	86·5	10·04	15·80	
49	Ditto ...	40	16-9-04	ditto ...	18·0	15·52	1·36	86·2	10·32	13·92	14th June
50	Ditto ...	41	17-9-04	ditto ...	18·6	16·16	1·30	86·9	9·62	14·60	
51	Ditto ...	47	17-9-04	ditto ...	20·5	18·00	1·37	87·9	11·25	15·97	18th May
52	Ditto ...	48	17-9-04	ditto ...	20·3	18·35	1·13	90·4	10·70	16·90	18th May
53	Ditto ...	49 (green) ...	17-9-04	ditto ...	19·6	17·68	1·49	90·2	10·56	15·81	25th May
54	Ditto ...	52	19-9-04	ditto ...	18·6	15·68	1·56	84·3	12·02	13·79	16th May. Fully
55	Ditto ...	54	19-9-04	ditto ...	19·9	16·85	1·74	84·7	8·71	15·38	18th May
56	Ditto ...	55	16-9-04	ditto ...	17·2	13·81	2·56	80·3	8·77	12·60	5th June
57	Ditto ...	56	19-9-04	ditto ...	19·2	16·82	1·40	87·6	11·88	14·82	
58	Ditto ...	60	19-9-04	ditto ...	17·6	15·21	1·33	86·4	7·11	14·13	
59	Ditto ...	64	16-9-04	ditto ...	19·0	16·95	1·31	89·9	10·10	15·23	
60	Ditto ...	65	19-9-04	ditto ...	21·6	18·73	1·14	86·7	8·95	17·05	25th May
61	Ditto ...	66	16-9-04	ditto ...	20·0	17·20	1·18	86·0	9·19	15·62	16th May. Fully
62	Mauritius ...	Borneo	19-9-04	ditto ...	15·3	12·37	1·32	80·8	9·61	11·18	19th May
63	Ditto ...	Galogo C.	19-9-04	ditto ..	20·6	17·59	1·04	85·4	9·26	15·96	
64	Ditto ...	Bois Rouge	19-9-04	ditto ...	22·7	20·69	0·31	91·1	10·55	18·51	16th May
65	Ditto	Bambou Rouge ...	19-9-04	ditto ...	16·5	13·45	1·15	81·5	10·47	12·04	
66	Ditto ...	Louzier Rouge ..	19-9-04	ditto ...	19·2	15·81	1·74	82·3	8·49	14·47	6th June
67	Ditto ...	Tamarin	19-9-04	ditto ...	20·9	17·86	1·39	89·3	10·13	16·05	
68	Ditto ...	Settlers	19-9-04	ditto ...	21·7	20·88	0·34	96·2	9·56	18·88	

The whole of the above analyses were made by Messrs. Anderssen and McCready, Assistant Chemists, who deserve praise for the industry and interest displayed by them in the work. For the analyses 40 running feet, including every stick, big and little, were taken, and formed the samples for the determination of the sucrose, glucose, fibre, &c.

Immediately the analyses were completed, the removal of the crop was commenced. The cane from each variety plat was carefully weighed over the station weighbridge, and again at the Meadowlands Mill, to preclude any chance of error. From the mill weights, with the analytical data, including an actual count of the canes, the following table is formed:—

CROP RESULTS OF VARIETIES, 1901.

Serial No.	Country.	No. or Name of Variety.	Age of Cane.	No. of Canes per Acre.	Average Weight of One Stick 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	Mavos	13 months	19,602	6·2	54·5	13,671	6·1
2	Ditto	Chenoma	ditto ...	27,587	1·7	22·7	8,276	3·7
3	Ditto	Oiva	ditto ...	19,602	3·9	34·8	8,079	3·6
4	Ditto	Batoe	ditto ...	19,602	6·2	55·0	14,184	6·3
5	Ditto	Kikarea	ditto ..	16,861	5·5	41·8	9,716	4·3
6	Ditto	Mabuan	ditto ...	26,136	3·8	44·6	12,026	5·3
7	Ditto	Mave	ditto ...	26,136	4·7	54·8	20,451	9·1
8	Ditto	Moo Moo	ditto ...	21,054	5·0	47·3	11,404	5·0
9	Ditto	Ocaya	ditto ...	31,218	3·4	47·9	12,711	5·6
10	Queensland	Meerah	ditto ...	23,595	3·1	32·8	10,699	4·7
11	New Guinea	Iduari	ditto ...	25,773	3·4	39·5	10,740	4·7
12	Ditto	Akewa	ditto ..	35,211	3·2	50·4	12,720	5·6
13	Ditto	Oiboku	ditto ...	20,331	4·0	36·5	8,201	3·6
14	Queensland	White Bamboo	ditto ...	17,424	2·9	22·6	7,913	3·5
15	Ditto	Striped Singapore	ditto ...	10,527	5·2	24·8	7,538	3·3
16	Ditto	Rose Bamboo	ditto ...	13,068	4·5	26·3	7,497	3·3
17	West Indies	Bourbon	ditto ...	1,689	3·4	2·6	781	0·3
18	Louisiana	Louisiana Striped	ditto ...	21,780	2·7	26·2	8,772	3·9
19	Ditto	Louisiana Tiboo Mord	ditto ...	27,586	3·7	45·8	13,778	6·1
20	Demerara	D 74	ditto ...	29,040	3·5	45·9	11,855	5·2
21	Ditto	D 95	ditto ...	19,962	3·3	30·1	8,091	3·6
22	Trinidad	Trinidad S. 60	ditto ...	23,182	5·3	55·7	18,911	8·4
23	Ditto	Trinidad S. 83	ditto ...	31,944	2·7	39·1	7,717	3·4
24	Ditto	Trinidad S. 202	ditto ...	13,794	6·0	37·0	10,130	4·5
25	Ditto	Trinidad S. 205	ditto ...	8,780	2·1	8·3	2,784	1·2
26	South Africa	Yuban	ditto ..	59,169	2·5	66·9	20,928	9·3
27	New Guinea	No. 3	ditto ...	18,150	4·2	34·7	10,668	4·7
28	Ditto	4	ditto ...	31,581	3·8	54·1	17,896	8·0
29	Ditto	5	ditto ..	30,976	3·1	43·1	16,552	7·3
30	Ditto	6B	ditto ...	26,136	2·1	24·6	8,136	3·6
31	Ditto	7	ditto ...	22,506	3·5	35·1	11,363	5·0
32	Ditto	8A	ditto ...	32,668	4·0	58·9	21,735	9·7
33	Ditto	11	ditto ...	42,592	2·6	50·5	7,710	3·4
34	Ditto	14A	ditto ...	25,168	2·4	27·0	8,002	3·5
35	Ditto	15	ditto ...	27,588	4·8	59·8	24,191	10·8
36	Ditto	17	ditto ...	24,186	2·2	24·2	8,788	3·9
37	Ditto	18	ditto ...	48,400	2·2	48·3	17,261	7·6
38	Ditto	19	ditto ...	28,040	3·1	38·8	13,508	6·0
39	Ditto	22	ditto ...	27,225	4·7	58·2	23,080	10·3
40	Ditto	24	ditto ...	23,232	6·1	63·5	24,901	11·1
41	Ditto	24A	ditto ...	30,096	4·3	58·9	21,537	9·6
42	Ditto	24B	ditto ...	26,862	5·0	60·4	19,944	8·9
43	Ditto	26	ditto ...	34,122	3·4	52·0	13,848	6·1

CROP RESULTS OF VARIETIES, 1904—*continued.*

Serial No.	Country.	No. or Name of Variety.	Age of Cane.	No. of Canes per Acre.	Average Weight of one Stick 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.
44	New Guinea...	No. 32	13 months	21,296	3·8	36·4	14,814	6·6
45	Ditto	35	ditto ...	34,364	2·5	39·7	15,085	6·7
46	Ditto	37	ditto ...	23,595	4·9	52·8	16,092	7·1
47	Ditto	38	ditto ...	32,374	3·7	54·1	18,842	8·4
48	Ditto	39	ditto ...	33,880	3·2	48·7	17,256	7·7
49	Ditto	40	ditto ...	29,040	4·4	57·5	17,950	8·0
50	Ditto	41	ditto ...	15,488	4·6	31·8	10,413	4·6
51	Ditto	47	ditto ...	22,748	3·7	38·3	13,709	6·1
52	Ditto	48	ditto ...	17,908	4·4	35·3	12,963	5·7
53	Ditto	49 (green)	ditto ...	19,360	3·5	30·6	10,853	4·8
54	Ditto	52	ditto ...	31,460	2·9	41·1	12,724	5·6
55	Ditto	54	ditto ...	28,556	3·5	45·7	15,769	7·0
56	Ditto	55	ditto ...	32,670	3·7	55·3	15,608	6·9
57	Ditto	56	ditto ...	27,588	2·9	36·2	12,023	5·3
58	Ditto	60	ditto ...	23,716	3·6	39·0	12,345	5·5
69	Ditto	61	ditto ...	21,780	5·8	56·7	19,377	8·6
60	Ditto	65	ditto ...	30,492	2·7	37·6	14,364	6·4
61	Ditto	66	ditto ...	49,368	2·7	61·8	21,631	9·6
62	Mauritius	Borneo	ditto ...	15,972	1·5	10·7	2,682	1·1
63	Ditto	Galogo C.	ditto ...	21,780	3·7	36·1	12,938	5·7
64	Ditto	Bois Rouge...	ditto ...	39,204	2·9	51·3	21,276	9·4
65	Ditto	Bambou Rouge	ditto ...	21,780	2·3	22·7	6,142	2·7
66	Ditto	Louzier Rouge	ditto ...	33,396	2·9	44·2	14,356	6·4
67	Ditto	Tamarin	ditto ...	29,040	3·7	48·4	17,413	7·7
68	Ditto	Settlers	ditto ...	31,944	3·6	52·3	22,158	9·8

Upon the foregoing results a further advance in the selection of varieties was made. Previous to the final analyses and the obtaining of the weights, some 16 of the varieties of the highest average promise, as indicated by the factors of value, were selected and planted to furnish seed for a final test and competition between the picked varieties of the several countries. By next March (1905), these plantings will be ready, and 10 of the best varieties, as shown by the highest average of qualities, from all countries will be selected and brought into competition for final results. The following table is a recapitulation of the results given by the 10 varieties that will in all probability enter the final competition:—

ANALYSES AND CROP RESULTS OF THE TEN VARIETIES SELECTED FOR FURTHER EXPERIMENTS IN 1905.

Serial No.	Country.	No. or Name of Variety.	Density of Juice (Brix.	Sucrose in Juice.	Glucose in Juice.	Purity of Juice.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.
19	Louisiana	Louisiana Tiboo Mard * ...	16·2	14·33	0·71	91·5	45·8	6·1
22	Trinidad	Trinidad S. 60	18·3	16·96	0·71	92·7	55·7	8·4
32	New Guinea...	No. 8A	19·8	17·74	1·20	89·6	58·9	9·7
35	Ditto	15	20·8	19·71	0·55	94·7	59·8	10·8
40	Ditto	24	20·5	19·60	0·27	95·6	63·5	11·1
41	Ditto	24A	19·8	17·86	1·43	90·2	58·9	9·6
42	Ditto	24B	18·6	16·29	1·42	87·6	60·4	8·9
59	Ditto	64	19·0	16·95	1·31	89·9	56·7	8·6
64	Mauritius	Bois Rouge	22·7	20·69	0·31	91·1	51·3	9·4
68	Ditto	Settlers	21·7	20·88	0·34	96·2	52·3	9·8

* Louisiana Tiboo Mard is not at present as high in position as some excluded varieties. There were circumstances during the recent trials which operated against the variety, and this consideration, with the further one that it is the representative of another country, causes it to be included in the "final tests."

This final series of tests will cover three years, and include plant and first and second ratoon crops.

On reviewing the foregoing tables of results, it is noteworthy and of moment to realise how far the newly introduced varieties have exceeded the older Queensland varieties in agricultural and commercial results.

Certain varieties are not yet free from disease. These are being carefully watched, and the utmost care is being taken in order that no cane leaves the station without a clean bill of health.

NEW WORK IN CANE EXPERIMENTATION

This will include—

(*a*) Continued experiments with canes of the highest promise.
(*b*) The planting of areas of the best varieties for distribution amongst farmers.
(*c*) Experiments in methods of planting and cultivation.

These will include tests in distances between the rows and quantity of seed used, also experiments in different methods of cultivation, with the cost and results.

SUPPLEMENTARY CROPS.

Sorghums.

During the year 1904 competitive experiments were conducted with sorghum varieties, including 6 imported American varieties and the local or common kind. The following table shows the number of crops harvested and the total weight per acre yielded by each variety during twelve months:—

Variety.	Number of Crops Produced in Twelve Months.	Total Weight per Acre Produced in Twelve Months in English Tons.
Giant Honduras	2	50·5
Planter's Friend	3	40·1
Early Orange	3	50·6
Folger's Early	4	55·5
Collier	3	51·4
Coleman	3	48·6
Common	3	42·5

The chemical analyses have shown that the heavy-cropping American varieties of sorghum contain very much less prussic acid poison than the common varieties.

Seed has been collected from all the imported varieties in sufficient quantity to plant out larger areas, and it is hoped before long to have sufficient seed, for distribution amongst farmers, of the best commercial varieties. The effect of deep subsoil cultivation upon the sorghum and other crops has been most marked.

Cassava.

During the year the crop of cassava planted at the station has matured, and has been partly used for pig-feeding. The yield of roots per acre amounted to 12 tons. The roots are chipped up and boiled, the water being carefully run off; cold water is then poured over them, and again run away. This is done in order to remove the prussic acid known to be contained in the cassava, as well as in sorghum and in some other plants. The cut-up roots mixed with molasses have a very high feeding value, and the pigs have done splendidly upon this diet.

Maize.

Unsuccessful attempts have been made to grow maize at the Experiment Station. Two crops have now been tried, and in each case the corn came up well and grew satisfactorily for some time, after which it commenced to die off, and finally failed altogether. These results are in accord generally with local experience in maize production in the district.

Mangoes and Grape Vines.

The mangoes, vines, and other fruits have received the usual care during the year, and are in a good state generally.

Cotton.

In December last some Caravonica cotton seed received from Dr. Thomatis, of Cairns, was planted on a small piece of ground. In all, some 50 trees were left after thinning out. The trees commenced to flower in May, and are still flowering in October. Owing to this irregular maturing, no definite results can be given, save that the trees grew well, and the cotton was clean and apparently free from any disease.

It is the intention of the Director to introduce other agricultural crops upon the station, which may prove to be of value. An account of these will be given at a later time, together with any results that may come to hand.

The following table represents the amount of analytical work performed at the Mackay Experiment Station Laboratory during the fiscal year:—

ANALYSES MADE AT MACKAY SUGAR EXPERIMENT STATION LABORATORY FROM 30TH JUNE, 1903, TO 30TH JUNE, 1904.

Materials, &c.	Number of Samples Analysed.	Number of Analyses.
Sugar-cane for Experiment Station	165	330
Sugar-cane fibres for Experiment Station...	33	66
Sugar-cane for outside growers	61	122
Cane leaves and trash nitrogen and moisture determinations	4	8
Lagoon mud nitrogen determination	1	2
Molasses	1	2
Sugar	1	2
	266	532

In carrying out the general work of experimentation at the Mackay Station, the Director has been very greatly indebted to his Assistant Director, Mr. H. T. Easterby. Mr. Easterby has not only full charge of the field tests, but also the supervision of the laboratory work, and, in addition, he has this year largely assisted the Director in bringing together the actual results of the Experiment Station work set forth in the foregoing paragraphs and tables.

SUB-STATIONS: EXPERIMENTAL WORK.

It was explained in the report of last year that, in addition to the Central Experiment Station at Mackay, several small sub-stations had been established in the sugar districts that were being conducted in co-operation with the farmers of those districts. The conditions upon which these sub-stations were established, and are being conducted, are set forth in the report of 1902-03, on page 23.

Altogether there were 13 actual sub-experimental stations begun, but several of these failed to furnish results, due to several causes, in two instances the farmers asking to be relieved from continuing the work for domestic reasons, and others for other reasons. The 9 sub-stations which brought experiments to maturity and furnished results were as follow:—

No.	Location of Sub-station.	Farmer in Charge.
1.	Mossman River	Exors., Pringle Estate
2.	Mulgrave	Mulgrave Central Mill
3.	Smudown, Johnstone River	Mr. J. Hart
4.	Mundoo, Johnstone River	Mr. R. Reid
5.	Halifax, Herbert River	Anderssen Bros.
6.	Woongarra, Bundaberg	Mr. Smith
7.	Pialba, Bundaberg	Mr. J. B. Stephens
8.	North Isis, Bundaberg	Isis Central Mill
9.	Beenleigh, Logan	Mr. W. Lubach

Certain of these sub-stations have furnished results, with full details of cost of production. These will be given first, after which a concise table will follow showing the crop results obtained upon the experimental plats by deep cultivation and manures, as compared with the results obtained by the farmers by ordinary cultivation alongside of the experimental plat.

SUB-STATION, MUNDOO.

This sub-station consisted of 2½ acres. Two acres, or 4 plats, were ploughed to a depth of 12 inches, and subsoiled to a further depth of 6 to 7 inches, and cross-ploughed three times. The yields of cane were as follow:—

Area.	Cultivation.	Manures.	Tons of Cane.
No. 1. ½-Acre	Deep—Subsoiled	Lime and manure	12·58
No. 2. ½-Acre	Deep—Subsoiled	Manure	12·39
No. 3. ½-Acre	Deep—Subsoiled	Manure	12·49
No. 4. ½-Acre	Deep—Subsoiled	Lime and manure	13·38
No. 5. ½-Acre	Ordinary	...	6·08

The weights were furnished by courtesy of the manager, Mr. Foster, of the Colonial Sugar Refinery Company's mill, Goondi.

The manure was composed of lime phosphate, nitrogen (as sulphate of ammonia), and potash (as sulphate of potash), the cost of which is stated in the "cost of production."

In stating the "cost of production," the whole of the deep and subsoil cultivation is charged against the present crop, although the deep ploughing and subsoiling will benefit the succeeding ratoon crops. The whole of the manure is also charged against the present crop, and one-third of the cost of the lime, lime continuing to have effects for several succeeding crops.

COST OF PRODUCTION PER ACRE.

Cultivation.	Nos. 1 and 4. £	s.	d.	Nos. 2 and 3 £	s.	d.
Ploughings and subsoiling	2	0	0	2	0	0
Putting trash in furrows	0	8	0	0	8	0
Cost of lime (one-third)	1	0	0	...		
Applying lime (one-third)	0	4	0	...		
Cost of manures	3	3	0	3	3	0
Applying manures	0	8	0	0	8	0
Cost of plants	0	12	0	0	12	0
Cost of drilling, cutting, and planting ...	1	10	0	1	10	0
Horse cultivating	0	8	0	0	8	0
Hand cultivation	0	7	6	0	7	6
Trashing cane	0	16	0	0	16	0
Harvesting	3	5	0	3	2	0
Total cost per acre	£14	1	6	£12	14	6

The "cost of production" by the "ordinary cultivation" is not furnished in detail by Mr. Reid.

The following table sets forth the value and cost of the crop per acre:—

VALUE AND COST OF THE CROP PER ACRE.

Experiments.	Weight of Cane per Acre.	Value per Acre.	Cost per Acre.	Profit per Acre.
	Tons.	£ s. d.	£ s. d.	£ s. d.
Nos. 1 and 4	26·0	19 10 0	14 1 6	5 8 6
Nos. 2 and 3	24·8	18 18 0	12 14 6	6 3 6
Farmers' Plat	12·1	9 1 6	8 5 0	0 16 6

In continuation of Mr. Reid's report upon the tests, he says:—"I am perfectly satisfied with the results."

(Signed) RALPH REID.

The Director has to state that Mr. Reid has not only carried out all instructions faithfully, he has throughout shown an enthusiastic interest in the whole question of experimentation and of the restoration of exhausted soils. The land upon which Mr. Reid has carried out these tests, which land was selected by the farmers' association, is one of the poorest soils of the district, and has been exhausted by previous cropping. If in one year, by the aid of deep and thorough cultivation and selected manures, the crop can be more than doubled upon these washed-out and exhausted lands, then the cane farmer has enough inducement to give attention to the restoration and maintenance of the fertility of his soils.

SUB-STATION, SUNDOWN.

The land selected by the farmers' association, Geraldton, for the experiments at Sundown is alluvial, and although it is not better than an average of the locality, yet it is decidedly better than the Mundoo soil with which Mr. Reid experimented.

The actual yields of the several plats, as stated by Mr. Hart, are as follow:—

Area.	Cultivation.	Manures.	Tons of Cane.
No. 1. ½-Acre	Deep—Subsoiled	Manure	12·04
No. 2. ½-Acre	Deep—Subsoiled	Lime and manure	12·85
No. 3. ½-Acre	Deep—Subsoiled	Lime and manure	14·26
No. 4. ½-Acre	Deep—Subsoiled	Manure	11·71
No. 5. ½-Acre	Ordinary	...	10·43

The weights were furnished by courtesy of Mr. Foster, manager of the Colonial Sugar Refinery Company's mill, Goondi.

The cultivation in Mr. Hart's experiments differed from those carried out by Mr. Reid, Mundoo, in so far that the ploughing was only 11 inches and the subsoiling 5 inches, thus giving 16 inches of loose soil against 18½ inches in Mr. Reid's case; also, Mr. Hart gave his land one ploughing less than Mr. Reid, the result being that the difference in cultivation between the experimental plats and the check or farmers' plat in Mr. Hart's case is less than in the case of Mr. Reid. The manures and lime applied to Mr. Hart's experiments were exactly the same as in Mr. Reid's tests at Mundoo.

COST OF PRODUCTION PER ACRE.

Cultivation.	Nos. 1 and 4. £ s. d.	Nos. 2 and 3. £ s. d.
Ploughing and subsoiling	2 10 0	2 10 0
Drilling furrows	0 4 6	0 4 6
Plants	0 14 0	0 14 0
Cutting and planting	0 12 0	0 12 0
Hand cultivation	0 11 0	0 11 0
Horse cultivation	0 7 2	0 7 2
Lime and application	...	1 4 0
Manures	3 3 0	3 3 0
Applying manure	0 8 9	0 8 9
Trashing	0 12 0	0 12 0
Harvesting	2 3 9	2 4 4
	£11 6 2	£12 10 9

VALUE AND COST OF THE CROP PER ACRE.

Experiments.	Weight of Cane per Acre.	Value per Acre.	Cost per Acre.	Profit per Acre.
	Tons.	£ s. d.	£ s. d.	£ s. d.
Nos. 1 and 4	23·8	17 17 0	11 6 2	6 10 10
Nos. 2 and 3	27·1	20 7 0	12 10 9	7 16 3
Farmers' Plat	20·8	15 12 0	8 3 8	7 8 4

In a communication accompanying his report, Mr. Hart says:—"The season has not been at all favourable, owing to the drought in the early part and to the extremely wet season in the latter part (the experimental plats were under water to a depth of over a foot for several days), after which heavy windstorms knocked the cane about badly."

(Signed) J. HART.

The chief damage resulting from the season was the leaching out of the manures when the experimental plats were flooded for a considerable length of time. The effects of the deep cultivation were also lost to some extent by the stagnant flood waters lying upon the ground. Nevertheless, the deeper cultivation and the lime and manures gave a notable increase of cane per acre, although the increase was not enough to make the profit larger than was made by ordinary cultivation. In Mr. Reid's case, the result in favour of the better cultivation was specially striking.

SUB-STATION, HALIFAX.

The Halifax Sub-station furnished results last year. The data now given are the result of the first ratoon crop from the experimental plat from which the plant crop was harvested in the season of 1903. The yield of the first ratoon crop was as follows, the weights being furnished by courtesy of Mr. Forest, manager of the Colonial Sugar Refinery Company's mill, Victoria:—

Crops.	Weight per Acre (First Ratoon).	Total Yields per Acre (Plant and First Ratoon).
	Tons.	Tons.
Experimental Plat	25·9	68·4
Farmers' Plat	17·0	42·0

VALUE AND COST OF FIRST RATOON CROP.

Crops.	Weight of Cane per Acre.	Value per Acre.	Cost per Acre.	Profit per Acre.
	Tons.	£ s. d.	£ s. d.	£ s. d.
Experimental Plat	25·9	25 17 11	15 16 5	10 1 6
Farmers' Plat	17·0	17 0 0	9 9 6	7 10 6

The crop was grown by white labour, and the bonus was 5s. per ton.

(Signed) ANDERSSEN BROS.

Messrs. Anderssen Bros. have carried out the experimental work, covering both the plant and first ratoon crops, exclusively with white labour, as distinguished from Mundoo and Sundown experiments, which were conducted with coloured labour. Anderssen Bros. have shown a careful interest in the tests, and have carried out all requirements faithfully.

SUB-STATION, WOONGARRA.

The land being used by this sub-station was selected by the "Woongarra Farmers' Association," it being decided that the soil was a fair average of the lands of the district.

This station was delayed in being started by reason of the extreme seasons of drought that had prevailed, the land being in a state of severe dryness and as hard as a road.

In speaking of the ploughing, Mr. Pringle, manager for Mr. Smith, the owner of the land, says:—

"The deep ploughing and subsoiling were commenced on 15th May, 1903. The land had, for many years, been ploughed only to a depth of 7 inches. At this depth the old roots of previous cane crops were bunched together on the hard bottom of the old furrows, the roots not having been able to penetrate deeper. By the deep ploughing and subsoiling for the present crop a depth was reached of 18 inches, or 2 inches less than the Director of the Sugar Bureau had instructed; but owing to the hardness of the ground this was the greatest depth that could be reached.

"At the time of furrowing the first acre for planting, the ground was too wet from a recent rain. Going on the land while it was wet had a very bad effect, which has stuck to the crop all through. Owing, also, to the instructions of the Director not being fully carried out, the Hawaiian method of irrigation could not be followed, the result being that the water applied to the irrigated plats lost much of its effect.

"The season has been most unfavourable, there being an excess of cold rain in October and a severe drought during the balance of the growing season. During the hot months of January, February, and March, when the chief growth of the year is made, only 6.9 inches of rain fell, instead of some 30 inches, which is the normal amount.

"The experimental area comprises 3 acres, all of which was deeply cultivated and subsoiled. One-half of the area was irrigated, the other half being non-irrigated.

YIELD OF CANE PER ACRE.

Irrigated cane	30 tons per acre
Non-irrigated	16 ,,

"The cost of production of the irrigated and non-irrigated areas was as follows:—

COST OF PRODUCTION OF THE CROP.

Cultivation.	Irrigated (Cost per Acre.) £ s. d.	Non-Irrigated (Cost per Acre.) £ s. d.
Ploughing and subsoiling	3 16 8	3 16 8
Harrowing	0 1 0	0 1 0
Rolling	0 2 0	0 2 0
Plants	0 12 0	0 12 0
Cutting and planting	1 12 6	1 12 6
Horse cultivation	0 12 0	0 12 0
Hand cultivation	0 11 0	0 11 0
Manure	2 13 4	2 13 4
Applying manure	0 3 4	0 3 4
Trashing	1 2 6	1 2 6
Irrigating	6 2 8	...
Harvesting	4 10 0	2 7 6
	£21 19 0	£13 13 10

VALUE AND COST OF THE CROP.

Crops.	Yield Per Acre.	Value Per Acre.	Cost Per Acre.	Profit Per Acre.
	Tons.	£ s. d.	£ s. d.	£ s. d.
Irrigated Area	30	27 8 5	21 19 0	5 9 5
Non-Irrigated Area	16	14 13 4	13 13 10	0 19 6

(Signed) GEORGE PRINGLE, Manager for A. H. Smith.

As Mr. Pringle has fully explained, the season was extremely unfavourable. The drought was very severe, and from December to April the crop was almost at a standstill when it should have been making its chief growth. Nevertheless, after all the heavy costs of deep ploughing and subsoiling and manures are charged against the crop, a small profit is made even upon the non-irrigated areas. The value of the deep cultivation, as well as that of the manures, still remains in the land. The crop was thirteen months

on the ground, and while it amounted to 16 tons per acre other plant crops of the same age, grown on better land in the locality, were averaging 8 to 9 tons per acre, according to the statement of Mr. Pringle.

There are other sub-stations that have carried out experiments and have furnished the yields, but these have not supplied data enough to enable complete statements to be made. A table is thus given showing the yields per acre of all the sub-station experiment plats with a comparative statement of the results obtained by the farmers by ordinary cultivation side by side of the experiment plats. In considering these comparative results it must be again remembered that the sub-station plats were selected by farmers' associations in the several localities, and that they were selected as representing the average soil fertility of each district. Great care was observed to be sure that soil richer than the average of a district was not chosen. In several localities, such as Mundoo, Pialba, and Mulgrave, soils of the lowest fertility, and which had been cropped and exhausted, were selected for experimental purposes.

GENERAL RESULTS OF INTENSIVE AND ORDINARY CULTIVATION.

Locality of the Sub-stations.	Age of the Crop.	Nature of the Crop.	Intensive Cultivation (Plats of Sub-stations).	Ordinary Cultivation (Farmers' Areas).
			Tons.	Tons.
Mossman	13 months ...	1 Ratoon ...	21·5	14·5
Mulgrave	ditto ...	Plant ...	21·0	11·0
Sundown	17 months ...	ditto ...	25 5	20·8
Mundoo	ditto ...	ditto ...	25·4	12·1
Halifax	13 months ...	1 Ratoon ...	25·9	17·0
Woongarra—				
Irrigated	ditto ...	Plant ...	30·0	19·0
Non-irrigated	ditto ...	ditto ...	16·0	9·0
Pialba	ditto ...	ditto ...	10·5	7 0
Beenleigh	ditto ...	ditto ...	25·3	24·9
North Isis (part irrigated)	ditto ...	1 Ratoon ...	38·2	12·0
Means = ...	...	...	23·9	14·7

The "intensive cultivation" of the experimental plats gave 9.2 tons an acre, or 62½ per cent. greater yield than the "ordinary cultivation" on the farmers' plats. Yet the farmers' plats, being close to the experimental plats, appear to have had somewhat better treatment than the fields in the districts. The farmers' plats gave 14.7 tons per acre, while the average yield per acre of the whole State for the past five years was only 13.2 tons per acre. There is no reason why the yield per acre of Queensland, which is about the lowest in the world, should not be doubled. In the case of Pialba it has already been said that the land experimented with is unusually poor. Moreover, the season was particularly unfavourable in that locality. From August through to the end of March the rainfall was only 17.3 inches, while during the months January, February, and March—the three wet and growing months—the rainfall was merely 4.45 inches, instead of 30 inches. It is necessary to include these results, however, poor as they may be. In the case of Beenleigh, it is seen that the intensive cultivation gave very little better returns than the ordinary cultivation. This was distinctly disappointing. The Beenleigh experimental plat, in its first five months, was more promising than any other. This plat led the ordinary cultivation by fully 2 feet in height of the cane. When the drought set in, the experiment plat, by reason partly of its great growth and the thickness of the crop, suffered from want of moisture severely, and the crop stood still, the ordinary cultivation plat gradually coming up until it nearly equalled the deeply cultivated plat. There is one other special cause of the drying up of the experimental plat during the intense drought. The soil of the experimental plat was not analysed in time to guide the Director in the matter of lime and manures that the soil would require. It was considered certain that nitrogen and potash would be short, and also that lime might be required: the analysis later showed that the first two elements were actually short, but that there was an excess of lime present naturally in the soil. Lime had been applied, however, and it became apparent that the addition of the burnt lime to land already very rich in that element, in the dry season, assisted to dry up the crop. This is an undoubted example showing the necessity of the analysis of the soil going before the application of lime or manures. The example of Beenleigh, and also that of Pialba, indicate that in localities of small and uncertain rainfall, where irrigation is not practised, planting should not be done too thickly. In the cases cited the rows were 5 feet apart, and the sets, of three eyes, 6 inches apart in the rows. In conditions of certain and good rainfall, or where the cane is irrigated, these distances give the largest yield of the highest quality. In those localities of such low average and uncertain rainfall the rows 6 feet apart would probably, one year with another, give the best results. It is better to widen the distance between the rows than the distance between the plants in the row. The distance between plants in the row governs largely the quality of the cane. If the plants are far apart, suckering is more free, and the suckers keep coming throughout the whole period of growth, which results in a very great variation in quality of the sticks, due to their different ages; and this is particularly so if the plant cane is cut while it is relatively young. Thicker and very regular planting in the row induces canes of more uniform quality, which is particularly required by the mill.

The experimental plat in the North Isis, which is managed by the Isis Central Mill, was begun as a means of utilising the waste waters from the mill, the disposal of which waters was threatening the mill with serious litigation, due to the pollution of streams into which it was being turned. On the advice of the Director of the Sugar Bureau, 5 acres of land near the mill were cleared, broken up, and planted with cane, to which the waste waters were applied as irrigation. In respect of this scheme the late manager, Mr. Desplace, reported to the company as follows:—

"The experimental block has been very satisfactory, and not only as a means of disposing of the refuse water of the mill, but also as a cane-producing plat; the vigorous growth of the cane being very remarkable. In the beginning of the experiment I noticed that the waste water which had stood over from Saturday till Monday morning had a bad effect upon the cane, which was traced to the sourness of the water; this was corrected by use of lime." According to Mr. Desplace, the cost of erecting pump and pipes to convey the water to the experimental block was £266 6s. 8d.; the cost of falling, clearing, fencing, breaking up, cultivating, planting, irrigating, and harvesting since 1901 to 1904 was £159 18s. 5d., making a total expenditure upon the block of £426 5s. 1d. The value of the cane sold last year, with the value of the heavy crop being harvested this year, is expected to go far towards covering all expenditures, after which the scheme, if it is properly managed, will continue to get rid of the waste water nuisance free of cost, and also leave a margin of profit from the cane produced upon the experimental area.

Tests were made with manures, with ordinary cultivation, by Mr. T. H. Wells, Childers, but without any positive result. The experience at Childers is in harmony with the results obtained in other dry localities, and particularly upon the red soils. At the Woongarra Sub-station the manures did not give paying results, except with irrigation; while the deep cultivation produced very notable increases of crop. At the Mackay Experiment Station, in the report of last year, it was shown that, while deep and subsoil cultivation almost doubled the crop over ordinary cultivation, the manures merely paid for themselves, but left no profit. The deep and thorough cultivation brings so large a quantity of plant food, in an available form, within reach of the crop that applied fertilisers have but little effect for the present, unless irrigation is applied, when, as the Mackay experiments showed, the manures become much more vitally operative. As larger crops are taken off, and especially by the aid of irrigation, then the crops will cry out for more potash, nitrogen, and lime than are found in an available condition even in the red soils and in districts of low rainfall. In the Northern districts, of heavy rainfall and leached soils, not only deeper cultivation, but also manures and lime, in most instances, are giving immediately notably good results. Where the rainfall is very low, and irrigation is not practised, it is very questionable whether manures, in the average of years and of crops, will pay. The soils are not leached (excepting on acute hill slopes) as in the wet districts, and the small and irregular crops do not draw on those lands as in districts where the crops are of annual regularity and size, so that applied manures are in less demand. Water is the primary need; but when water, as irrigation, is applied, then the need will follow for applied manures, and the regularity of moisture for the crop will enable them to operate and pay.

RESULTS OF DEEP CULTIVATION BY INDIVIDUAL FARMERS.

In addition to experiments in deep and subsoil cultivation made at the Mackay Central Station, and at the sub-stations already cited, tests have been carried out to prove the value of deep cultivation by individual farmers, and altogether without any aid from the Sugar Bureau more than the suggestion that such trials should be made. The farmers who have made these trials have sent in the results to the Sugar Bureau, and the Director has a very special satisfaction in giving their statements a place in this report, since the enterprise and personal initiative of these progressive cultivators form one of the most powerful aids in bringing the value of modern and thorough methods of cultivation to be recognised. The results are given in the words of the farmers themselves, who have furnished them to the Bureau:—

(*a*) "In reply to the inquiry of the Sugar Bureau, the following statement was received:—"We beg to say that our expectations have been fully realised as to the quantity and quality of the yield of cane from deeply cultivated land. We are harvesting twenty-two months old cane grown upon land which was ploughed and subsoiled to a full depth of 16 inches, and the average yield, so far, is 65 tons to the acre. No manure was used, and the rainfall during the period of growth was only moderate.

(Signed) "BLISSETT AND HART, Goodwood.

"23rd September, 1904."

(*b*) "There are crops planted at the same time as mine, and were planted in almost new ground, which are no better than mine which was planted in ground that has been cropped for years. The deep cultivation has made the old land young again.

(Signed) "W. H. BATES, Cordalba.

"8th October, 1904."

(*c*) "Deep ploughing and subsoiling have proved a great success in the Isis. We planted 30 acres in October, 1902, and cut it in 1903, which gave 20 tons per acre, and you know what a very dry season it was; and now we have cut the first ratoon crop, which has given us 17 tons per acre in another rather dry year. The land was ploughed three times, and to a depth of fully 14 inches. Of course it is expensive to cultivate deep; but the deep cultivation gave us the first year an increase of 5 tons per acre, and the second year (without extra expense) an increase of 2 tons an acre over ordinary working.

(Signed) "GAUT AND BRAND, Isis.

"14th October, 1904."

(*d*) "I wish to say to you that I am perfectly satisfied that what deep cultivation has been done on my place has increased the yield. I have not yet cut the crop of this year, excepting a piece of 7 acres that was twenty-one months old. The yield from that piece was 279 tons, or 39.8 tons per acre. My son has gone in for some deep cultivation, and he says the way to get good crops is by subsoiling and deep cultivation, which I am following.

(Signed) "THOMAS E. BARNES, North Isis.

"27th September, 1904."

(*e*) "The deep cultivation that I have done here, I beg to say I am quite satisfied with results of the same. I subsoiled during the drought of 1902, and planted early in October of same year. It yielded exactly 20 tons per acre at thirteen months old, this yield being 5 to 6 tons per acre a better crop than other cane planted at the same time around here. The crop on same piece of land grew a great deal better than ordinarily cultivated cane this year, and the ratoons of the deep cultivated ground will go several tons more than ordinary cultivation. The bigger crop on the deeply cultivated ground requires getting off early, as it dries up quicker than the lighter crop, because it has grown quicker and is softer.

(Signed) "A. ADIE, North Isis."

(*f*) "I have much pleasure in sending results of my deeper cultivation of cane grown this year. The block is 8¼ acres, was ploughed and subsoiled to a depth of about 12 inches only, as we were short of horse power, and could not go deeper, the ground being very dry and hard. Notwithstanding the eight weeks of dry weather during January and February (the growing months), the cane grew well, and it has cut 22 tons 5 cwt. to the acre, with an estimated loss of 3 tons to the acre on account of frost. The crop was planted in July, 1903, and was about thirteen months old.

(Signed) "JAMES KIRKE, Gin Gin.

"13th October, 1904."

(*g*) "I am afraid that I have not done what you would call deep cultivation, but I will give you a short description of a small experiment tried by me last year. Two blocks of land were ploughed:—

"No. 1 block was ploughed about 10 inches. The drills, after being marked out, had a subsoiler run twice along each drill, reaching a depth of 14 inches from the surface. This block when cut yielded 24 tons per acre.

"No. 2 block was ploughed to a depth of nearly 7 inches, and the cane was planted without the use of the subsoiler. This block, when cut, gave 11 tons to the acre. This small yield was partly due to its being heavily frosted, and not being harvested in due time. I am well satisfied with my small experiment, and shall most certainly subsoil any land in future before planting.

(Signed) "W. H. BARNES, Gin Gin.

"14th October, 1904."

Some few other statements upon deep cultivation have been made, but the publication is confined to written accounts of trials and results.

The written statements just produced are of particular value and importance. The number, however, is very small, and if it is taken to represent the proportion, out of the 2,600 farmers, who are growing cane in the State, then there is just ground for grave dissatisfaction. A serious responsibility rests upon the cane farmers, and this will become apparent in due time, when it will have to be recognised and felt. For it has now to be admitted what great possibilities and, in fact, actual certainties will follow cane cultivation in Queensland if the methods which produce large crops in other countries are put into general practice in this country. The central station at Mackay has shown that the yield of cane per acre in Queensland can be doubled, and without any other means than are in common practice in the most progressive cane-growing countries. The sub-stations, where the trials, though planned by the Sugar Bureau, are carried out by local farmers, have not only demonstrated in several localities what can be done, they have actually resulted in raising the yield per acre more than 60 per cent. above the yield of ordinary cultivation in those localities, and 80 per cent. above the average yield of the cane crop in Queensland for the past five years. And, in addition to these proofs, individual farmers, cultivating notable areas, have, by their own unaided enterprise, given further and final demonstration of what can be done to raise the producing power of the land. If these farmers have done these things, then other farmers can do them if they will determine to follow the same advices and adopt the same methods that these successful cane farmers have adopted with such signal success and satisfaction. These successful farmers have understood that while they are advised and instructed in modern scientific methods it rests with them to put those methods into operation. The scientist cannot go into the fields and do every man's work for him. The farmer himself has to do that. During the past fifteen years Louisiana has raised its yield per acre from 15 tons to nearly 30 tons; Hawaii from 25 tons to over 40 tons per acre; and Java from 20 tons to approaching 40 tons per acre. Science and experimentation have introduced the methods and opened the way to those great achievements; but it has been the planters and farmers in the field, and as a body, who have actually brought these achievements about.

"Manufacture," and all the matters relating thereto, which it was indicated in the report of last year would be dealt with this year, will be exhaustively dealt with at a later time, the results of which will appear in the first report of the "Bureau of Central Sugar Mills."

ECONOMIC.

The sugar crop of 1903 was greater than the crop of 1902 by 15,202 tons.

The area of cane cultivated in 1903 was 111,516 acres, the second largest area on record.

The area of cane crushed and manufactured in 1903 was 60,375 acres, giving a yield of 823,875 tons of cane and 91,828 tons of sugar.

The yield per acre in 1903 was 13.65 tons of cane and 1.52 tons of sugar.

PRODUCTION IN THE THREE DISTRICTS.

Districts.	Cane Produced (English Tons).	Sugar Produced (English Tons).
(1) Southern (Bundaberg)	196,007	19,062
(2) Central (Mackay)	258,496	28,433
(3) Northern (Cairns)	369,372	44,333
Totals	823,875	91,828

It is thus seen that over 79 per cent. of the total sugar grown by the State was produced in the Mackay and Northern districts, the Northern district producing 48.2 per cent. of the output of the State.

It has been stated that the area of cane crushed in 1903 was 60,375 acres out of a cultivated area of 111,516 acres, leaving 51,141 acres of uncrushed cane, which residue would provide a large proportion of standover cane with which to begin the crushing of the current year, 1904. That residue is already entering manufacture, and the tonnage to be crushed in 1904 will be the second largest on record.

RELATIVE PROPORTIONS OF CANE EARNING REBATE OF FEDERAL EXCISE IN 1903.

Districts.	Tons of Cane Harvested by Coloured Labour.	Tons of Cane Harvested by White Labour.	Rebate of Excise Received.
			£
Southern (Bundaberg)	121,144	74,863	16,228
Central (Mackay)	157,763	100,733	24,811
Northern (Cairns)	332,851	36,521	9,415
Totals	611,758	212,117	50,454

These data are furnished by the State statistician, and they show that, in 1903, 25.7 per cent. of the total cane crushed was harvested by white labour, as compared with 16.5 per cent. in the year 1902.

THE RELATION OF THE SUGAR INDUSTRY TO THE STATE.

In preceding reports data have been published showing the value and importance of the sugar industry to the State, and to determine its place as an article of export, compared with the exports of other agricultural crops, and with the net exports of all articles of consumption.

ESTIMATED VALUE OF THE SUGAR CROP OF 1903.

Volume of crop, 91,828 tons.

	£
Value of exported sugar and molasses	647,558
Value of sugar reserved for home consumption	451,199
Value of uncrushed cane	409,000
Value of cane feed, molasses, &c.	120,000
	£1,627,757

These figures deal only with the total production of the crop of 1903, and do not include reserve stocks from the crop of 1902.

The money value of "exported sugars" is, in the first place, governed by the volume exported; it is also very largely determined by the circumstance, viz., whether the sugars are exported as "raws" or as "refined sugars." Data appear not to be to hand clearly showing the volumes of raw sugars and refined sugars respectively which are exported, with the relative total values and their respective values per ton.

1.—EXPORT VALUE OF THE SUGAR CROP IN RELATION TO THE VALUE OF OTHER CROPS AND PRODUCE, INCLUDING DAIRY PRODUCTS.

Crop, 1903.	Imports.	Exports.	Balance of Imports.	Balance of Exports.
	£	£	£	£
Grain, fruit, vegetables, &c.	1,551,581	198,891	1,352,640	
Dairy products	87,074	52,004	35,070	
Sugar and molasses	799	648,357	...	647,558

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

	Net Exports.
	£
Meat and extracts	892,134
Cattle, sheep, pigs	290,401
Crop and other edible produce	32,396
Sugar and molasses	617,558

It is seen from the preceding tables—

(1) That of all crops of the State, including dairy produce in 1903, sugar commanded the whole net exports, or 100 per cent.

(2) That the exports of sugar, as part of the net exports of meats, extracts, cattle, sheep, pigs, and all other edible produce of the State amount, in 1903, to 34.7 per cent.

The significance of corresponding figures having a bearing upon the relation of the sugar industry to the industrial condition and wellbeing of the State and of the Commonwealth was carefully commented upon in the report of 1902. It is not necessary to repeat those observations. The figures recorded in the above tables also carry with them their own comment.

CANE CRUSHED AND ASSESSMENTS PAYABLE THEREON, AT THE RATE OF ONE PENNY PER TON, FOR THE YEAR 1903.

Tons of Cane.	Name of Mill.	Total. Dr. £ s. d.	Total. Cr. £ s. d.	Overpaid. s. d.	Short Paid. s. d.
19,646	Plane Creek	81 17 2	81 17 4	0 2	0 0
7,287	Benowa	30 7 3	30 7 2	0 0	0 1
2,059	Goodwood	8 11 7	8 11 8	0 1	0 0
46,355	Fairymead	193 2 11	193 2 11	0 0	0 0
21,784	Mourilyan	90 15 4	90 15 4	0 0	0 0
11,855	Isis Central	49 7 11	49 7 10	0 0	0 1
21,069	Bingera	87 15 9	87 15 9	0 0	0 0
21,621	Racecourse Central	90 1 9	90 1 9	0 0	0 0
8,415	Meadowlands	35 1 3	35 1 2	0 0	0 1
5,550	Qunaba	23 2 6	23 2 6	0 0	0 0
4,828	Waterview	20 2 4	20 2 4	0 0	0 0
2,974	Sunnyside	12 7 10	12 7 10	0 0	0 0
268	Waterloo	1 2 4	1 2 4	0 0	0 0
38,930	Childers	162 4 2	162 4 2	0 0	0 0
28,316	Homebush	117 19 8	117 19 8	0 0	0 0
39,516	Victoria	164 13 0	164 13 0	0 0	0 0
51,844	Macknade	216 0 4	216 0 4	0 0	0 0
68,523	Goondi	285 10 3	285 10 6	0 3	0 0
53,36[illegible]	Hambledon	222 7 0	222 7 0	0 0	0 0
62,211	Pioneer	259 4 3	259 4 4	0 1	0 0
24,431	Pleystowe	101 15 11	101 15 11	0 0	0 0
18,520	Ripple Creek	77 3 4	77 3 4	0 0	0 0
3,527	Alberton	14 13 11	14 13 10	0 0	0 1
1,130	Miara	4 14 2	4 14 2	0 0	0 0
18,210	Moreton Central	75 17 7	75 17 7	0 0	0 0
70,274	Mossman Central	292 16 2	292 16 2	0 0	0 0
4,546	Palmyra	18 18 10	18 18 10	0 0	0 0
45,553	Mulgrave Central	189 16 1	189 16 0	0 0	0 1
2,962	Spring Hill	12 6 10	12 6 10	0 0	0 0
7,917	Doolbi	32 19 9	32 19 8	0 0	0 1
952	Rosevale	3 19 4	3 19 3	0 0	0 1
2,590	Eagleby	10 15 10	10 15 9	0 0	0 1
7,865	Mount Bauple Central	32 15 5	32 15 4	0 0	0 1
17,658	Marian Central	73 11 6	73 12 5	0 11	0 0
31,346	The Palms	130 12 2	130 12 2	0 0	0 0
25,864	Proserpine Central	107 15 4	107 15 4	0 0	0 0
5,740	Rocky Point	23 18 4	23 18 4	0 0	0 0
3,522	Steiglitz	14 13 6	14 14 3	0 9	0 0

CANE CRUSHED AND ASSESSMENTS PAYABLE THEREON, AT THE RATE OF ONE PENNY PER TON, FOR THE YEAR 1903—*continued.*

Tons of Cane.	Name of Mill.	Total.	Total.	Overpaid.	Short Paid.
		Dr. £ s. d.	Cr. £ s. d.	s. d.	s. d.
1,368	Albert River Sugar Co., Beenleigh	5 14 0	5 13 10	0 0	0 2
14,709	North Eton Central	61 5 9	61 5 8	0 0	0 1
825,100		3,437 18 4	3,437 19 7	2 3	1 0
	Tegege, account Season 1901	...	1 0 8		
	Rosevale, overpaid	...	3 19 4		
			3,442 19 7		

MILLS WHICH DID NOT CRUSH.—Kalbar, Rockholme, Woondooma, Annesley, Invicta, Pemberton, Knockroe, Albionville, Maryborough, Oakwood, Sharon, Bonna, Ashfield, Gin Gin, Seaview, Windermere, Woodlands, Ashgrove, Tegege, Yeppoon, Mount Cotton, Belle Vue, Habana, Farleigh, Nindaroo, Kalamia.

STATEMENT OF EXPENDITURES FOR THE YEAR ENDING 30TH JUNE, 1904.

	£ s. d.
Salaries	4,225 6 6
Wages	495 11 3
Travelling expenses—Dr. Maxwell	372 15 0
,, Penny, J.	89 0 0
,, Anderssen, A. E.	31 10 9
,, McCready, L. C.	15 10 6
,, Other officers	10 15 7
Freights, passages, railway travel, &c.	227 18 2
Horse and buggy hire—Dr. Maxwell	28 5 0
,, Other officers	62 18 6
Chemicals and apparatus	210 14 1
Stamps, petty cash, &c.	141 13 2
Stationery	16 0 4
Gas	55 18 6
Manures (Mackay and sub-stations)	113 14 0
Printing and advertising	92 7 2
Tools, implements, &c.	49 10 1
Library	25 5 11
Repairs (carpenter, blacksmith, &c.)	25 3 1
Exchange	11 7 3
Rates	14 6 9
Purchase stock	13 9 0
Furniture	17 14 1
Farmers' meetings	20 5 0
Timber	35 12 9
Fencing	4 8 6
Fuel	3 13 6
Fodder	2 7 5
Sundries	44 19 0
Refund over-payment, Rosevale Mill	3 19 4
	£6,462 0 2

STATEMENT OF RECEIPTS FOR THE YEAR ENDING 30TH JUNE, 1904.

	£ s. d.	£ s. d.
Assessments (gross)		3,442 19 7
Endowment assessment	3,442 19 7	
Less overpayment	3 19 4	
		3,439 0 3
Sale of cane, Mackay		110 18 3
Rebate on white-grown cane, Mackay		34 10 1
Other collections		124 0 6
		£7,151 8 8
Total collections for year		£7,151 8 8
Total expenditure for year...		6,462 0 2
Balance		£689 8 6

The receipts and expenditure of the Treasury Trust Fund from date of inception to 30th June, 1904, as per statement of Audit Inspector, have been:—

RECEIPTS.

	£ s. d.	£ s. d.
Advanced by Treasury—		
1900-1	4,000 0 0	
1901-2	4,057 0 0	
Endowment—		
18th November, 1902	4,909 0 0	
27th October, 1903	2,670 19 5	
		15,627 19 5
Assessments paid		11,033 13 11
Other receipts—		
Cane, &c., sold	185 4 11	
Refund Dr. Maxwell's expenses to Melbourne	115 0 0	
Rebate on white-grown cane ...	34 10 1	
		334 15 0
		£26,996 8 4

EXPENDITURE.

	£ s. d.	£ s. d.
1900-1	3,292 11 2	
1901-2	6,722 6 4	
1902-3	6,541 12 4	
1903-4	6,462 0 2	
		23,018 10 0
Balance, 30th June, 1904		£3,977 18 4

The amount advanced by the Treasury, £8,057, has not yet been repaid.

As shown in the statement of the Audit Inspector, the balance in hand on 30th June, 1904, was £3,977 18s. 4d.: to this amount is added the endowment due from the Consolidated Revenue, being £1 per £1 of assessments collected upon the crop, which is shown as follows:—

	£ s. d.
Balance on hand	3,977 18 4
Endowment due	3,439 0 3
	£7,416 18 7

As shown by the Audit Inspector's statement, there is an amount of £8,057 owing to the Treasury, being the sum of the advances made from the Consolidated Revenue to initiate the work of the Bureau of Sugar Experiment Stations. No part of this advance has yet been repaid, due to small crops during the past two years. As the salary of the Director is henceforth wholly paid out of Consolidated Revenue, it is now possible to make a first repayment of the original advance from the Treasury, which will be affected as follows :—

	£	s.	d.
Original advance from Consolidated Revenue	8,057	0	0
First repayment of advance from the Consolidated Revenue	3,557	0	0
Balance due to Consolidated Revenue	£4,500	0	0

The collection of assessments due upon the crop now being crushed, with the endowment, will enable the whole of the balance due to Consolidated Revenue to be paid off next year, after which the assessments for maintaining the work of the Bureau of Sugar Experiment Stations can be reduced by one-half.

Price 1*s.* 1*d.*]

By Authority : George Arthur Vaughan, Government Printer, William street, Brisbane.